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Book of Abstract

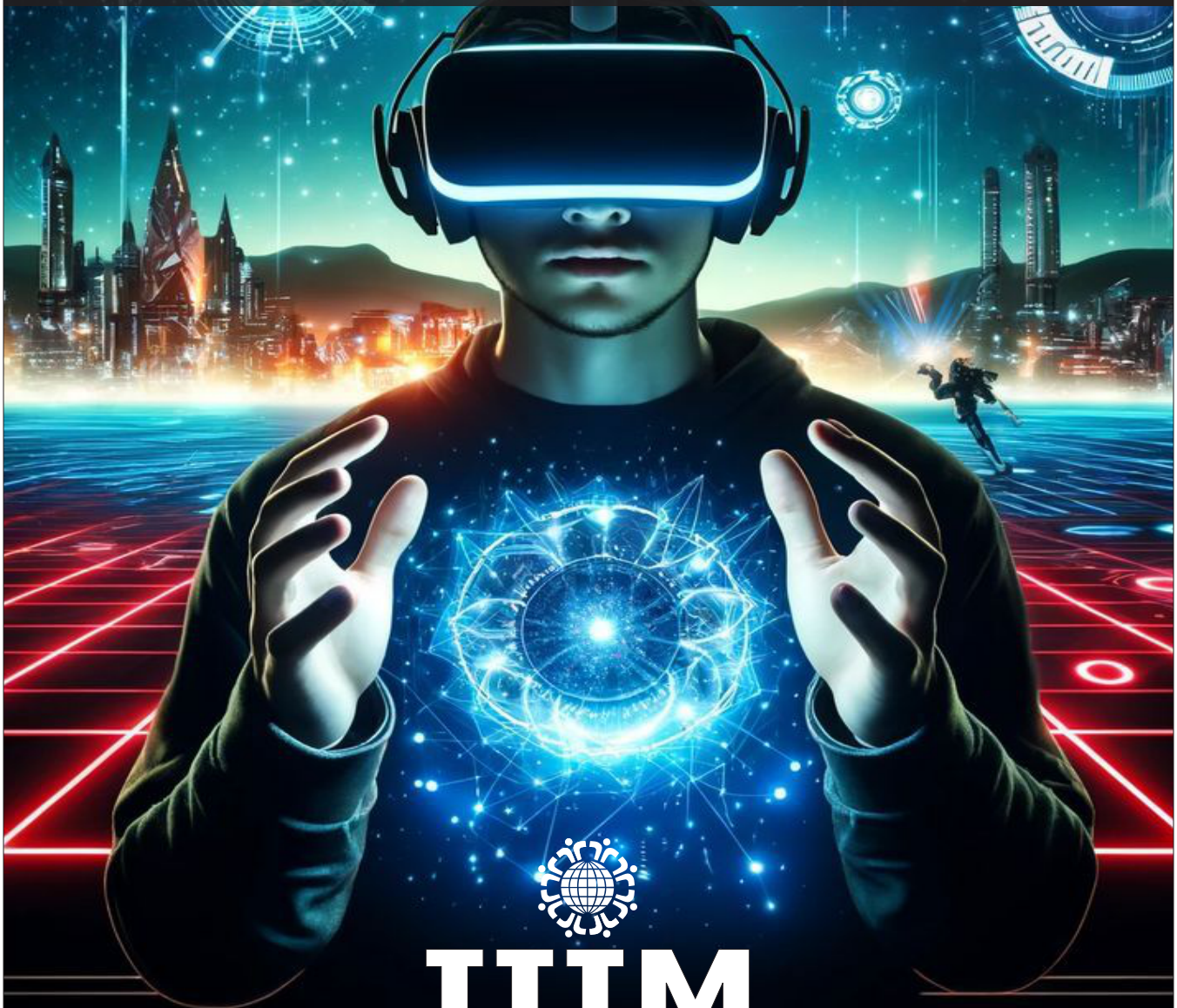
ICMIT 2025

International Conference on Management & IT

Harnessing Metaverse & Data Analytics:

Redefining IT & Business Approaches

12-13 September 2025



IIIM
INTERNATIONAL SCHOOL OF INFORMATICS & MANAGEMENT
Mansarovar, Jaipur

15th ICMIT-2025

12-13 September, 2025

ABOUT THE CONFERENCE

The digital landscape is undergoing a seismic shift as the Metaverse and Data Analytics converge to redefine how businesses and IT operate. The Metaverse—an immersive, interconnected digital universe—is no longer a futuristic concept; it is rapidly becoming a viable platform for commerce, collaboration, and customer engagement. Simultaneously, Advanced Data Analytics is empowering organizations to make real-time, data-driven decisions with precision.

The convergence of the Metaverse and advanced data analytics is catalyzing a transformative shift in the operational paradigms of both information technology and modern business practices. Together, these technologies are nurturing a new era where physical and digital interactions seamlessly intertwine, creating opportunities for innovation and competitive advantage. Businesses are exploring virtual storefronts, interactive customer service avatars, and immersive product demos, transforming how they interact with customers and stakeholders.

This International Conference aims to explore the intersection of immersive virtual environments and intelligent data-driven decision-making. It will provide a comprehensive and technically rigorous platform to examine how these two cutting-edge domains are reshaping digital infrastructures, organizational models, customer engagement strategies, and data governance frameworks.

ICMIT 2025 shall bring together industry leaders, academicians, researchers, and professionals to a dynamic platform for exchanging visionary insights, pioneering solutions, and proven strategies on leveraging the power of the Metaverse and Data Analytics to accelerate organizational transformation and redefine digital engagement.

OBJECTIVES

- To discuss how organizations can integrate metaverse and data analytics solutions into their core strategies.
- To propose adaptable frameworks that guide organizations in transitioning from legacy systems to metaverse-ready and analytics-driven architectures.
- To highlight the importance of data privacy, security, and ethical considerations in managing large-scale data generated in virtual ecosystems
- To present successful real-world implementations of metaverse technologies and advanced analytics in various Industrial Sectors.
- To define appropriate KPIs and measurement frameworks for evaluating the impact and ROI of metaverse and data analytics initiatives.
- To advocate for the development of policies, standards, and regulatory frameworks governing the use of the metaverse and data analytics technologies.
- To investigate the Cyber Security vulnerabilities and solutions specific to immersive and data-intensive digital platforms

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सत्यमेव जयते

CHIEF MINISTER
RAJASTHAN

Message

I am glad to know that the International School of Informatics and Management, Jaipur is organizing the International Conference on Management and IT (ICMIT-2025) on the theme "Harnessing Metaverse and Data Analytics."

For Rajasthan, which is steadily moving towards a digital-first economy, such deliberations are both timely and inspiring. I believe that this conference will provide a vital platform for industry leaders, researchers, academicians, and policymakers to come together, reflect on emerging challenges, and explore strategies to ensure that technology remains inclusive, ethical, and citizen-centric.

I congratulate the organisers for coming up with a conference on such a contemporary issue in the domain of data science.

I wish the event great success.

(Bhajan Lal Sharma)

Dr. Prem Chand Bairwa
Deputy Chief Minister
Government of Rajasthan

सत्यमेव जयते

Technical Education, Higher Education,
Ayurveda, Yoga & Naturopathy, Unani,
Siddha & Homeopathy (Ayush),
Transport & Road Safety Department

Message

Date: 25/08/2025

I am happy to know that I International School of Informatics & Management, Jaipur is organizing an International Conference on *"Harnessing Metaverse & Data Analytics"* on 12-13 September 2025, in Jaipur.

I am sure the conference will address important issues relevant to the conference theme and capture key- takeaways about the future dimensions of Metaverse and Data Analytics. Nonetheless, it will give an opportunity to the young researchers to express themselves in a meaning full way. I wish success to the conference.

(Dr. Prem Chand Bairwa)

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Ph. No. 0141-2227852, E-mail: dcm.drpcbairwa@rajasthan.gov.in

प्रो. (डॉ.) भगवती प्रसाद सारस्वत
कुलगुरू

Prof. (Dr.) Bhagwati Prasad Saraswat
Vice Chancellor

राजस्थान तकनीकी विश्वविद्यालय, कोटा

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

No: RTU/VCS/F(1)/26/2025/

Date: 01.09.2025

MESSAGE

It is a pleasure to know that International School of Informatics & Management, Jaipur is organising and international conference on the theme *"Harnessing Metaverse and Data Analytics"* on 12th -13th September 2025 in Jaipur.

I believe that the endeavour by the organizers will result in broadening the horizons in the domain of Metaverse and Data analytics. I am hopeful that the symposium will motivate the participants to contribute further in this field.

I wish all success to the event.

(Prof.(Dr.) Bhagwati Prasad Saraswat)
Vice-Chancellor

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कुलदीप रांका
आई.ए.एस.
Kuldeep Ranka
I.A.S.

सत्यमेव जयते

अतिरिक्त मुख्य सचिव
उच्च एवं तकनीकी शिक्षा विभाग
राजस्थान सरकार
Additional Chief Secretary
Higher & Technical Education Department
Government of Rajasthan

Message

I am glad to know that International School of Informatics and Management is organising an international conference on *"Harnessing Metaverse & Data Analytics"* on 12-13 September 2025 at its campus in Jaipur.

I am hopeful that the conference will be immensely helpful for the participants. Equally, it will augment the knowledge of researchers whose domain of interest is Data Analytics and Metaverse.

I wish the event a grand success.

(Kuldeep Ranka,IAS)
Additional Chief Secretary
Higher & Technical Education
Government of Rajasthan

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डॉ. ओम प्रकाश बैरवा, भा.प्र.से.
Dr. Om Prakash Bairwa, I.A.S.

सत्यमेव जयते

आयुक्त
कॉलेज शिक्षा विभाग
राजस्थान सरकार
Commissioner
College Education
Government of Rajasthan

Message

I am delighted to congratulate the International School of Informatics & Management (IIIM), Jaipur, for organizing the International Conference on Management and IT (ICMIT-2025) on the theme "Harnessing Metaverse and Data Analytics: Redefining IT & Business Approaches." This initiative underscores IIIM's commitment to academic excellence and innovation.

The conference's focus on metaverse and data analytics is timely, offering a platform for global scholars and researchers to exchange ideas and address digital transformation challenges. IIIM's consistent Category 'A' rankings and national recognition reflect its dedication to shaping future leaders.

I wish the organizers and participants a successful and inspiring conference, fostering innovative solutions and collaborations.

With best wishes,

Dr. Om Prakash Bairwa
Commissioner, Department of College Education
Government of Rajasthan, Jaipur

ब्लॉक नं. 4, डॉ. आर. के. शिक्षा संकुल, जे.एल.एन. मार्ग, जयपुर-302017 (राज.)
Block No. 4, Dr. R.K. Siksha Sankul, J.L.N. Marg, Jaipur-302017 (Raj.)
Phone : 0141-2706847, E-mail : cce_raj@yahoo.com, commissioner.cce@rajasthan.gov.in

WELCOME NOTE

It is my pleasure to welcome you all to the conference on Harnessing Metaverse and Data Analytics – Redefining IT and Business Approaches. We meet at a time when organizations everywhere are grappling with the demands of digital transformation, and the opportunities before us are immense.

The metaverse and data analytics are reshaping the way we think about customer engagement, business models, and decision-making. Yet, innovation brings with it responsibility. As we adopt immersive and data-rich platforms, we must also ask: how do we protect privacy, secure trust, and ensure technology serves people rather than the other way around?

This conference is designed to spark meaningful dialogue on these pressing issues. Together, we will learn from real-world implementations across diverse industries, examine adaptable frameworks for transition, and explore new benchmarks for evaluating impact and return on investment. At the same time, we must not ignore the vulnerabilities inherent in immersive platforms—cybersecurity, regulation, and trust must remain at the center of all innovation.

Over the coming sessions, you will hear from experts who are not only theorizing but already applying these technologies in manufacturing, education, healthcare, and beyond. You will also see how frameworks, policies, and measurable outcomes can be designed to make innovation sustainable.

I invite each of you to use this conference as more than a learning space—see it as a chance to build new connections, exchange ideas, and challenge conventional wisdom. Together, we can define the path forward for IT and business in a metaverse-enabled world.

Welcome, and let us make this conference a success.

Amit Gupta
Chairperson

ABOUT THE CONFERENCE

Welcome to the 15th Annual International Conference in Management and Computer Science, organized by International School of Management & IT (Popularly known as IIIM), on the theme **"Harnessing Metaverse and Data Analytics: Redefining IT and Business Approaches."**

As the world steps into a new era of immersive technologies and intelligent data ecosystems, the Metaverse and analytics are no longer futuristic concepts but transformative forces shaping how enterprises innovate, collaborate, and create value. This conference comes at a defining moment, when India is accelerating its vision of becoming a $5 trillion digital economy, with technology as its primary catalyst.

By convening global experts, thought leaders, researchers, and practitioners, this platform seeks to reimagine the intersections of IT and management in light of these trailblazing advancements. The deliberations here will open windows into pioneering research, path-breaking applications, and agile business models that leverage the power of the Metaverse and data intelligence to navigate complexity and unlock unprecedented opportunities.

At IIIM, we believe that true education is a launchpad where curiosity meets practice, and where innovation, inspiration, and impact converge. With that spirit, I wish this conference meaningful dialogues, visionary collaborations, enriching research outcomes, and enduring contributions to the continuum of knowledge and practice, as we collectively shape tomorrow's digital frontiers.

Prof. Roopa Mathur
Director

INTRODUCTION

The theme of this year's conference—Harnessing Metaverse and Data Analytics: Redefining IT and Business Approaches—reflects the growing convergence of immersive environments and data-driven intelligence in today's enterprises.

Our objectives are clear. First, to examine how organizations can embed metaverse and analytics solutions into their strategies. Second, to share frameworks that enable the shift from legacy systems to architectures designed for interactivity, scalability, and intelligence. Third, to highlight the importance of privacy, ethics, and regulatory safeguards in managing the vast data generated by these new ecosystems.

Data remains at the heart of this transformation. As enterprises collect information from both physical and virtual touchpoints, questions of privacy, security, and ethics take center stage. The conference dedicates space to discussing regulatory frameworks and policy guidelines that safeguard both businesses and users in this evolving landscape.

Alongside these discussions, we will hear case studies from industries that are already experimenting with virtual environments and advanced analytics. Their successes and setbacks provide valuable lessons for others preparing to embark on similar journeys.

The conference also addresses the critical question of measurement. Defining KPIs and ROI models is essential if investments in metaverse and data analytics are to be more than experiments. Equally essential is the discussion on cybersecurity—because without robust safeguards, the promise of immersive platforms cannot be realized.

This gathering is designed not just as an academic exercise, but as a forum where theory meets practice, and where strategy aligns with real-world application. Over the next two days, our collective task is to map out approaches that are innovative yet responsible, ambitious yet grounded.

To sum up, this introduction sets the stage for a conversation that is as much about shaping future possibilities as it is about addressing present realities.

Prof. Manju Nair
Convenor

EDITORS' NOTE

In compiling this year's proceedings, one thing has become clear: the conversation around the metaverse and data analytics has shifted from "if" to "how." Organizations are no longer asking whether these technologies matter. They are asking how to integrate them responsibly, effectively, and with measurable outcomes.

The papers and discussions in this collection reflect diverse perspectives—academic research, industry case studies, regulatory viewpoints, and technological insights. Taken together, they highlight three recurring themes: the urgency of transition from legacy systems, the centrality of data ethics and security, and the need to define meaningful KPIs that move beyond hype to measurable value.

You will see frameworks that help businesses move beyond legacy systems, case studies that prove adoption is already underway, and critical discussions on security, privacy, and ethics. These contributions do not aim to provide definitive answers. Rather, they lay out pathways and provoke the questions that will shape our next steps.

These proceedings show what has worked, what has not, and what remains uncertain. And in doing so, they encourage us to engage critically with the realities of immersive platforms and analytics-driven strategies.

I encourage you to read, reflect, and critically engage with these materials. Use them as reference points in your own journey of integrating metaverse and analytics solutions. Most importantly, allow them to spark new ideas and collaborations that extend beyond the conference itself.

I am hopeful that readers will use these materials not only as references, but as catalysts—tools for further research, collaboration, and policy-making. The future of IT and business will not be shaped by technology alone, but by the way we design, regulate, and evaluate its use.

This is both a summary and a challenge: let us take these insights forward, beyond the pages, into real practice.

Prof. Manju Nair
Prof. Kavaldeep Dixit
Prof. Swati V. Chande
Dr. Vijay Gupta
Dr. Preeti Tiwari
Dr. Sandeep Vyas

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Mr. Sumit Gupta

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Prof. Roopa Mathur
Prof. Manju Nair

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Prof. Swati V. Chande

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Dr. Preeti Tiwari- 8875003216

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PROGRAMME SCHEDULE

DAY-1: 12-September 2025

Youtube Link: https://youtube.com/live/X6LFTxlVpJw?feature=share

Day-1: 12.09.2025	**INAUGURAL CEREMONY**	
SNO	**Speaker**	**Time**
1.	Vandana and Lamp Lighting	10:00 AM – 10:05 AM
2.	**Welcome Address:** Prof. Roopa Mathur, Director, IIIM, Jaipur	10:05 AM – 10:09 AM
3.	**Introduction to the Conference:** Prof. Manju Nair, Principal, IIIM, Jaipur	10:09 AM – 10:14 AM
4.	**Inaugural Address: Chief Guest**- Mr. Aviral Chitkara, Vice President-Operations, IT Sales & Marketing Sarvika Technologies, Jaipur, India	10: 14 AM -10:30 AM
5.	**Guest of Honor:** Mr. Anil Pilania, Founder & Managing Director, MIDCAI, Jaipur, India	10: 30 AM -10:45 AM
6.	**Key Note Speaker:** Dr. Aditi Gupta, CEO & Founder, TechTip24, Jaipur , India	10:45 AM-11:00 AM
7.	Glimpses of ICMIT	11:00 AM-11:05 AM
8.	Release of Book of Abstracts (Online)	11:05 AM – 11:10 AM
Zoom Link: https://us06web.zoom.us/j/89389384021?pwd=I8bWv66rbNWaQGeENwb0uagQo1bvtp.1 **Meeting ID:** 893 8938 4021 **Passcode:** iisu#123		
TECHNICAL SESSION -1: Business Transformation in the Era of Metaverse & Data Analytics		
SNO	**Speaker Profile**	**Time**
1.	Dr. Mohammad Qais Rezvani, Strategic Advisor & International Representative in HOPE Foundation in Manta, Manabí, Ecuador	11:30 AM – 11:50 AM
2.	Prof. (Dr.) Thanoon Yoonus Thanoon, Vice Chancellor (Admin Affairs) Northern Technical University Iraq	11:50 AM – 12:10 PM
3.	Prof (Dr.) Varinder Singh Rana, City University Ajman, Ajman, UAE	12:10 PM – 12:30 PM
LUNCH BREAK		**12:30 PM – 1:30 PM**
Zoom Link: https://us06web.zoom.us/j/89389384021?pwd=I8bWv66rbNWaQGeENwb0uagQo1bvtp.1 **Meeting ID:** 893 8938 4021 **Passcode:** iisu#123		
PAPER PRESENTATIONS -TRACK -1: Business Transformation in the Era of Metaverse & Data Analytics		
Session Chairs		**Time**
• Prof (Dr.) Ampu Harikrishnan, Visiting Professor, Odesa State Agrarian University, Ukraine • Dr. Poornima Mathur, Associate Professor, International School of Informatics & Management, Jaipur		11:30 AM – 1:00 PM
Rapporteur		
Dr. Sandeep Vyas, Associate Professor, International School of Informatics & Management, Jaipur		11:30 AM – 1:00 PM
Session Coordinator	**Technical Coordinator**	
Dr. Kavya Saini, Associate Professor, International School of Informatics & Management, Jaipur	Ms. Ritu Khandelwal, Assistant Professor, International School of Informatics & Management, Jaipur	11:30 AM – 1:00 PM
Google Meeting Link: https://meet.google.com/xcw-wotm-xmz		
TECHNICAL SESSION -2: Advanced Data Analytics & Metaverse Development		
SNO	**Speaker Profile**	**Time**
1.	Dr. Froilan D. Mobo, Professor, Philippine Merchant Marine Academy, Philippines	01:30 PM - 01:50 PM
2.	Prof. (Dr.) Viana Hassan Professor, American University of Malta , Republic of Malta. Malta	01:50 PM - 02:10 PM
3.	Dr. Nawaf Abuoliem, Asst. Professor, Jerash University, Jordan	02:10 PM – 02:30 PM
4.	Prof. (Dr.) Osman Titrek, Professor, Sakarya University, Turkiye	02:30 PM – 02:50 PM
Zoom Link: https://us06web.zoom.us/j/89389384021?pwd=I8bWv66rbNWaQGeENwb0uagQo1bvtp.1 **Meeting ID:** 893 8938 4021 **Passcode:** iisu#123		
PAPER PRESENTATIONS -TRACK -2 (PARALLEL TRACK): Advanced Data Analytics & Metaverse Development		
Day-1: 12.09.2025		
Session Chairs		**Time**
• Dr. Madhavi Sinha, Associate Professor & HOD, Birla Institute of Technology, Extension Center, Jaipur • Dr. Nishtha Keswani, Associate Professor, Central University, Ajmer		1:30 PM – 3:00 PM
Rapporteur: Dr. Gargi Sharma, Associate Professor, International School of Informatics & Management, Jaipur		1:30 PM – 3:00 PM
Session Coordinator	**Technical Coordinator**	
Dr. Preeti Tiwari, Associate Professor, International School of Informatics & Management, Jaipur	Ms. Anushri Vijay, Assistant Professor, International School of Informatics & Management, Jaipur	1:30 PM – 3:00 PM
Google Meeting Link: https://meet.google.com/xcw-wotm-xmz		

PROGRAMME SCHEDULE

DAY-2: 13-September 2025

PANEL DISCUSSION: Data Analytics in the Metaverse: Business and IT Perspective		
Day-2: 13.09.2025	**PANELIST**	
SNO	**Speaker**	**Time**
1.	Mr. Manish Tiwari, Head of Enterprise 5G, Ericsson, California, US	09:30 AM – 12:00 PM
2.	Mr. Rahul Deshmukh, Sales & Strategy Lead - Life Sciences GCC, Accenture, Bangalore , India	09:30 AM – 12:00 PM
3.	Mr. Nimit Bhargava, Sr. Product Manager, DocuSign, Bangalore , India	09:30 AM – 12:00 PM
4.	Ms. Anjana Tandon, CEO & Co-Founder, Reckon Computers & Consultant, New Delhi, India	09:30 AM – 12:00 PM
5.	Mr. Mahavir Pratap Sharma, General Partner, Swishin Ventures, Co -Founder and Chair, RAIN (Rajasthan Angels), New Delhi, India	09:30 AM – 12:00 PM
6.	Prof. Anil Mehta, Department of Management Banasthali Vidyapeeth, Banasthali , Tonk, India	09:30 AM – 12:00 PM
LUNCH BREAK		**12:00 PM – 1:00 PM**
Zoom Link: https://us06web.zoom.us/j/89389384021?pwd=I8bWv66rbNWaQGeENwb0uagQo1bvtp.1 **Meeting ID:** 893 8938 4021 **Passcode:** iisu#123		
TECHNICAL SESSION -3: Strategic Business Decisions, Advanced Data Analytics & Intelligent Insights		
SNO	**Speaker Profile**	**Time**
1.	Prof (Dr.) Beatriz Lucia Salvador Bizoto, Professor, UNIFACTVEST University, Brazil	01:00 PM – 01:20 PM
2.	Prof. Maria Emilia Camargo, Dean of International Relations, Veni Creator Christian University (Florida, USA)	01:20 PM –01:40 PM
3.	Prof (Dr.) Nadiia P. Reznik, National University of Life & Environmental Sciences, Ukraine	01:40 PM – 02:00 PM
4.	Prof (Dr.) Walter Priesnitz Filho, Federal University of Santa Maria, Brazil	02:00 PM -02:20 PM
Zoom Link: https://us06web.zoom.us/j/89389384021?pwd=I8bWv66rbNWaQGeENwb0uagQo1bvtp.1 **Meeting ID:** 893 8938 4021 **Passcode:** iisu#123		
PAPER PRESENTATIONS – TRACK-3 (PARALLEL TRACK): **Strategic Business Decisions, Advanced Data Analytics & Intelligent Insights**		
Session Chairs		**Time**
• Dr. N. K. Joshi, Director, Modi Institute of Management & Technology, Kota • Dr. Bharti Sharma, Associate Professor, International School of Informatics & Management, Jaipur		01:00 PM – 02:30 PM
Rapporteur		
Dr. Bhumija Chouhan, Associate Professor, International School of Informatics & Management, Jaipur		01:00 PM – 02:30 PM
Session Coordinator	Technical Coordinator	
Dr. Vijay Gupta, Associate Professor, International School of Informatics & Management, Jaipur	Mr. Santosh Kumar Pandey, Assistant Professor, International School of Informatics & Management	01:00 PM – 02:30 PM
Google Meeting Link: https://meet.google.com/xcw-wotm-xmz		

CONTENTS

ABSTRACTS

ICMIT-2025
(12-13 September, 2025)
International Conference on Management & IT
Harnessing Metaverse & Data Analytics: Redefining IT & Business Approaches

FORECASTING CRUDE OIL PRICES: A THEORETICAL REVIEW WITH ECONOMETRIC PERSPECTIVE

Mr. Satyendra Sahu, Member of the Institute of Chartered Accountants of India & Senior Director (Finance), Natco Pharma USA LLC
Dr. Devendra Jarwal , FCS, Ph.D. Professor, Motilal Nehru College, University of Delhi
Ms. Smita Ray, Student, University of the Potomac

ABSTRACT :
Crude oil is one of the most vital resources in the modern world, serving as a fundamental source of energy that powers economies and drives technological advancement. With its extensive use across various sectors, including transportation, manufacturing, and residential applications, crude oil accounts for approximately 33% of global energy consumption. This considerable reliance on oil highlights its role as an economic driver and a marker of geopolitical stability. This study aims to enhance the accuracy of forecasting crude oil prices by utilizing a hybrid model that integrates multiple methodologies to identify discernible patterns in historical data. We have employed a Parallel hybridization of Multiple Multi-scale/ Hybrid Model (PHOM3) utilizing statistical methods, machine learning techniques, and time-series analysis with software tools such as Python and R-programming for data evaluation. The PHOM3 model outperforms traditional forecasting methods, achieving lower Mean Squared Error (MSE), Root Mean Square Error (RMSE), Mean Absolute Error (MAE), and Mean Absolute Percentage Error (MAPE) in predicting crude oil prices, but in comparison to hybrid models, our proposed model lagged behind the HM-3 i.e. CEEMDAN – simple – RNN – LSTM model in the test dataset. This study is applicable in areas such as energy economics, financial forecasting, investment strategies, policymaking for energy management, aiding stakeholders in making informed decisions. This research introduces an application of novel hybrid forecasting model that effectively captures the complexities of crude oil price movements, advancing existing methodologies and providing a comprehensive framework for future studies in energy price forecasting.

Keywords: Crude Oil Prices, Forecasting Models, Hybrid Methodologies, Time Series Analysis, Machine Learning, Economic Impact

ICMIT-2025
(12-13 September, 2025)
International Conference on Management & IT
Harnessing Metaverse & Data Analytics: Redefining IT & Business Approaches

COMPARATIVE STUDY ON MACHINE LEARNING ALGORITHMS & NATURAL LANGUAGE PROCESSING: A TECHNICAL PERSPECTIVE

Dr. Vijay Gupta, Associate Professor, International School of Informatics & Management (IIIM), Jaipur

ABSTRACT:

In recent years, the fields of Machine Learning (ML) and Natural Language Processing (NLP) have emerged as two of the most transformative domains within artificial intelligence (AI), influencing sectors ranging from healthcare and finance to education, entertainment, and governance. While ML provides the foundational algorithms and models capable of learning patterns from structured and unstructured data, NLP specifically focuses on enabling machines to understand, interpret, and generate human language. This comparative study explores the current landscape of ML algorithms and NLP techniques, examining their methodologies, applications, strengths, limitations, and potential for convergence in the context of contemporary technological challenges.

Machine learning algorithms are fundamentally categorized into supervised, unsupervised, semi-supervised, and reinforcement learning approaches. Key algorithms such as Decision Trees, Random Forests, Support Vector Machines (SVM), k-Nearest Neighbours (k-NN), Gradient Boosting Machines (GBMs), and deep learning models like Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs) are evaluated on their accuracy, computational efficiency, scalability, and their ability to adapt to varied datasets. The discussion emphasizes the evolution of ML towards transformer-based and attention-driven architectures, which have significantly improved performance in complex prediction and classification tasks.

In contrast, NLP has evolved from rule-based linguistic models to sophisticated neural network-based systems capable of semantic understanding and contextual reasoning. Traditional NLP pipelines—comprising tokenization, stemming, lemmatization, and part-of-speech tagging—have been augmented or replaced by advanced models such as BERT (Bidirectional Encoder Representations from Transformers), GPT (Generative Pre-trained Transformer), RoBERTa, and T5.By utilizing transfer learning and extensive pre-training data sets, these models attain cutting-edge performance in various tasks such as sentiment analysis, named entity recognition, text summarization, question answering and conversational artificial intelligence. The comparative dimension highlights that while NLP builds upon general ML principles, it demands specialized techniques to manage the complexity, ambiguity, and contextual variability inherent in human languages.

A synergistic relationship between ML algorithms and NLP states that ML serves as the backbone for NLP applications, enabling language models to learn from large-scale text data. Conversely, NLP techniques enrich ML capabilities in domains that require language-based feature engineering, such as chatbots, virtual assistants, content recommendation systems, and automated translation tools. However, the study underscores key differences: ML algorithms are generally domain-agnostic and data-type agnostic, whereas NLP models are highly domain-dependent, requiring tailored pre-processing steps and fine-tuning for specific languages, dialects, and domains.

The comparative analysis also addresses performance trade-offs. While ML algorithms like SVMs or Random Forests can perform efficiently on medium-sized datasets with minimal computational overhead, state-of-the-art NLP models often require enormous computational resources, GPUs/TPUs, and extensive labeled datasets. The study further examines ethical and practical considerations, including bias in training data, model interpretability, explainability, and the environmental cost of large-scale model training. The increasing attention to Responsible AI is discussed, highlighting the need for fairness, accountability, transparency, and energy efficiency in both ML and NLP development.

From an application perspective, ML algorithms are driving innovations in predictive analytics, fraud detection, image and speech recognition, medical diagnostics, and supply chain optimization. Meanwhile, NLP powers applications such as intelligent document processing, real-time translation, automated grading systems, customer service automation, and sentiment-driven marketing strategies. Emerging trends indicate a growing integration of multimodal AI systems that combine ML-based image and video analysis with NLP-driven textual and audio understanding, paving the way for more holistic and context-aware AI solutions.

This paper elaborates that while ML and NLP are interdependent, they retain distinctive characteristics in terms of methodology, data requirements, computational needs, and application domains. The convergence of the two fields, driven by deep learning and transformer architectures, is enabling unprecedented capabilities in automation, personalization, and decision-making. The paper focuses on exploring full potential of ML & NLP to address challenges related to scalability, interpretability, bias mitigation, and sustainability. The paper also elaborates on bridging core ML theory, computational linguistics, cognitive science, and domain-specific expertise and also harnessing the combined power of ML algorithms and NLP for socially beneficial, efficient, and ethically sound technological advancements.

Keywords: Machine Learning, Natural Language Processing, Deep Learning, Transformer Models, Comparative Analysis, Artificial Intelligence, Responsible AI

COLLABORATIVE ROLE OF LEADERSHIP AND CHANGE MANAGEMENT IN THE ERA OF METAVERSE AND DATA ANALYTICS: A COMPREHENSIVE REVIEW

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ABSTRACT:

Leadership and change management have become essential in guiding organizations through the rapid digital transformation of the 21st century. Leaders play a critical role in setting a vision, inspiring teams, and ensuring smooth adaptation to emerging technologies, while change management provides structured processes to minimize resistance and maximize adoption. This paper explores the integration of leadership and change management with innovations such as the Metaverse and data analytics, which are reshaping how organizations operate, communicate, and make decisions.

The Metaverse, an immersive and interactive virtual environment, offers leaders unique opportunities for collaboration, employee engagement, and experiential training. Through virtual simulations, leaders can visualize change scenarios, test strategies, and create inclusive spaces where employees experience upcoming changes in real time. Such approaches reduce uncertainty, build trust, and enhance cross-cultural collaboration across geographically dispersed teams.

Data analytics further strengthens leadership and change management by enabling evidence-based decision-making. Leaders can leverage predictive analytics to anticipate challenges, sentiment analysis to monitor employee morale, and performance metrics to evaluate the progress of change initiatives. By continuously monitoring and analyzing data, leaders can refine strategies in real time, ensuring alignment with organizational objectives.

The combined application of Metaverse tools and advanced analytics transforms traditional change management into a dynamic, interactive, and measurable process. This integration empowers leaders to foster innovation, resilience, and inclusivity while ensuring that change is effectively implemented and sustained. As organizations embrace the future of work, the convergence of strong leadership, structured change management, immersive technologies, and data-driven insights will be vital for maintaining competitiveness and achieving long-term success. This study concludes by proposing a strategic framework for leaders to manage change proactively in this evolving digital landscape, ensuring sustainable innovation and competitive advantage.

Keywords: Leadership, Change Management, Metaverse tools, advanced analytics

TRANSFORMING CUSTOMER EXPERIENCE AND MARKETING STRATEGIES THROUGH THE METAVERSE AND DATA ANALYTICS

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ABSTRACT:

The global business landscape is undergoing a significant transformation driven by the rise of the Metaverse and the rapid advancement of data analytics. Together, these technologies are redefining how organizations design, deliver, and sustain customer experiences. Traditional marketing, rooted in mass media and one-way communication, has evolved into digital marketing, which leverages personalization, targeted campaigns, and interactive content. Now, the Metaverse introduces an entirely new dimension - immersive 3D environments where consumers can interact with brands in real time, often through virtual reality (VR) and augmented reality (AR) platforms.

This research focuses on understanding how customer experience and marketing strategies are being reshaped in this new era. It examines how data analytics complements the Metaverse by providing deep insights into consumer behaviour, enabling brands to deliver highly personalized, context-aware interactions. With real-time behavioural tracking, sentiment analysis, and predictive modelling, businesses can anticipate customer needs and design experiences that foster long-term engagement. Industry examples such as Nike's NIKELAND, Hyundai Mobility Adventure, and Gucci Garden demonstrate how immersive platforms are being used to build emotional connections, increase engagement, and strengthen brand loyalty.

The paper compares customer retention rates across three marketing eras: traditional (25-30%), digital (35-45%), and Metaverse-driven (55-65%), based on industry reports and case study data. The analysis highlights how immersive environments combined with data-driven personalization result in higher customer satisfaction and repeat interactions. This shift is not only a technological evolution but also a strategic one, requiring brands to rethink storytelling, community building, and value delivery in a virtual-first economy.

The primary focus of this research is to identify the critical elements that drive successful customer experiences in the Metaverse when powered by data analytics. It aims to provide actionable insights for marketers, strategists, and business leaders seeking to design future-ready marketing approaches that integrate immersive technologies and advanced analytics to maximize customer retention in an increasingly competitive digital ecosystem.

Keywords: Metaverse, Data Analytics, Customer Experience, Marketing Transformation, Brand Loyalty, Immersive Technology, Consumer Engagement

CHANGING PERSPECTIVE FROM WEB2 TO WEB3 AND DECENTRALIZED DATA: A SURVEY

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ABSTRACT:

The internet has gone through different stages, and today we are seeing a shift from Web2 to Web3. In Web2, most platforms are centralized, which means big companies control user data, decide the rules, and manage how information is stored and shared. This system has allowed businesses to grow fast and use data analytics to give personalized services. But it has also created problems such as loss of privacy, misuse of user information, and major data breaches. A well-known example is the Aadhaar data leak in India during the COVID-19 period.

Web3 brings a new way of handling data through decentralization. Instead of storing everything on a central server, Web3 uses blockchain, peer-to-peer networks, and smart contracts to distribute data across many nodes. In this model, users have more control over their own information, and transactions can be verified without needing middlemen. This gives more transparency and reduces dependency on large corporations. However, Web3 is not without risks—it faces issues like DeFi hacks, smart contract errors, and cryptocurrency thefts, which are different from traditional Web2 security problems.

This study looks at how perspectives are changing between Web2 and Web3, with a focus on trust, privacy, security, and business use cases. It shows how Web2 relies on centralized systems that can be attacked at one point, while Web3 spreads out control but creates new types of vulnerabilities. The survey also compares how businesses use data in both models. In Web2, companies profit mainly by collecting and analysing user data, often without full consent. In Web3, businesses can still use data analytics, but users keep ownership of their data, making the process more ethical and transparent.

Another major focus of this paper is the metaverse, a digital space where people interact using virtual identities and assets. In Web2, companies control these environments and the data within them. In Web3, decentralized systems allow users to own their digital identities and assets, creating fairer and more trustworthy interactions. For businesses, this opens up opportunities like transparent supply chains, tokenized assets, new revenue models, and stronger customer trust.

The research is based on academic studies, industry reports, and real-world cases of Web2 and Web3 breaches. It builds a framework to compare the two systems on important factors such as trust, scalability, interoperability, and business value. It also shows how decentralization, combined with advanced analytics, can improve decision-making and customer engagement in both digital platforms and metaverse environments.

In short, the shift from Web2 to Web3 is not just about technology-it is about changing the way data is governed, how businesses create value, and how users build trust in digital platforms. This paper surveys these changes to help researchers, businesses, and policymakers understand the impact of decentralized systems in shaping the future of the internet.

Keywords: Web2, Web3, centralized data, decentralized data, blockchain, survey, metaverse, business strategy, data analytics, trust

REDEFINING LEADERSHIP AND CHANGE MANAGEMENT THROUGH VIRTUAL ENVIRONMENTS

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ABSTRACT:

Leadership is the ability to guide, motivate, and influence people toward achieving common goals. Good leaders create trust, build strong communication, and inspire teamwork. In today's world, leadership is not limited to physical spaces but also extends into digital and virtual environments where people connect and work together.

This research focuses on leadership and changes management in the Metaverse. The Metaverse is a 3D digital space where individuals interact, collaborate, and work through avatars using technologies such as virtual reality, augmented reality, and online communication tools. Alongside this, data analytics plays an important role in tracking behavior, improving productivity, and helping leaders make informed decisions. The study explores how leaders can manage teams in virtual environments, overcome challenges like digital fatigue, and maintain strong employee engagement.

The paper also highlights how organizations can adapt to change in the Metaverse by introducing immersive tools, offering proper training, and creating guidelines for digital behaviour and security. It shows how analytics can support leaders by providing insights into employee engagement, productivity, and customer interactions. Predictive models further help in preparing for future trends and improving virtual experiences.

In short, this research combines leadership, change management, and data analytics to explain how organizations can succeed in the Metaverse. It shows that by balancing human-centered leadership with smart use of data, businesses can adapt faster, strengthen connections with their teams, and thrive in this new digital era.

Keywords: Leadership, Metaverse, Change Management, Data Analytics, Virtual Collaboration, Digital Transformation, Employee Engagement

BIG DATA AND DATA ANALYTICS IN THE METAVERSE: OPPORTUNITIES AND CHALLENGES

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ABSTRACT:

The convergence of Big Data and Data Analytics with the Metaverse is creating a new era of digital innovation, fundamentally transforming how information is collected, processed, and applied in Immersive virtual environments. Big Data refers to the massive volume of structured and unstructured data generated from various sources, while Data Analytics involves extracting meaningful insights from this data to support decision-making. In the Metaverse an interconnected network of 3D virtual world, these technologies work together to enable personalized experiences, intelligent simulations, and real-time interactions.

By integrating Big Data into Metaverse platforms, vast datasets from user activities, virtual transactions, IoT devices, and Al-driven interactions can be processed at high speed. Advanced analytics tools, including predictive analytics, machine learning algorithms, and sentiment analysis, allow developers and organizations to understand user behaviour, optimize content, and enhance engagement. For example, businesses can analyse how users interact with virtual products to improve design, marketing, and service strategies.

The synergy between Data Analytics and Metaverse also enables the creation of dynamic virtual economies, realistic simulations for education and training, and enhanced collaboration in sectors such as healthcare, urban planning, and entertainment. Real-time analytics support adaptive virtual environments that respond instantly to user needs, increasing immersion and satisfaction.

However, the integration of Big Data in the Metaverse introduces challenges, including data privacy, cybersecurity risks, and the ethical use of Al-driven insights. Robust governance frameworks, secure data storage, and transparent policies are essential to ensure user trust and regulatory compliance.

The fusion of Big Data, Data Analytics, and Metaverse is paving the way for highly intelligent, adaptive, and inclusive virtual ecosystems. As these technologies continue to evolve, their combined potential will drive innovation, enhance decision-making, and shape the future of digital interaction

The convergence of Big Data, Data Analytics, and the Metaverse enhances personalization, user experiences, and innovation across digital platforms. It transforms sectors like healthcare, education, and urban planning through immersive simulations and data-driven modelling. These technologies promote inclusivity by creating adaptive environments and enabling remote collaboration. Real-time analytics empower smarter decisions, driving economic growth and more connected, accessible digital ecosystems.

keywords: Immersive virtual environments, personalized experiences, intelligent simulations, Real-time interactions, User activities, Virtual transaction

DETECTING DEEPFAKE CONTENT USING DATA ANALYSIS & ML

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ABSTRACT:

Deepfake technology can create realistic fake images, videos, and audio, leading to new challenges in media trust and the spread of misinformation. This research focuses on detecting deepfake content using data analysis and machine learning (ML). Different types of deepfakes shall be described and explain on how ML models like convolutional neural networks (CNNs) and transformers can spot fakes by searching for small differences in facial features, movements, and digital signals. The study shows how feature extraction, dataset usage, and ensemble learning methods help improve detection accuracy. Different challenges such as changing deepfake techniques and the importance of analyzing both visual and metadata clues are also discussed in this research paper. By comparing various ML tools and data approaches, this research aims to find the best ways to reliably detect deepfakes and protect society from false information. Finally, it highlights the need for ethical standards to guide technology use and reduce harm. The work encourages collaboration among researchers, technology experts, and policymakers to develop better protection tools, keep up with new deepfake methods, and educate the public about ways to spot and report fake media.

Advanced deepfake detection systems use training datasets that contain both real and manipulated content, allowing ML algorithms to learn key differences. Preprocessing steps such as image normalization, noise reduction, and face alignment are critical for improving detection performance. Techniques like frequency analysis, temporal artifact detection, and biometric feature comparison are increasingly adopted to boost model accuracy. Beyond technical methods, this study explores the need for user-friendly verification tools that can be utilized across social media and messaging platforms. Public education efforts are vital so more people understand how deepfakes work and what signs to look for.

Further, the research reviews state-of-the-art models and highlights the importance of continuously updating them as deepfake generation methods evolve. Transfer learning and domain adaptation help detection algorithms stay effective against new threats. The paper also recommends building global standards for deepfake reporting and verification and stresses the need for transparent sharing of detection results. In conclusion, this study offers practical strategies and calls for a combined approach, using technology and policy to safeguard digital content and empower users against deepfake threats.

KEYWORDS: Detecting Deepfake, Data Analysis, ML, Convolutional Neural Networks (CNNs), Feature Extraction, Dataset Usage, Challenges, Analyzing, Metadata Clues, Ethical Standards, Training datasets, Frequency Analysis, Temporal Artifact Detection, state-of-the-art models

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International Conference on Management & IT
Harnessing Metaverse & Data Analytics: Redefining IT & Business Approaches

BRAND ENGAGEMENT AND LOYALTY IN THE VIRTUAL WORLDS

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ABSTRACT:

The rise of the metaverse is changing the way businesses connect with their customers. Instead of only depending on physical stores or traditional online platforms, companies can now create virtual spaces where people can interact with their brands in new and engaging ways. Platforms like Decentral and, Roblox, and Meta's Horizon Worlds allow businesses to build immersive environments where customers do not just shop but also attend events, play games, and form deeper connections with the brand.

This research looks at how these metaverse experiences, such as digital storefronts, live events, and game-like interactions, influence customer loyalty. It also explains how data analytics can be used to measure and improve these interactions. By using orange workflows, customer data can be grouped into different loyalty levels with clustering methods like k-means and hierarchical clustering. At the same time, models such as Random Forest and Logistic Regression can help predict which customers are at risk of leaving. Alongside this, Python tools make it possible to study chat logs for sentiment analysis, explore how avatars interact with each other through network analysis, and use regression models to see how the frequency of engagement is linked to the chance of making a purchase. Together, these methods give businesses practical insights that can be used to design loyalty programs, personalized campaigns, and real-time offers.

Adding AI-based analytics into the metaverse offers businesses many advantages. It allows them to track customer behaviour as it happens, make predictions about customer lifetime value, and visualize trends through interactive dashboards. Still, there are also some challenges. Data privacy is a big concern, as is the responsible use of customer information. There are also issues with making different metaverse platforms work smoothly together. To deal with these challenges, businesses need strong policies for data governance, privacy-protecting techniques, and clear, transparent practices to build and maintain customer trust.

Overall, this study shows that customer loyalty in the metaverse is not only about transactions but also about experiences. The more personalized and engaging the interactions are, the stronger the connection between the brand and the customer becomes. By combining immersive virtual environments with advanced data analytics, businesses can create long-term relationships, adapt alongside their online communities, and achieve steady growth in this new era of commerce.

Keywords: Metaverse, Customer Engagement, Brand Loyalty, Virtual Experiences, Data Analytics, Artificial Intelligence, Orange Workflows, Python, Sentiment Analysis, Customer Retention

IMPACT OF PRICE AND DELIVERY TIME ON CONSUMER CHOICE: EXPERIMENTAL INSIGHTS FROM INDIAN Q-COMMERCE PLATFORMS

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Dr. Preeti Tiwari, Associate Professor, International School of Informatics & Management, Jaipur

ABSTRACT:

Changes in the ways in which customers engage with an online channel, especially in terms of product pricing and delivery models, have quickly advanced due to the rapid growth of e-commerce in India. Instamart, Blinkit and Jiomart are the main competitors competing for customers. As the emotion and rationality of understanding the determinants of consumer behaviour increasingly influence business strategy and academic research. Price sensitivity and time of delivery are two overarching factors affecting consumers in the competitive landscape of digital commerce as dynamic pricing and instant delivery makes the traditional methods of how consumers purchase obsolete.

Integrating this backdrop with this research, the current study utilizes transaction-level datasets from leading Indian e-commerce platforms to systematically examine how product price and delivery time influence consumer choices. The dataset encompasses diverse variables, including product details, categories, delivery times, ratings, and Feedback. Advanced analytical methods such as exploratory data analysis, hypothesis testing, and predictive modelling are employed to assess how these factors interact and differ across platforms and product categories. The research also introduces novel feature engineering, such as delivery speed categorization and percentage discount calculations, to enhance insight into consumer decision-making patterns.

The objective of this research paper is to measure both the relative importance of price and delivery time in purchase likelihood on Instamart, Blinkit, and Jiomart, as well as to measure customers sensitivity to price and delivery time by platform and category. The findings of the paper lead to practical recommendations for q-commerce companies on how to structure their prices based on customer delivery time and payment sensitivity. The objective of this research paper is to measure both the relative importance of price and delivery time in purchase likelihood on Instamart, Blinkit, and Jiomart, as well as to measure customers sensitivity to price and delivery time by platform and category. The paper leads to practical recommendations for q-commerce companies on structuring their prices based on customer delivery time and payment sensitivity.

Keywords: E-commerce, Consumer Choice, Price Sensitivity, Delivery Time, Instamart, Blinkit, Jiomart, Logistic Regression, Decision Trees, Online Shopping India

MACHINE LEARNING-BASED LOAN APPROVAL: ANALYSING KEY FACTORS AND PREDICTIVE MODEL

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ABSTRACT:

Rapid digitization in the banking sector has changed how financial institutions assess and approve loans. This shift is fuelled by a greater need for efficiency and accuracy in decision-making. Traditional manual evaluation methods now face competition from algorithmic approaches, especially in cases with various applicant profiles and large transactions. As predictive models based on machine learning become essential to the industry, it's crucial to understand their practical factors. Elements like income patterns, credit history, and applicant demographics significantly influence loan approval results. This complexity and volume make traditional risk assessment methods less effective.

The current study uses anonymized applicant-level data from major banking and lending platforms to examine how applicants' financial and personal characteristics affect loan approval decisions. The dataset includes a wide range of features, such as credit scores, employment status, income level, loan amount, and loan purpose. Different methods like exploratory data analysis, data visualization, and classification algorithms, including decision trees and logistic regression will be used to explore how these variables interact and to compare how well different models predict outcomes. New techniques shall be applied for feature engineering, such as risk categorization and estimating default probabilities, to gain a better understanding of approval likelihood and risk levels.

The aim of this research is to measure the importance of key applicant factors in loan approval decisions and to assess the accuracy of machine learning models in various lending situations. The results will help financial institutions improve their lending criteria and implement automated, data-driven loan assessment processes. Ultimately, the findings provide practical advice to banks and fintech companies on creating fairer, faster, and clearer loan approval processes as regulations and technology change.

Keywords: Loan Approval, Machine Learning, Credit Risk, Decision Trees, Logistic Regression, Automated Lending, Feature Engineering, Risk Assessment

COMPREHENSIVE AI ANALYTICS FOR INDIA'S EV SECTOR: "TRENDS, ADOPTIONS PATTERNS, AND MARKET FORECASTING"

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ABSTRACT:

India's electric vehicle (EV) market has moved from curiosity to commitment over the past decade. What began around 2014 as a policy-driven experiment, spurred by early incentives and pilot charging projects, has matured into a broad movement shaped by technology, shifting consumer expectations, and a stronger economic case for going electric. This study examines transition through an AI lens, using models not only to forecast sales but to explain why adoption happens where and when it does.

The approach blends three strands of analysis. First, Time series forecasting projects segment-wise EV uptake of two-wheelers and passenger cars over the next ten years, capturing momentum driven by cheaper batteries, consistent policy support and the spread of fast charging corridors. Second, regression models quantify how factors like purchase subsidies, GST reductions, interest rates and charging density relate to adoption rates, identifying which levers move the needle. Third, Clustering reveals consumer heterogeneity. Early adopters in metro areas with home charging behave differently from value-driven buyers in Tier-2 cities or commercial fleet operators optimising total cost of ownership.

Several patterns stand out. Growth has been steady year over year with clear inflexion points when incentives and infrastructure expanded together. Two and three-wheelers lead on volume, unsurprisingly giving India's short-trip urban reality and strong fleet use cases, while electric cars are building share as more models arrive in the ₹10 lakh to ₹20 lakh band and charging becomes more predictable. Domestic manufacturers have set the pace. Companies like Tata Motors and Mahindra are integrating practical software features like reliable navigation, battery health insights and predictive maintenance rather than chasing gimmicks. Alongside them, newer entrants have pushed down price points and iterated on designs suited to India's roads and climate.

Ownership models are evolving as well. Battery as a Service (BAAS) is attracting attention because it separates the most expensive component from the vehicle, easing the upfront burden on middle-income buyers and high-utilisation commuters. In the regressions, flexible ownership and financing options consistently emerge as strong predictors of adoption in semi-urban clusters and among cost-sensitive consumers. This aligns with what users say matters most: predictable running costs, minimal downtime and the battery will last.

Policy remains the accelerator. Subsidies and tax incentives reduce initial friction, targeted financing lowers EMIs, and visible charging infrastructure, especially reliable fast charging on key corridors, reduces range anxiety and builds trust in long-distance travel. When these elements not only pull demand forward, they broaden the pool of likely adopters and reduce regional disparities.

This research is focusing on the Analytics, suggesting EVs in India are crossing from niche to mainstream. Progress differs by states and user needs, but the overall trend is upward. Success depends on practical engineering and solid economics, reliable vehicles, truthful range, clear lifetime costs and useful software. Policymakers should keep incentives steady, build dependable charging networks and back local manufacturing. For companies and investors, the best opportunities are in segment-focused products, innovative financing and data-driven after-sales services. With AI highlighting where and why EVs' demand will grow, EVs in India look set to become the new normal in mobility.

keywords: India's EV adoption patterns, AI-driven analytics, Time series Forecasting, Consumer Clustering, Battery-as-a-Service (BAAS), Charging Infrastructure, Government incentives, Market forecasting, Total cost of ownership (TCO), Regression analysis, Policy impact modelling, Predictive maintenance, Data-driven decision making.

FROM DATA TO DECISIONS: DRIVING ROI THROUGH ANALYTICS IN E-COMMERCE

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ABSTRACT:

E-commerce platforms such as Amazon, Flipkart, and Myntra generate vast amounts of transactional and behavioural data every day. This data, if analysed effectively, can provide valuable insights into consumer preferences, shopping patterns, and operational efficiencies. Through advanced data analytics, businesses can make informed decisions, improve personalization, and optimize supply chains, ultimately enhancing customer satisfaction and business growth.

Return on Investment (ROI) is an important measure that shows how profitable business decisions are. By using analytics in areas like marketing campaigns, discount strategies, and product recommendations, companies can assess if their investments bring good returns. Insights from analytics help businesses match their spending with strategies that genuinely improve ROI. This provides a competitive edge in the market.

This research paper looks at how data analytics can turn raw information into practical strategies that affect ROI. The study will focus on the shift from traditional decision-making methods to data-driven models. It will highlight their impact on revenue growth, customer retention, and long-term profit. By comparing results before and after implementing analytics, this research will show the clear benefits of using a data-focused approach in e-commerce operations.

For this research, publicly available datasets like the UCI Online Retail Dataset, Kaggle Instacart Market Basket Dataset, and Food Hub Order Dataset shall be used to study consumer behaviour and business outcomes. Python will be the main tool for analysis. Important python libraries such as pandas, NumPy, matplotlib, and seaborn shall be applied for statistical modelling, visualization, and predictive analytics. These tools will help us measure ROI by looking at the effects of different e-commerce strategies, including targeted promotions, customer segmentation, and recommendation systems.

Keywords: Data Analytics, ROI, E-Commerce, Decision-Making, Business Growth, Customer Insights, Predictive Modelling

FRAUD DETECTION AND CYBER RISK ANALYTICS IN VIRTUAL ENVIRONMENTS

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ABSTRACT:

Fraud detection and cyber risk analytics have become increasingly critical as organizations migrate their operations and data to virtual environments. The expansion of cloud computing, remote work infrastructures, virtual classrooms, and online banking platforms has elevated both the convenience and the vulnerability of digital ecosystems. In virtual environments, the very attributes that enable flexibility and scalability - such as remote access, distributed resources, and automation - also present new opportunities for malicious actors to exploit weaknesses. This research examines how the landscape of fraud and cyber risk is being reshaped in these modern digital realms and explores the advanced methods and frameworks being deployed to defend against evolving threats.

In traditional settings, fraud investigation commonly relied on static rule-based systems that flagged predefined anomalies in transaction data. However, the sophistication, volume and velocity of attacks in virtual environments have rendered many of these legacy defenses inadequate. Threats now emerge in multiple forms, ranging from payment fraud, account, takeover, data breaches, and identity theft to more novel schemes such as synthetic identity creation, credential stuffing, bot attacks, and collusive behaviors in online collaborations. The virtual context also affords attackers greater anonymity and automation, often enabling them to coordinate attacks at scale, evade conventional detection, and launch adaptive assaults in response to defensive changes.

Amid these challenges, organizations are increasingly leveraging machine learning (ML) and artificial intelligence (AI) to revolutionize fraud detection and cyber risk analytics. ML algorithms, trained on vast datasets of behavioral and transactional records, can identify complex, non-linear patterns and subtle anomalies that deterministic systems would likely miss. For example, predictive models now analyze historical and real-time data to forecast which transactions are most likely to be fraudulent, enabling preemptive blocking and investigation. Anomaly detection systems employ behavioral analytics - tracking geographic location changes, biometric inputs, device fingerprints, and user navigation patterns - to quickly discern genuine users from imposters. AI further enables the creation of adaptive defense systems that learn from each incident, continuously improving their response to emerging threats.

Cyber risk analytics in virtual environments do not stop at fraud detection. Modern solutions aggregate, correlate, and interpret signals from a variety of sources: cloud activity logs, network traffic, access control systems, user device telemetry, and even dark web threat intelligence feeds. Real-time monitoring provides security teams with immediate alerts and context-rich evidence regarding suspicious activities or potential breaches. The integration of SIEM (Security Information and Event Management) platforms and automated orchestration tools allow organizations to triage and respond to threats faster and more accurately, efficiently prioritizing remediation efforts by severity and likelihood of impact.

The research also highlights the unique role of virtual environments as enablers of security advancements. Virtual machines and containerized environments offer isolated sandboxes for safe malware analysis, penetration testing, and incident response simulations - empowering organizations to experiment and adapt their defenses without jeopardizing production data. Furthermore, cloud-native security architectures can enforce granular, scalable access controls and security policies across distributed geographic locations.

In conclusion, as the digital footprint of organizations continues to grow, effective fraud detection and cyber risk analytics in virtual environments demand a holistic, proactive strategy. Integrating AI-driven techniques, real-time risk monitoring, and cross-system data fusion is essential for protecting against the increasingly complex spectrum of cyber threats. This paper underscores the importance of resilience, adaptability, and innovation in building and sustaining trust within the rapidly evolving realm of virtual ecosystems.

Keywords: Cyber Attacks, Virtual Environment, Fraud Detection, Cyber Risk Analytics, Artificial Intelligence

ENHANCING SMOOTH AND SMART COMMUNICATION IN THE METAVERSE USING NATURAL LANGUAGE PROCESSING

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ABSTRACT:

The metaverse is an emerging digital world that connects users through immersive, interactive spaces, fundamentally changing how we socialize, work, and conduct business. At the heart of these changes lies Natural Language Processing (NLP), a critical technology that enables virtual environments to understand, interpret, and produce human language naturally. As these virtual worlds become more complex and focused on people's needs, NLP becomes essential for allowing users and smart digital agents to communicate easily, intuitively, and in ways that are aware of context. This greatly improves the overall experience and effectiveness of interactions within the metaverse.

This paper explores how NLP is applied across various metaverse platforms and highlights its role in creating more natural and inclusive communication. Using advanced deep learning models, especially those based on transformer architectures like BERT and GPT, NLP systems can break down complicated language inputs, handle ongoing conversations, and respond accurately in real time. This enables digital avatars, assistants, and bots to interact with users not just by following fixed scripts, but by adapting to the situation and showing empathy. For instance, conversational agents powered by NLP can detect the user's emotional state through sentiment analysis and adjust their tone and replies accordingly, making the virtual experience more engaging and personalized.

NLP also plays a vital role in bridging language gaps by supporting real-time translation between multiple languages. This feature helps users from different linguistic and cultural backgrounds to communicate effortlessly in virtual classrooms, business meetings, and social spaces within the metaverse. Such multilingual support makes virtual spaces more welcoming and fair for people everywhere.

Combining NLP with sophisticated data analytics further boosts its value by improving user experience and driving innovation. By studying patterns in user conversations and behaviors, NLP-enabled systems can uncover useful insights about preferences and trends. These insights allow virtual marketplaces to use intelligent recommendation systems that pick up clues from chats to suggest relevant products, enhancing customer satisfaction and increasing sales. In education, NLP-powered tools adapt teaching materials and methods based on how learners interact and respond, leading to better outcomes in remote and online learning environments.

Despite its many advantages, implementing NLP effectively in real-time virtual worlds comes with significant challenges. Human language is often ambiguous, and understanding its context precisely requires complex disambiguation techniques that must be continually improved. Real-time communication demands quick processing speeds without sacrificing understanding, meaning that neural networks must be optimized carefully. Privacy is another critical concern because conversational data often contain personal information, which must be handled in compliance with laws like GDPR and CCPA. Ethical issues also need attention, particularly regarding preventing bias in the data used to train NLP models, so the AI doesn't produce unfair or prejudiced results. Transparent governance, regular audits, and explainability are essential practices to maintain user trust and fairness in NLP applications.

This study includes detailed examples from leading metaverse platforms and uses cases such as immersive virtual training and social collaboration spaces like Decentraland. These examples illustrate how integrating NLP enriches user engagement and creates measurable business benefits. The results suggest that where NLP meets data analytics, virtual worlds not only become more sophisticated and functional but also open the door to new ways of thinking about information technology and business strategies.

As the metaverse develops into a major technology influencing multiple industries, companies should actively invest in NLP technologies while carefully addressing the technical, ethical, and operational difficulties involved. By doing so, they will unlock the full potential for communication that is seamless, inclusive, and intelligent, ultimately transforming how IT systems work and how businesses approach the digital age.

Keywords: Natural Language Processing (NLP), Metaverse, Virtual Environments, Conversational AI, Sentiment Analysis, Data Analytics, Real-Time Communication, Ethical AI, User Interaction, Business Intelligence.

INTEGRATING AI WITH IT SECURITY, DATA PRIVACY AND ETHICS: AN OVERVIEW

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ABSTRACT:

The rapid advancement of Artificial Intelligence (AI) has significantly transformed the landscape of Information Technology (IT) security, data privacy, and digital ethics. AI-driven systems enhance threat detection, automate incident response, and predict vulnerabilities through intelligent analysis, thereby strengthening cyber security frameworks. At the same time, the integration of AI raises complex challenges in safeguarding sensitive data, ensuring transparency, and addressing biases in automated decision-making. This creates a critical intersection between technological innovation and ethical responsibility.

This research, the integration of AI with IT security, data privacy, and ethics is examined as a multidimensional approach to addressing the complexities of today's digital environment. AI is explored not only as a tool for enhancing cyber security through intelligent monitoring, detection, and predictive analysis, but also as a disruptive force that raises new concerns about data misuse, transparency, and accountability.

The focus of this research is to analyze how Artificial Intelligence can be effectively integrated into IT security systems while simultaneously upholding principles of data privacy and ethics. It emphasizes the dual role of AI—as both a powerful enabler of advanced cyber security solutions and a potential source of ethical and privacy risks.

Keywords: Artificial Intelligence, Cyber security, Data Security, Ethical AI, Security Automation, Transparency, Data Protection.

THE IMPACT OF USER-GENERATED MEMES (UGMS) ON PURCHASE INTENTION AND BRAND ENGAGEMENT

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ABSTRACT:

In India, User-generated Memes (UGMs) have come to light as an economical and popular social media marketing tool, yet their impact on consumer behaviour is currently insufficiently studied. This study looks at how UGMs affect Gen Y and Gen Z customer's intention to buy and their brand engagement. Data were gathered from 233 respondents via online questionnaires using Quantitative and Cross-sectional methodology; t-tests and chi-square tests were used for data analysis. The findings show that UGMs have a modest direct impact on immediate purchase intention in both the generations, even when they significantly enhance brand engagement especially among Gen Z. According to the results, brands hoping to use UGMs ought to focus on creating genuine and culturally appropriate content that attracts younger consumers in order to develop trust and ongoing engagement. This study contributes to the expanding field of research on meme marketing and provides helpful guidance to brands seeking to employ interactive content techniques to connect with digital natives.

Keywords: Social Media Marketing, Meme Marketing, User-generated Content, Purchase Intention, Brand Engagement

SIGNIFICANCE OF MACHINE LEARNING AND NATURAL LANGUAGE PROCESSING IN THE MODERN ERA

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ABSTRACT :

Machine learning is a part of Artificial Intelligence where the data is recognised through patterns and actions are taken based on it. Machine learning helps in problem solving by using large amount of data. Machine learning has algorithms which are put as input data where patterns are predicted. Accuracy of prediction is evaluated with rules of classification. At last predictive analysis is improved for delivering of more potential and accurate outcomes using statistical analysis. Some of their applications are financial analysis, spam detection, Google translation, self-driving Cars etc. Some different types of machine learning algorithms are:

Machines use Natural Language Processing technology to understand interpret and analysis human languages. Some of its applications are chat bots, machine translation, speech recognition, text summarisation, Information extraction, machine translation etc. Natural Language Processing have two components- Natural Language Understanding and Natural Language Generation. NLU deals with understanding the meaning behind human language (what the user wants) and extracts and entities followed by analysing of grammar and semantics. NLG deals with generating of human like text from structured data by converting data, numbers into natural language which forms sentences that sound natural to a human. Some challenges are faced by NLP which create difficulties during understanding of language and its generation.

One major issue is handling synonyms, as different words can carry the same meaning, yet cannot be used in the same way. Similarly, contextual words create difficulties due to the same word can mean different things depending on the situation. Another challenge creates that arises from errors in text or speech, such as typos, misspellings or silent words in spoken language, which can confuse NLP models. Ambiguity is another big problem in human language where a sentence can have multiple interpretations that also create complications in processing. In low-resource languages, the lack of enough datasets and linguistic tools makes it harder for the NLP systems as compared to widely spoken languages like English. Moreover detection of irony and sarcasm which rely on tone, intent, and cultural background remains a significant barrier .The lack of research and development in certain linguistic areas further slows progress like some languages, dialects, or linguistic problems don't get enough attention from researchers and the widespread use of slang makes it difficult for NLP systems to understand or create consistent language as these are not part of standard grammar or dictionaries, and their meaning changes quickly. Together, these challenges highlight the complexity of human communication and the on-going need for advanced techniques in NLP.

The integration of Machine Learning (ML) and Natural Language Processing (NLP) has opened significant opportunities in domains such as in healthcare, ML–NLP systems are used for extraction of meaningful clinical data from unstructured clinical notes, supporting disease predictions .Beyond these in metaverse technologies, ML and NLP enhances human–machine interaction through natural conversations. In cyber security, NLP-driven ML systems are helps in detecting phishing attacks, analyse threats, detect anomalies, social engineering attempts, and monitor dark web communications in real time. This paper describes how NLP and ML works together to help computer process and understand human language.

Keywords: Artificial Intelligence, cyber security, Machine Learning, Natural Language Processing, chat bots

AI FOR SOCIAL IMPACT AND COMMUNITY DEVELOPMENT

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ABSTRACT :

Artificial Intelligence (AI), Data Analytics, and the Metaverse are three powerful technologies that can work together to bring positive changes to society and help communities grow. AI can think and learn like humans in some ways, making it possible to solve problems faster, predict outcomes, and offer smart solutions. Data Analytics helps in understanding information collected from people, places, and activities, so leaders and organizations can make better decisions. The Metaverse is a shared virtual world where people can meet, work, learn, and explore without being in the same physical location.

When combined, these technologies can be used to support social impact projects and community development. For example, AI can identify problems in a community, such as a lack of education or healthcare, by studying data patterns. Data Analytics can then help in finding the best solutions and tracking progress over time. The Metaverse can provide a platform for delivering these solutions, such as virtual classrooms for remote learning, virtual hospitals for healthcare advice, or online community meetings where everyone can share ideas. The Metaverse can make learning and working more exciting and realistic. Students can take virtual field trips to historical places or space without leaving their homes. Workers from different countries can meet in the same virtual office to share ideas. People with disabilities can join events and activities without worrying about travel or accessibility issues.

From a business and IT perspective, this combination can create new opportunities for jobs, entrepreneurship, and skill development. Companies can use these tools to reach more people, offer personalized services, and build inclusive digital spaces. IT systems, such as cloud computing and secure networks, ensure that these services work smoothly and are accessible to all.

In simple terms, AI, Data Analytics, and the Metaverse together can help communities solve problems, improve education and health, and give people equal opportunities. They can connect people from different places, make decision-making faster, and create a fairer and more connected world, both online and offline.

The integration of Artificial Intelligence, Data Analytics, and the Metaverse has the potential to reshape the way societies function and grow. Together, these technologies can address real-world challenges, empower communities with better education and healthcare, and create inclusive spaces for collaboration and innovation. By enabling smarter decision-making, immersive learning, and wider access to opportunities, they not only drive technological progress but also promote social equality and community development. Ultimately, this powerful combination can pave the way for a more connected, fair, and sustainable future. This paper focuses to highlight on how these technologies can solve real world problems in education, healthcare etc. It also explains how these technologies can empower communities for smarter decision making.

Keywords: Artificial Intelligence, Data Anaytics, Metaverse**,** Virtual World, Community Development

FACULTY'S EMOTIONAL INTELLIGENCE AND RESISTANCE TO ARTIFICIAL INTELLIGENCE ADOPTION: IMPLICATIONS FOR JOB PERFORMANCE IN HIGHER EDUCATION OF RAJASTHAN

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ABSTRACT:

Over the past several decades, education has made significant progress due to advancements in information and communication technology (ICT). Artificial intelligence (AI) holds great potential to revolutionize education and learning. However, the integration of AI in education should prioritize emotional management alongside academic achievements, as emotional factors play a vital role in the educational process (González et al., 2023). This study explores the impact of emotions and artificial intelligence on learning and interpersonal interactions within educational environments.

Technologies such as automated grading, plagiarism detection, virtual assistants, and adaptive learning systems have the potential to transform teaching and research in higher education. Despite these benefits, many faculty members resist adopting AI, perceiving it as a threat to their roles. Overcoming such resistance may require emotional intelligence (EI), as faculty with higher EI can better manage stress, emotions, and technological changes, ultimately enhancing their teaching, research, and contributions to their institutions.

This study investigates the influence of Emotional Intelligence (EI) on faculty resistance to AI adoption and job performance in higher education institutions in Rajasthan, India. Drawing on theories of emotional regulation and technology resistance, it posits that teachers with higher EI are better equipped to manage stress, adapt to technological disruptions, and embrace AI-enabled practices—thereby reducing resistance and improving performance. Structural equation modeling is employed to analyze data from a quantitative, cross-sectional survey utilizing validated measures of EI, technology resistance, and job performance.

The findings aim to extend theoretical understanding by integrating emotional and technological dimensions of faculty performance. Additionally, they provide practical insights for policymakers and administrators to develop EI-based interventions and training programs that facilitate smoother AI integration in higher education.

Keywords: Emotional Intelligence, Artificial Intelligence Adoption, Technology Resistance, Job Performance, Higher Education, Rajasthan

BLOCKCHAIN-DRIVEN DATA SECURITY IN THE METAVERSE: ENHANCING TRUST AND TRANSPARENCY

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ABSTRACT:

The merging of the data analytics and metaverse is changing the digital economy of the world. It creates chances for immersive experiences, business changes, and quick decision-making. However, as companies move to data-heavy virtual environments, issues of security, privacy, and trust become very important. Block chain, with its secure ledger and decentralized structure is the key to solving these problems. It ensures safe identity management, clear and smooth transactions, and trustworthy data integrity management.

This study shows that how block chain technologies can be combined with metaverse platforms to create strong frameworks for security and governance. It uses case analysis and prototype simulations to explore block chain applications for identity verification, secure asset ownership, decentralized finance in virtual spaces, and smart contracts for business processes and transactions. The study also examines how block chain and data analytics work together to find fraud, boost cyber resilience, and provide audit trails in immersive digital environments. The findings show how block chain can reshape trust in metaverse interaction by reducing cyber risks, building user confidence, user environment and allowing safe connections between different platforms. The research also points out important policy matters, such as regulation, ethical challenges, and the trade-off between transparency and user privacy. The paper also presents block chain as a base for sustainable management and secure metaverse growth. It empowers businesses, organizations and IT leaders to create new future-ready, data-focused systems that are resilient and accountable.

Keywords: Block chain, Metaverse, Data Security, Cyber Resilience, Decentralized Identity, Trust Frameworks, Smart Contracts, Virtual Ecosystems, sustainable management,

AI DRIVEN PRODUCTIVE AND PERSPECTIVE MODEL IN CRIMINAL INVESTIGATIONS: LEVERAGING DATA ANALYTICS AND THE METAVERSE

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ABSTRACT:

Artificial Intelligence (AI), Data Analytics, and the Metaverse are rapidly reshaping the landscape of modern digital ecosystems, with far-reaching implications for fields such as healthcare, business, education, and law enforcement. Among these, criminal investigation stands out as an area where the adoption of advanced technologies can significantly improve both efficiency and accuracy. AI-driven predictive and prescriptive models allow investigators to process massive amounts of structured and unstructured data, identify critical patterns, and generate actionable recommendations. When coupled with the analytical depth of data analytics and the immersive visualization capabilities of the Metaverse, these models provide a comprehensive framework for redefining investigative practices in the digital era.

The integration of AI and data analytics into criminal justice enables faster identification of suspects, better analysis of forensic evidence, and stronger connections between disparate information sources. Predictive models assist investigators in anticipating suspect behaviour and narrowing down possibilities, while prescriptive models recommend the most effective investigative pathways. For example, in complex cases such as the Tamil Triple Murder, AI technologies can analyse hours of CCTV footage, detect anomalies in suspect movements, interpret digital communications using natural language processing, and highlight potential leads that might otherwise be overlooked. In addition, Metaverse-based platforms offer immersive crime scene reconstruction, enabling multi-agency collaboration and real-time evidence mapping, thus transforming the way investigators approach critical cases.

The focus of this research paper is to examine how the convergence of AI, data analytics, and the Metaverse can collectively enhance criminal investigations by improving evidence accuracy, reducing timelines, and strengthening collaboration. The study also emphasizes the challenges associated with these technologies, including concerns over data privacy, algorithmic bias, ethical governance, and the legal admissibility of AI-generated evidence. Addressing these challenges is crucial to ensuring that the use of AI remains both effective and socially responsible. Ultimately, this paper highlights the transformative potential of predictive and prescriptive AI models in creating a modern investigative ecosystem that is not only technologically advanced but also transparent, ethical, and aligned with the principles of justice.

Keywords: Artificial Intelligence, Data Analytics, Metaverse, Predictive Models, Prescriptive Analytics, Criminal Investigation, Forensic Data, Ethical AI

EDGE AI FOR SMART HEALTHCARE

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ABSTRACT:

Artificial Intelligence (AI) and the Internet of Things (IoT) are transforming healthcare systems by enabling smarter, faster, and more reliable medical services. With the help of these technologies, patients vital signs such as heart rate, blood pressure, oxygen levels and temperature can be continuously monitored in real time. This allows doctors and caregivers to respond quickly, improving both the quality of treatment and patient safety. However, the growing amount of healthcare data generated by IoT devices creates challenges related to storage, transmission and latency. To address these issues, edge computing has emerged as a powerful solution, as it allows data to be processed closer to where it is generated rather than sending everything to distant cloud servers.

This paper presents a scalable and reliable AI-enabled IoT healthcare framework that integrates edge computing to minimize latency and ensure faster response times. The proposed system operates in three stages: (i) collection of patient health data through IoT-enabled wearable and sensor devices (ii) data processing and analysis at edge nodes using AI smodels and (iii) secure storage and data sharing through edge data centers. By distributing the workload to edge nodes, the system can provide real-time feedback and decision support without unnecessary delays. The additional advantage of this approach is the use of edge controllers for intelligent scheduling and resource allocation. These controllers ensure that patients are prioritized and provided with the necessary resources efficiently, which is especially important in emergency care and resource-constrained environments. The framework was tested through simulation studies and the results show significant improvements in reducing end-to-end delay, optimizing computation and minimizing transmission latency. To further understand the system in real-world healthcare, a neural network model works well to do prediction of transmission latency under different conditions. This demonstrates the practicality of the framework in real-time deployment scenarios.

The review also shows the potential applications of such a system in supporting elderly and disabled patients who require continuous monitoring as well as in pandemic situations where remote healthcare delivery is essential. By reducing dependency on physical hospital visits and enabling timely interventions, the system can improve healthcare accessibility and efficiency.

In summary, this review paper provides insights into how the integration of AI, IoT and edge computing can shape the future of healthcare. It not only examines system design and simulation results but also discusses the broader implications for real-world deployment. The findings suggest that AI-enabled IoT healthcare frameworks with edge computing can play a crucial role in building responsive, reliable and patient-centered healthcare systems.

Keywords: Artificial Intelligence, Internet of Things, Edge Computing, Healthcare Monitoring, Low Latency, Neural Networks, Real-Time Scheduling, Pandemic Care, Remote Healthcare

BIG DATA AND DATA ANALYTICS: TECHNICAL FOUNDATIONS AND APPLICATIONS

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ABSTRACT:

The rapid growth of digital technologies has led to an explosion of data generated every second through social media platforms, mobile devices, sensors, business transactions, and enterprise systems. This phenomenon, commonly referred to as Big Data, is not only about the enormous quantity of information but also its speed, diversity, and reliability. Traditional data management techniques are unable to cope with these demands, which make new approaches to data storage, processing, and analysis essential. In this context, Data Analytics has emerged as a crucial discipline that transforms raw, large-scale datasets into meaningful insights, supporting evidence-based decision-making in both academia and industry.

Big Data Analytics is often described through four progressive stages: descriptive, diagnostic, predictive, and prescriptive analytics. Descriptive analytics explains what has happened, diagnostic identifies why it happened, predictive forecasts future outcomes, and prescriptive suggests actions to optimize results. These layers are made possible by modern computational frameworks such as Hadoop and Apache Spark, which allow massive datasets to be processed efficiently, along with advanced methods in machine learning, deep learning, and natural language processing. Together, these tools and techniques make it possible to uncover trends, patterns, and relationships that would otherwise remain hidden.

The applications of Big Data Analytics are diverse and impactful. In healthcare, it is used to predict disease risks and improve patient care through personalized treatment. In finance, large-scale transaction analysis helps detect fraud and strengthen risk management systems. Retail companies rely on consumer behavior data to design better marketing campaigns and manage supply chains. Governments and smart cities apply analytics to improve traffic flow, manage resources, and respond more effectively to emergencies. These examples demonstrate that Big Data is not just a technological advancement but a driver of social and economic transformation.

However, the growth of Big Data also raises serious challenges. Privacy and security of sensitive data remain a global concern, especially as more personal and behavioral data is collected. Another challenge lies in ensuring the accuracy and quality of data, since decisions based on faulty or biased information can have harmful consequences. Moreover, the shortage of professionals trained in data science, distributed computing, and statistical modeling limits the full-scale adoption of analytics in many organizations. Beyond technical barriers, ethical considerations such as algorithmic bias and transparency in automated decision-making must also be addressed to maintain trust in data-driven systems.

Looking ahead, Big Data is expected to expand further through its integration with technologies such as the Internet of Things (IoT), edge computing, and blockchain. IoT devices will continue to generate vast real-time data streams, while edge computing will help reduce delays by processing data closer to its source. Block chain, on the other hand, offers opportunities for more secure and transparent data handling. These developments highlight that Big Data Analytics will remain at the center of digital transformation, but its success depends on achieving a balance between innovation, responsibility, and ethical governance.

In summary, Big Data and Data Analytics together represent a paradigm shift in how organizations and researchers approach information. By enabling large-scale, accurate, and timely analysis, they provide tools to make smarter decisions and solve complex problems. This paper explores the fundamental principles, technological foundations, practical applications, challenges, and future opportunities of Big Data Analytics, emphasizing both its transformative potential and the responsibilities it entails.

Keywords: Big Data, Data Analytics, Block chain, Big Data Analytics

AI-DRIVEN FORECASTING OF INCLUSIVE GROWTH IN AFRICAN ECONOMIES

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ABSTRACT:

Inclusive growth remains a pressing policy priority across African economies, where rapid technological change and globalization increasingly coexist with deep-seated structural inequalities. Despite strong economic growth over the past two decades in many African nations, the benefits of such growth have not been equitably shared across populations. Persistent challenges such as income inequality, unemployment, low financial inclusion, and macroeconomic volatility continue to constrain the ability of growth to translate into meaningful social and economic opportunities for the majority. In this context, there is a growing need for rigorous, data-driven approaches that can both capture the multidimensional nature of inclusive growth and help policymakers identify the levers most critical for fostering equitable development. This study leverages machine learning techniques to construct a composite Inclusive Growth Proxy (IGP) from a set of macroeconomic and financial indicators, and to evaluate its underlying determinants across African economies. Using balanced panel data, the IGP was developed by integrating measures of income distribution, private sector credit penetration, trade openness, inflation, and investment activity dimensions widely acknowledged in the literature as central to the inclusivity of growth. To model the IGP and assess its drivers, Ridge regression was employed. This approach was chosen due to its ability to handle multicollinearity among predictors, a common issue in macroeconomic datasets, while also providing interpretable coefficients that shed light on variable importance. The empirical results indicate that financial sector development, particularly the expansion of private sector credit, exerts the strongest positive influence on inclusive growth. This finding underscores the role of financial deepening and credit accessibility in empowering households and firms, broadening participation in economic activity, and enabling the benefits of growth to be distributed more widely. Trade openness also emerges as a significant determinant, highlighting the role of cross-border integration, regional markets, and globalization in enhancing growth inclusivity by creating employment opportunities and stimulating investment. Conversely, inflation exhibits a negative association with the IGP, reinforcing the view that macroeconomic instability undermines welfare gains by eroding purchasing power and disproportionately affecting vulnerable groups. The predictive performance of the model, with $R^2 = 0.72$, demonstrates the robustness of the machine learning approach in capturing the complexity and interdependencies inherent in inclusive growth dynamics. Beyond prediction, the framework allows for the identification of policy-sensitive variables, thus offering a pragmatic tool for monitoring progress and evaluating the potential impact of structural reforms. From a policy perspective, the findings carry important implications. Strengthening digital financial systems, expanding private sector credit in an inclusive manner, and investing in financial literacy can significantly accelerate inclusive development. Simultaneously, enhancing regional trade frameworks and mitigating inflationary pressures through sound macroeconomic management are essential for ensuring that growth translates into broad-based welfare improvements. By applying machine learning methods to macro-financial data, this study contributes to the growing literature on artificial intelligence and digital technologies as enablers of inclusive growth in Africa. The approach provides both a scalable empirical framework and actionable insights for policymakers seeking to align economic transformation with social equity, thus advancing the long-term agenda of inclusive and sustainable development on the continent.

Keywords: Africa, Emerging Technologies, Financial Development, Inclusive Growth, Machine Learning

AN ANALYSIS ON AI-DRIVEN PREDICTIVE AND PRESCRIPTIVE MODELS

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ABSTRACT:

Artificial intelligence (AI) has become a disruptive force in many industries in the quickly changing digital landscape. Predictive and prescriptive modeling approaches are two of its most influential uses; they allow businesses to predict future events and suggest the best course of action with exceptional precision and effectiveness. The methods, uses, advantages, and drawbacks of AI-driven predictive and prescriptive models are all thoroughly examined in this paper. Forecasting future events is made possible by predictive models, which use historical data to find patterns and trends. Machine learning algorithms like decision trees, support vector machines, neural networks, and ensemble methods are frequently used in these models. Predictive modeling now has previously unheard-of capabilities for processing unstructured data, including text, images, and audio, thanks to the development of deep learning.

AI-enhanced predictive analytics is commonly utilized in finance for risk evaluation, healthcare for disease identification, marketing for customer behavior analysis, and supply chain management for demand forecasting. Prescriptive models, on the other hand, take it a step further by using predictive insights to suggest the best way to go. These models use optimization methods, simulation, and reinforcement learning to suggest choices that will help the business reaches its goals. Prescriptive models can change with new data and changing conditions when they are combined with decision-making frameworks and predictive analytics. Personalized healthcare treatment planning, route optimization in logistics, dynamic pricing strategies in e-commerce, and automated trading systems in financial markets are all examples of use cases.

The combination of predictive and prescriptive analytics is a major change in decision support systems. AI is very important for making these models more accurate, scalable, and flexible. Big data technologies, cloud computing infrastructure, and real-time data streams from IoT devices are all important enablers that work together to power data-driven AI models. Using Natural Language Processing (NLP) and explainable AI (XAI) techniques makes models even more clear, trustworthy, and easy to understand.AI-driven predictive and prescriptive models have a lot of good things about them, but they also have a lot of problems. Data quality and availability are still very important, because biased or incomplete data can lead to wrong results.

Also, the fact that AI algorithms are so complicated and some models are black boxes raises ethical and regulatory questions, especially in sensitive areas like healthcare and criminal justice. Also, making sure that AI-based decision-making is fair, accountable, and follows privacy rules is an ongoing issue.

This paper stresses the importance of a balanced approach that takes into account both technological progress and moral issues. Companies that use AI-powered predictive and prescriptive models need to spend money on strong data governance, ongoing model evaluation, and systems that put people in the loop to make sure the models are used responsibly and effectively.

To sum up, AI-powered predictive and prescriptive models mark a substantial advancement in data analytics and judgment. Across all industries, their capacity to foresee emerging trends and suggest workable solutions gives them a competitive edge. However, in addition to technical know-how, a careful approach to data ethics and human oversight are necessary for the successful implementation of such models. AI's incorporation into prescriptive and predictive frameworks will revolutionize how businesses handle complexity, unpredictability, and strategic planning in the twenty-first century as it develops further.

Keywords: Artificial Intelligence, Natural Language Processing, Prescriptive Models, Predictive Models

NATURAL LANGUAGE PROCESSING AND MACHINE LEARNING: A CONVERGENCE OF LINGUISTIC INTELLIGENCE, EMOTIONAL INSIGHT, AND CULTURAL RELEVANCE

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ABSTRACT :

This paper explores the convergence of Natural Language Processing (NLP) and Machine Learning (ML) as a transformative paradigm in linguistic intelligence, emotional insight, and cultural relevance. Recent advancements in deep learning have enabled NLP systems to move beyond basic syntactic parsing, now embracing semantic nuance, sentiment gradients, and contextual interpretation. This evolution allows machines to comprehend not only the literal meanings of language but also its emotional undertones and cultural contexts.

The study emphasizes the necessity of developing emotionally intelligent and culturally adaptive AI systems, particularly in multilingual societies like India, where idiomatic expressions and regional dialects demand heightened sensitivity. With India being home to over 19,500 languages and dialects, this presents a unique challenge and opportunity for AI to bridge communication gaps and foster understanding. Various applications, including education, digital storytelling, and competency-based assessment, are examined to illustrate how ML-enhanced NLP can personalize learning experiences, interpret poetic and metaphorical language, and facilitate inclusive content creation. For example, in educational settings, AI-powered tools can adapt to dierent learning styles and languages, providing tailored support to students.

Ethical considerations are also discussed, highlighting the need for culturally representative datasets, strategies for bias mitigation, and adherence to copyright regulations in content generation. The paper proposes a framework for designing AI systems that are not only technically procient but also empathetic and socially responsible. By integrating emotional and cultural dimensions into computational models, this research contributes to the development of AI that meaningfully supports educators, creators, and learners in context-aware ways. This convergence represents a shift from mechanical processing to nuanced interpretation, positioning NLP and ML as collaborative forces in human expression and cultural preservation. Moreover, this integration of technology and culture could potentially lead to innovations in digital heritage preservation, allowing for the safeguarding of endangered languages and traditions.

Keywords: Natural Language Processing, Machine Learning, Emotional Intelligence, Cultural Relevance, Multilingual AI

BUILDING SUSTAINABLE AND CUSTOMER-CENTRIC BUSINESSES THROUGH METAVERSE AND ANALYTICS

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ABSTRACT:

The business world is going through major changes with the rise of the Metaverse and the growth of data analytics. The Metaverse creates virtual spaces where people can interact, shop, and connect with brands in ways that were not possible before. Data analytics supports this transformation by providing companies with real-time insights into customer behavior, market trends, and business performance. Together, these tools help organizations redesign their strategies, improve services, and create long-term value.

This research focuses on how businesses are using the Metaverse for marketing, customer engagement, e-commerce, and brand loyalty. Extended reality (XR), virtual reality (VR), and augmented reality (AR) are making the customer journey more interactive and enjoyable. At the same time, data analytics allows companies to study patterns, predict demand, and make faster, evidence-based decisions.

Another important part of this transformation is operational improvement. Robotic Process Automation (RPA), digital dashboards, and supply chain analytics are helping organizations reduce errors, save time, and increase efficiency. Fraud detection systems and risk management processes are also being improved through analytics, making virtual environments safer and more reliable.

Sustainability is becoming a key focus for businesses. By using predictive and transparent data systems, companies can monitor resources, reduce waste, and adopt environmentally responsible practices. In addition, new opportunities in entrepreneurship and finance are opening up in the Metaverse, especially in e-commerce and emerging markets.

Overall, the findings show that the combination of immersive technologies and analytics is driving business transformation across many sectors. This change is not only about technology but also about building sustainable, customer-focused, and competitive organizations for the future.

Keywords:

Metaverse, Data Analytics, Customer Engagement, E-Commerce, Sustainability, Risk Management, Business Transformation, Supply Chain

AI POWERED ACADEMIC ADVISOR CHATBOT: PERSONALIZED GUIDANCE FOR STUDENTS THROUGH NATURAL LANGUAGE INTERACTION

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ABSTRACT:

Modern universities face a growing challenge in providing adequate academic support to their students. With increasing enrolment numbers and limited faculty resources, traditional one-on-one academic advising often falls short of meeting student needs. Many students struggle to get timely guidance on course selections, career paths, and academic planning, leading to delayed graduations and uncertain career directions.

This research explores how gap can be bridged through an intelligent chatbot designed specifically for academic advising. Our proposed system goes beyond simple question-and-answer interactions by creating personalized conversations with students about their academic journey. The chatbot learns from each student's unique background, academic performance, and career interests to offer tailored recommendations that evolve over time.

What makes this approach particularly valuable is its ability to be available 24/7, providing immediate support when students need it most – whether they're planning their next semester at midnight or exploring career options during summer break. The system doesn't replace human advisors but rather extends their reach, handling routine inquiries while identifying students who need more specialized guidance.

Through advanced language understanding capabilities, the chatbot can engage in meaningful conversations about complex topics like degree requirements, prerequisite planning, and career alignment. It maintains detailed profiles of each student's progress and preferences, enabling increasingly sophisticated recommendations as the relationship develops.

Early indicators suggest that such systems could significantly improve student satisfaction with academic support services while reducing the administrative burden on faculty advisors. By making academic guidance more accessible and responsive improvements can be anticipated in student retention rates and more informed decision-making throughout their academic careers.

This study presents the methodology for developing and implementing this intelligent advising system, with particular attention to ensuring student privacy and maintaining the personal touch that makes academic advising effective.

Keywords: Intelligent Academic Support, Conversational AI in Education, Personalized Student Guidance, Educational Technology, Digital Academic Advising

METAVERSE: A FRAMEWORK FOR TANGIBLE REAL-WORLD IMPLEMENTATION

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ABSTRACT:

The Metaverse will rapidly evolve in the future generation. It represents the next evolution of the internet. It is a 3D virtual world where we are represented by avatars, can interact with each other with a lot of digital objects, avatars as clothing, a virtual house, a car, and a city.

The metaverse will experience in three dimensions- real-time, allowing for live, synchronous interactions with the environment and other users. Single Unifies metaverse doesn't exist yet, several platforms embody elements of the concept, serve as a 'Proto metaverse'. Companies like Microsoft Mesh for Teams allow colleagues to collaborate in a shared 3D space and enhance the Hybrid work culture. They can use digital twin Technology and Virtual Reality (VR) to create realistic simulations for training employees, engineers learn to repair complex machinery without risk, and construction workers can visualize architectural plans on-site through Augmented Reality (AR) headsets. Walmart has used VR to train over a million employees in skills ranging from customer service to crisis management. Users and businesses can create, own, invest, sell, and be rewarded for a wide range of virtual assets and services, often powered by technologies like blockchain and non-fungible tokens (NFTs).

A significant portion of the content, experiences, and environments within the Metaverse will be created by its users, not by the platform owners. Brands like Nike and Gucci have created virtual experiences and sold digital-only apparel and accessories for avatars on platforms like Roblox. Platforms like Decentraland and The Sandbox allow users to buy, develop, and monetize virtual plots of land as NFTs. Virtual Showrooms, "Try Before You Buy": Using AR, customers can see how a new Dining room would look in their living room or how a particular lipstick shade will look at you through their smartphone camera. The metaverse will break down all the geographical barriers and lead a revolution in Hybrid work culture substantial amount of content, experiences, and environments within the Metaverse will be generated by its users, rather than exclusively by platform proprietors.

However, despite significant investment and widespread enthusiasm, the path to successful real-world implementation is fraught with challenges. The metaverse is rapidly transitioning from a speculative, futuristic concept into a practical and impactful business reality. The critical gap lies between technological possibility and human-centric utility. the most successful applications of the metaverse are not driven by novelty, but by clear business objectives. Whether it's enhancing employee training, optimizing complex manufacturing processes with digital twins, creating immersive customer experiences, or fostering deeper collaboration among remote teams, the focus must be on delivering measurable value and a clear return on investment. For the metaverse to become truly main stream, it must be intuitive, accessible, and solve problems more effectively than existing tools. This means prioritizing user experience, addressing hardware limitations, and ensuring that these new digital spaces are inclusive and safe for everyone. In the long term, the true power of the metaverse will be unlocked not by walled gardens, but by an interconnected ecosystem where users and their digital assets can move seamlessly between different worlds and experiences. This will require a commitment to open standards, much like the protocols that underpin the internet today.

Keywords: Virtual Reality**,** non-fungible tokens, Augmented Reality, Metaverse, block chain

INTEGRATING DATA ANALYTICS WITH THE METAVERSE: A PATHWAY TO NEXT-GENERATION BUSINESS GROWTH

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Dr. Anubha Jain, Director, IIS (Deemed to be University), Jaipur.

ABSTRACT:

In today's world, technology is changing very fast in this digital world which has moved faster than expected. Technology have come up with two new ideas that are becoming very important and useful now a days are: Metaverse and Data Analytics.

Metaverse is all about virtual reality or online games, but all digital world where people can work together and meet others and learn to interact with people, can do businesses by using virtual spaces. Whereas, Data Analytics helps us to recognise the large amount of information along with the patterns and make better choices.

When these two come together in one platform they open a new way of redefining their usage together in a way they can change the businesses and IT work and can operate in the future. The Metaverse gives virtual environments to companies to setup or to create an office to conduct the meetings, shops and other services in a virtual space. For example, a company can make a virtual shop where customers walk around, see products, and talk to staff. At the same time, data analytics can track what customers do inside the shop, what they like, and what they ignore. This helps the business improve their products and provide a better experience. In this way, the Metaverse and data analytics together can make business more effective and save both money and time. From an IT perspective both of them comes with a big change that how digital system are very well designed and managed. Whereas earlier IT Systems only supported websites apps and cloud storage. Now a days IT companies need to think about supporting 3D environment throughout the systems, line interactions, safe and secure data sharing across all different platforms. Analytics helps IT teams by showing them what works well, where problems are, and how users behave. This makes IT stronger and more flexible for the future.

There are many reasons or areas where this type of combination can be used and endless. In education students can attend virtual classes that feel more real, and teachers can use analytics to track the data to check the performance of the student and give personalized guidance. In healthcare, doctors can interact with patients in virtual clinics and use data analysis to predict health risks or treatment outcomes. In shopping, companies can make virtual malls where customers buy things from home, and data can be used to suggest items. Even governments can use the Metaverse to plan smart cities and improve services.

However, with all these opportunities there are also some problems which can come over challenges. In which the biggest concerns are data privacy, cybersecurity, ethical use of analytics are very important. The Metaverse collects a lot of sensitive data, including how people behave, communicate, and even move in a virtual world. Businesses and IT professionals need to make sure this data is protected and used responsibly. It collects a lot of information about people, like how they act and move in the digital space. This must be kept safe and not misused. Another issue is that different platforms must work together; otherwise, the Metaverse will stay broken into small parts instead of becoming one connected space.

This paper focuses on the integration of Metaverse and Data Analytics together that can completely change the technology support for IT and Business work. The paper explores new chances to connect with people, understand them better, and build smarter systems. This smart combination can help in create a digital future which is not only more advanced, more connected, intelligent, more useful, and human friendly.

Keywords: Metaverse, data Analytics, Business growth

THE ROLE OF METAVERSE, ANALYTICS AND AUTOMATION IN BUSINESS GROWTH

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ABSTRACT:

The Metaverse and data analytics are creating new opportunities for business transformation in today's digital world. Companies are moving beyond traditional models by using immersive technologies like virtual reality (VR), augmented reality (AR), and extended reality (XR) to connect with customers in more engaging ways. At the same time, real-time analytics and artificial intelligence help businesses understand customer behavior, improve decision-making, and design more personalized experiences. As businesses begin to explore virtual real estate, 3D product simulations, and avatar-based communication, the Metaverse opens new dimensions for branding, training, and customer engagement.

This study highlights how tools like robotic process automation (RPA), predictive analytics, and digital dashboards are making operations faster and smarter. Businesses are also using these technologies for supply chain efficiency, fraud detection, and risk management. In addition, AI-driven talent acquisition and employee engagement in the Metaverse are changing how organizations manage human resources. By leveraging predictive and prescriptive analytics, companies can forecast market trends, optimize marketing campaigns, improve customer segmentation, and make more informed strategic decisions.

Another important aspect is sustainability. Data-driven insights and virtual platforms allow companies to adopt eco-friendly practices, increase transparency, and build trust with stakeholders. E-commerce, branding, and entrepreneurship are growing rapidly in the Metaverse, giving rise to new business opportunities and revenue models.

The research concludes that the integration of the Metaverse with advanced analytics and automation will lead enterprises to achieve growth, efficiency, and customer loyalty in a competitive environment. Together, these tools not only support digital transformation but also enable organizations to adapt quickly, innovate continuously, and drive sustained business growth in an increasingly complex and competitive business world.

Keywords: Metaverse, Data Analytics, Automation, Customer Experience, Sustainability, E-Commerce, Business Transformation, Innovation, Virtual Reality, Business Intelligence, Robotic Process Automation

REDEFINING INVESTOR TRUST: A SENTIMENT ANALYSIS OF ROBO-ADVISORS IN THE DATA-DRIVEN ERA

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ABSTRACT:

The rapid convergence of financial technology, artificial intelligence, and data analytics is transforming the global investment landscape, with Robo-Advisory platforms standing out as a significant innovation. By combining machine learning algorithms and big data insights, these platforms provide investors with automated, personalized, and cost-effective portfolio management solutions that challenge traditional advisory models. However, the way investor's view, trust, and interact with these platforms is just as important to their success as their technological prowess.

To determine the factors that influence investor happiness and dissatisfaction with Robo-advisory services, this study analyses vast amounts of investor ratings and comments using sentiment analysis and natural language processing (NLP). The results show that favourable sentiment is frequently linked to clear communication, easy-to-use interfaces, reasonable pricing schedules, strong security protocols, and consistent returns. Negative opinions, on the other hand, are expressed regarding unstated expenses, uneven performance, poor customer service, and unclear advice.

This study offers practical ideas for raising user engagement, boosting service quality, and bolstering confidence in digital financial platforms by incorporating advanced data analytics into the evaluation of investor experiences. The article emphasises how new technologies like the metaverse might further reshape investor-advisor relationships through gamified financial learning, virtual advisory consultations, and immersive experiences, going beyond existing implementations. This research, which sits at the nexus of fintech evolution, IT innovation, and behavioural finance, advances our knowledge of how data-driven strategies and cutting-edge technologies might transform investor relationships and company strategies in the digital economy.

Keywords: Artificial Intelligence in Finance, Automated Investment, Financial Technology, Investor Satisfaction, Investor Sentiment, Robo-Advisors, Sentimental Analysis

VISUAL ANALYTICS FOR REAL-TIME FRAUD DETECTION IN VIRTUAL E-COMMERCE SYSTEMS

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ABSTRACT:

This paper describes the confluence of visual analytics and state-of-the-art machine learning (ML) techniques to detect fraud in real-time within virtual online shopping platforms, such as the new breed of metaverse-based marketplaces. The swift transformation of digital trade has transformed the consumer experience by making transactions immersive, interactive, and decentralized. Yet, this digital growth has also been accompanied by a drastic increase in the volume, complexity, and sophistication of fraudulent transactions. Cyber-criminals are increasingly making use of automation, identity obfuscation, cross-platform washing, and concerted attack channels that bypass conventional fraud detection systems. As such, there is a pressing need for novel, adaptive, and open fraud detection systems that can function in high-speed, high-volume transactional environments.

This research fills this gap by deploying a hybrid anomaly detection model trained on a synthetic e-commerce transaction dataset. The dataset captures realistic transactional parameters—transaction value, frequency, geolocation, device fingerprinting, and behavioral patterns—designed to replicate true and false behavior in both conventional online marketplaces and metaverse-driven commerce platforms. The machine learning system utilizes an ensemble of Isolation Forests, Random Forests, and Gradient Boosting models for stable anomaly detection.

A characteristic aspect of this research is the use of interactive visual analytics dashboards to bridge the gap between ML outputs and human decision-making. Time-series visualizations, geospatial heatmaps, and network graphs allow analysts to identify anomalous clusters, high-risk geographies, and suspicious connections. Real-time pipelines using Apache Kafka and Spark Streaming enable uninterrupted fraud detection within milliseconds.

This combination greatly enhances fraud detection accuracy, minimizes false positives, and improves analyst response time. The findings highlight that human-centered AI, when coupled with real-time analytics, offers a powerful framework for combating fraud in decentralized e-commerce ecosystems.

Keywords: Visual Analytics, Fraud Detection, Machine Learning, Real-Time Data Analytics, Metaverse E-Commerce, Anomaly Detection, Streaming Data, Human-Centered AI, Data Privacy, Cybersecurity

INTEGRATING XAI WITH METAVERSE PLATFORMS FOR TRANSPARENT CROP PRICE FORECASTING

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ABSTRACT:

Crop procurement and its associated supply chain is the backbone of the global agricultural industry which ensure a steady flow of essential crops for food production and its distribution. However, this process is very complicated as its having connected challenges such as price volatility, supply chain inefficiencies, and sustainability concerns due to traditional procurement practices. Farmers continue to struggle with price volatility, distrust in digital projections, and comprehension of complicated data, issues that current methods are unable to resolve because of gaps in literacy and accessibility.

To overcome these barriers, this research proposes a novel framework that integrates the Metaverse with Explainable Artificial Intelligence (XAI) to deliver a crop price prediction. The framework leverages historical crop price and production data, combined with dynamic factors such as seasonal production patterns, market arrivals, and price segregated based on crops, to produce accurate and reliable forecasts. AI possesses the capacity to revolutionize crop procurement by enhancing decision-making, optimizing supply chain operations, and promoting sustainability. Moreover, the adoption of explainable AI (XAI) in crop procurement has the potential to increase transparency, interpretability, traceability and accountability in AI systems. In this complex landscape, using Metaverse the farmers can get guidance from Experts in a virtual environment that offers several methods of digitally interacting and experiencing different use cases. Such interactive experiences lower the barriers posed by limited digital literacy, empower farmers to resist exploitation by private traders, and improve their profitability by facilitating evidence-based market choices. The system is built using different machine learning (ML) algorithms, including ARIMA, XGBoost, and LSTM and performance was measured using MAE and RMSE. An XAI layer that employs SHAP values and causal reasoning gives understanding of the causes of price changes, increasing farmer trust. The metaverse interface delivers results through immersive 3D environments and interactive simulations, allowing farmers to visualize scenarios, interpret recommendations, and make informed market decisions. Beyond farmer empowerment, the framework has significant implications for governance and food security. By monitoring real-time procurement and supply chain dynamics, governments can improve traceability, enhance resource allocation, and safeguard against shortages or disruptions. This approach demonstrates how emerging technologies can reshape agricultural supply chains, strengthen food security. In the future, this framework can be extended to build a comprehensive metaverse mandi for virtual market planning and transactions. This approach offers a transparent, interactive, and farmer-friendly decision-support system for resilient agri-economics.

Keywords: Metaverse, Machine Learning, Explainable AI, Decision Making, Transparency, Intractability, Agriculture sustainability, Crop Price Prediction.

PERFORMANCE ANALYSIS OF HADOOP-MAPREDUCE IN PSEUDO-DISTRIBUTED MODE FOR WORDCOUNT APPLICATION

Dr. Vandana Vijay, Assistant Professor, S. S. Jain Subodh PG College, Jaipur

ABSTRACT:

Business Intelligence (BI) has been around for quite a long time, and it keeps on yielding significant business experiences. However, as information volumes keep on detecting, new techniques for storage and analysis are requisite. Hadoop has arisen as a well-known method for dealing with both the storage and analysis of these huge volumes of information. Utilizing Apache Hadoop or one of the commercial distributions, organizations can store petabytes or zettabytes of information in the Hadoop Distributed File System (HDFS) and examine it utilizing MapReduce framework. MapReduce can reduce long computation times to minutes or seconds. A well-known benchmarking tool, WordCount, is included in the Apache Hadoop distribution for analysing its performance. The main objective of this paper is to examine the performance of Hadoop-MapReduce in pseudo-distributed mode using WordCount. The WordCount is an application that calculates the frequency of each word appearing in a text file. In this paper, the experimental work conducted on the Hadoop-MapReduce framework is presented. Different sizes of input data files are executed, and the performance of the Hadoop-MapReduce framework is evaluated with respect to the execution time of the WordCount application.

The paper is split into five given sections: the first section gives the introduction. The second section describes the concepts of the Hadoop-MapReduce framework. It also describes the benchmarking tool, the WordCount application. The third section briefs the implementation details required for evaluating the performance of Hadoop-MapReduce in pseudo-distributed mode. Section fourth highlights the results and discussion predicted through the experiments and finally, the conclusion and future scope are given in section fifth.

Keywords: Business Intelligence, Hadoop, MapReduce, HDFS, WordCount.

METAVERSE AS A TOOL FOR EMPOWERING MARGINALIZED ENTREPRENEURS AND SMALL BUSINESS OWNERS IN INDIA

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ABSTRACT:

The Metaverse, a convergence of augmented reality (AR), virtual reality (VR), blockchain, and artificial intelligence (AI), is evolving as a transformative digital space with enormous potential for reshaping economic participation and entrepreneurial engagement. For a country like India, where a vast segment of entrepreneurs operate from the margins—be it due to caste, gender, geography, or economic class—the Metaverse presents a unique opportunity to bridge systemic gaps and foster inclusive growth.

Despite global discussions on Metaverse applications, little is known about its potential for marginalized entrepreneurs in developing economies like India. Therefore, this research paper crucially explores the potential of Metaverse technologies to empower marginalized entrepreneurs and small business owners in India. Drawing from digital inclusion theories and the platform economy framework, this study investigates how immersive, persistent digital platforms can democratize access to markets, skills, finance, and networks for entrepreneurs traditionally excluded from the mainstream economy. This paper develops a conceptual framework drawing on three case illustrations and drawn qualitative insights.

The study contributes to digital entrepreneurship scholarship by positioning the Metaverse as a strategic tool for inclusive growth in India. Furthermore, it articulates how the Metaverse can function not just as a futuristic idea, but as an actionable policy and technological intervention to uplift informal, rural, and underserved entrepreneurs. In this way, this study contributes for developing the understanding over a new horizon that was not discussed earlier. Finally, it concludes with a forward-looking agenda for research and practice in India's evolving digital economy.

Keywords: Metaverse, Marginalized entrepreneurs, Small business owners, Digital economy, Conceptual framework.

IMPACT OF AUGMENTED REALITY (AR) AND VIRTUAL REALITY (VR) IN REVOLUTIONIZING THE RETAIL SECTOR: A CONSUMER-CENTRIC STUDY

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ABSTRACT:

Augmented Reality (AR) and Virtual Reality (VR) are reshaping retail by changing the way people explore products and make purchase decisions. AR, in particular, plays a powerful role by blending the online and physical shopping experience. With tools like real-time product previews, virtual try-ons, and tailored suggestions, customers feel more confident in what they are buying. This not only improves engagement and satisfaction but also boosts purchase likelihood. Retailers benefit too, as immersive environments powered by AR help create stronger emotional bonds with shoppers, leading to increased loyalty and a competitive edge. Despite these opportunities, challenges such as high setup costs, technical hurdles, and privacy concerns remain important considerations. A design-thinking approach, focused on simplicity, empathy, and usability, can help retailers integrate AR in ways that truly improve both in-store and online shopping experiences. One of the biggest advantages of AR is its ability to reduce the uncertainty of online shopping. Traditional e-commerce still relies on flat images and written descriptions, which don't always give customers the full picture. Many buyers are left questioning whether a product will fit their lifestyle, match their taste, or suit their space. AR solves this by allowing them to visualize items in real-world settings. For example, IKEA's AR app lets customers see how furniture like sofas or tables would look in their own living room through a smartphone camera. This boosts buyer confidence and cuts down on returns, a major challenge for online retailers. In the fashion and beauty industries, AR try-on features let customers test how clothes or makeup products will look on them before making a purchase, adding personalization and reducing post-purchase regret. From a business angle, AR bridges online and offline shopping. Physical retailers are using smart mirrors or AR kiosks so customers can explore different styles and products without physically touching them—saving time, enhancing hygiene, and offering a fresh brand experience. Meanwhile, online stores use AR to replicate the hands-on feel of in-store shopping, overcoming the limitations of standard digital commerce. In both cases, AR isn't just functional—it keeps shoppers engaged with the brand longer and encourages deeper interaction.

Personalization is another powerful aspect of AR. By combining AR with machine learning and AI, retailers can recommend items based on a customer's preferences, purchase history, or even real-time choices. Imagine virtually trying on a dress and instantly receiving suggestions for shoes or accessories that pair well with it. Some brands also integrate AR into loyalty programs through gamified experiences—like digital treasure hunts or interactive rewards—which motivate repeat purchases while strengthening brand-consumer relationships.

At the same time, barriers to adoption exist. Implementing AR requires significant investment in technology and trained professionals. While large brands can manage this, smaller businesses may struggle. Technical challenges, such as device compatibility, internet speeds, and user learning curves, can also slow down adoption. Privacy is another critical issue, since AR often relies on personal data, camera access, and location tracking to personalize experiences. Retailers must strike the right balance between innovation and consumer trust. Design thinking offers a solution here. By grounding AR development in empathy, customer insights, and iterative testing, brands can ensure the technology is practical, inclusive, and meaningful. Features should remain clear and user-friendly so that people of all ages and technical abilities can benefit. Involving customers directly through feedback and prototyping also helps in building tools that address real needs rather than delivering flashy tech with little value.

Beyond individual purchases, AR shapes long-term loyalty and brand differentiation. Companies that adopt AR not only deliver unique shopping experiences but also position themselves as innovators. Over time, AR will integrate with trends like the metaverse, AI assistants, and social commerce, opening new dimensions for how consumers shop, connect with brands, and even socialize within digital spaces.

KEYWORDS: Augmented Reality (AR), Virtual Reality (VR),, Consumer Behavior, Retail Experience, Product Visualization, Consumer Engagement.

THE EVOLUTION OF GENERATIVE AI: A STUDY OF CHATGPT MODELS

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ABSTRACT:

This study examines the evolution of OpenAI's ChatGPT models from GPT-1 in 2018 to GPT-5 in 2025, highlighting the technological advancements and motivations behind each version. Like upgrading phones or cars, each new model fixes previous issues and adds enhanced features to address expanding real-world demands. Key drivers of this evolution include faster and cheaper computing, correction of errors such as hallucinations and bias, increasing user and business demands for features like multimodal inputs and faster responses, and competition in the AI industry.

Starting with GPT-1, which introduced the transformer architecture and pioneered large-scale unsupervised training, the models advanced to GPT-2's ability to generate coherent paragraphs and triggered important discussions about ethics and misuse. GPT-3's massive scale enabled versatility in language tasks such as translation, coding, and few-shot learning, supported by an API for broad developer access. GPT-3.5 popularized natural conversational AI through human feedback training, kick starting widespread adoption.

GPT-4 expanded capabilities by supporting multimodal inputs (text and images) and increased accuracy, while GPT-4 Turbo optimized speed and cost, enhancing real-time applications. GPT-4o introduced real-time voice, video, and text interaction, broadening accessibility. The o1 series specialized in logical reasoning for complex scientific and coding tasks. GPT-4o mini delivered high performance in lightweight form factors for mobile and low-power devices. GPT-5 progressed toward autonomous agent-like AI, capable of building applications, reducing fabrication and bias while offering deeper integration with apps and services and solving complex problems with increasing independence.

Throughout this evolution, persistent challenges such as ethical concerns, privacy issues, and high computational costs were addressed incrementally. The models enabled impactful applications in education, healthcare, customer support, research, and creative industries. Looking forward, future models aim to be more personalized, ethically aligned, and eco-friendly, integrated seamlessly into daily life—advancing toward artificial general intelligence.

Keywords: GPT models, OpenAI, generative AI, transformer architecture, multimodal AI, conversational AI, reasoning models, AI ethics, artificial general intelligence.

TRANSFORMING BUSINESSES THROUGH DYNAMICS BUSINESS SOLUTIONS WITH MICROSOFT POWER BI AND POWER APPS

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ABSTRACT:

Data analytics has become a driving force in shaping how businesses operate and make informed decisions. With business analytics tools like Microsoft Power BI, organizations can transform raw data into actionable insights. Instead of relying on static reports, companies today can build interactive dashboards that help leaders monitor performance, detect risks, and plan strategically. The study attempts to cover Power BI in action across diverse industry sectors to solve business challenges and foster data-driven decision-making.

In the energy industry application of Power BI dashboards focused on safety, compliance, and field production monitoring. With the integration of Power Automate, real-time alerts were triggered for incidents, ensuring faster response times.

In the banking sector, dashboards showcased KPIs such as loan performance, digital adoption, and customer activity. Power BI allowed simulation of real branch-level data, giving a realistic view of financial operations. This helped demonstrate how banks can track growth, identify issues early, and improve customer engagement.

For supply chain & logistics dashboards on sustainability, finance, and executive summaries during research provided insights on shipment delays, emissions, and cost management. Features like What-If analysis and forecasting enabled decision-makers to plan better for uncertainties. Visuals such as sparklines and dynamic slicers made it easier to explore multiple scenarios and outcomes.

This study also examines the potential of integrating Power BI with Power Apps in case of donor and endowment management as users/donors can view data and also update records directly within the dashboard. This write-back capability depicted how analytics can be combined with action to streamline data management.

The study also examined risk and incident management wherein dashboards helped organizations understand compliance breaches, asset damages, and SLA delays. By visualizing incident trends and predicting risks, businesses could proactively manage operations and avoid costly penalties.

During study Data simulation using Python scripts was done to generate realistic datasets for testing dashboards. Advanced Analytics involving features like forecasting, What-If parameters, and dynamic slicers were also utilized to add depth to analysis. The study also covered integration of Power Apps and Power Automate for write-back and real-time workflows with an aim to extend Power BI from reporting to action. Integrating Microsoft Copilot in research provided natural language Q&A and automated reporting, enhancing user accessibility.

In conclusion, Power BI can be leveraged for advanced business intelligence accelerating business processes across various industry sectors.

Keywords: Power BI, Data Simulation, Interactive Dashboards, Data Analytics.

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METAVERSE DRIVEN CUSTOMER ENGAGEMENT AND IMMERSIVE COMMERCE

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ABSTRACT:

The emergence of the metaverse represents a transformative juncture in digital business strategy, offering novel affordances for customer engagement and commerce. Conceptualized as a persistent, immersive, and interconnected three-dimensional virtual ecosystem enabled by extended reality (XR), artificial intelligence (AI), blockchain, and Web 3.0 infrastructures, the metaverse has been increasingly positioned as a critical site for reimagining consumer–brand interactions. This paper examines the role of metaverse-driven engagement in shaping immersive commerce (i-commerce), with particular emphasis on how experiential affordances alter consumer perceptions, behaviors, and relationship-building processes. Grounded in the theoretical lenses of customer engagement theory, experiential marketing, and service-dominant logic, the discussion situates the metaverse as more than a technological innovation: it is a socio-technical environment in which value is co-created through interactivity, presence, and community participation.

Metaverse-enabled customer engagement is distinguished by its multisensory, interactive, and participatory nature. Prior research on engagement suggests that affective, cognitive, and behavioral dimensions collectively contribute to consumer loyalty and advocacy. In virtual environments, these dimensions are amplified through avatar-mediated interactions, immersive storytelling, and gamified brand experiences that simulate co-presence and social identity. For example, the use of digital twins, branded environments allows consumers to explore products dynamically, customize offerings, and obtain exclusive ownership rights, thereby fostering emotional attachment and perceived value.

Immersive commerce extends traditional e-commerce by integrating transactional, experiential, and social dimensions within a seamless virtual ecosystem. Consumers are able to enter branded metaverse spaces, interact with products in three-dimensional formats, and complete purchases using decentralized, blockchain-based payment systems. This "phygital" model of commerce underscores the interplay between virtual and physical realities, wherein virtual experiences influence offline consumption patterns and vice versa. From a service-dominant logic perspective, value is no longer delivered unilaterally by firms but co-created with consumers, who actively shape brand narratives, product designs, and marketing campaigns within the metaverse. Such participatory dynamics enhance authenticity and inclusivity in consumer–brand relationships, while also generating granular behavioral data that can inform predictive analytics and personalization strategies.

Nevertheless, the adoption of metaverse-driven engagement and commerce is accompanied by critical challenges. Concerns regarding data privacy, interoperability, accessibility, and the psychological implications of prolonged virtual immersion pose ethical and managerial dilemmas. Moreover, the high infrastructural and developmental costs associated with building immersive environments raise questions about scalability and return on investment. These challenges highlight the need for strategic frameworks that balance innovation with responsibility, ensuring that the metaverse evolves as a sustainable and equitable platform for engagement. frameworks that balance innovation with responsibility, ensuring that the metaverse evolves as a sustainable and equitable platform for engagement.

The metaverse offers a paradigm shift from transactional to experiential engagement, positioning immersive commerce as a cornerstone of future consumer–brand interactions. By synthesizing insights from engagement theory, experiential marketing, and service-dominant logic, this paper underscores the transformative potential of the metaverse while calling for further empirical inquiry into its long-term impacts on consumer psychology, marketing practice, and digital economies.

Keywords: Metaverse, Customer Engagement, Immersive Commerce, Experiential Marketing, Service-Dominant Logic, Virtual Environments, Co-creation.

BIG DATA ANALYTICS: EXPLORING APPLICATIONS, BENEFITS, AND CHALLENGES ACROSS INDUSTRIES

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ABSTRACT:

Big data refers to the enormous and continuously growing volumes of structured, semi-structured, and unstructured data generated across industries in today's digital era. Data analytics, in turn, is the systematic process of examining, cleaning, transforming, and modeling such data to extract meaningful insights that can support informed decision-making. Together, big data and data analytics form a powerful combination that allows organizations to understand customer behavior, identify market trends, mitigate risks, and enhance overall efficiency. The adoption of big data analytics has become a cornerstone for organizations striving to remain competitive in a rapidly evolving business landscape.

Applications of big data analytics span diverse industries. In customer analytics, it enables organizations to study consumer behavior, segment target groups, and personalize marketing strategies. Predictive maintenance supports manufacturing and engineering industries by detecting early signs of equipment failure, reducing downtime, and minimizing costs. Risk management and cyber security rely on big data to detect anomalies, identify potential threats, and reduce exposure to fraud and financial losses. In healthcare, big data analytics aids in disease prediction, personalized medicine, and patient care improvement, while in financial services, it supports fraud detection, algorithmic trading, and more accurate investment decision-making. These applications highlight the versatility of big data in addressing sector-specific needs. The benefits of big data analytics are numerous. It enhances decision-making through data-driven insights, improves customer experience, increases operational efficiency, reduces costs, and enables real-time responses to market changes. Organizations also gain competitive advantages by adopting analytics to optimize supply chains, innovate product development, and strengthen business resilience. Despite its advantages, several challenges hinder the full potential of big data analytics. Data management and quality issues remain significant, as organizations often struggle with integrating large volumes of heterogeneous data. Security and privacy concerns emerge due to sensitive data handling and growing risks of cyber attacks. Technical and operational challenges include the integration of analytics systems with legacy infrastructures, while human resource limitations reflect the shortage of skilled data scientists and professionals capable of interpreting complex datasets.

As technologies evolve, big data analytics continues to advance with innovations such as AI integration, real-time analytics, edge computing, and adaptive cloud-based solutions. These developments are enabling organizations to gain deeper insights, act faster, and drive sustainable growth. This paper explores the applications, benefits, and challenges of big data analytics across industries, emphasizing its critical role in unlocking business value, strengthening decision-making, and fostering innovation in the modern enterprise ecosystem.

Keywords: Big Data, Data Analytics, Predictive Maintenance, Risk Management, Customer Analytics, Healthcare Analytics, Financial Analytics, Data Security

INTEGRATING EXPLAINABLE AI AND METAVERSE PLATFORMS FOR TRANSPARENT CROP PRICE PREDICTION

Dr. Uma Joshi, IIS (Deemed To Be University), Jaipur

ABSTRACT :
Crop procurement and its associated supply chain form the backbone of the global agricultural industry, ensuring a steady flow of essential crops for food production and distribution. However, this process remains highly complex due to challenges such as price volatility, supply chain inefficiencies, sustainability concerns, distrust in digital projections, and limited accessibility of reliable data. Farmers continue to struggle with fluctuating prices and uncertainties, as current methods often fail to address these issues effectively.
To overcome these barriers, this research proposes a novel framework that integrates the Metaverse with Explainable Artificial Intelligence (XAI) for transparent crop price prediction. The framework combines historical crop price and production data with dynamic factors such as seasonal patterns, market arrivals, and price segregation by crop type to generate accurate and reliable forecasts. By leveraging machine learning algorithms—including ARIMA, XGBoost, and LSTM—evaluated with performance metrics such as MAE and RMSE, the framework enhances decision-making and optimizes supply chain operations. An XAI layer employing SHAP values and causal reasoning further improves interpretability, enabling farmers to understand the drivers of price changes and build trust in predictions. The Metaverse interface adds value by offering immersive 3D environments and interactive simulations, allowing farmers to visualize scenarios, receive expert recommendations, and make informed market decisions. Beyond farmer empowerment, this framework has broader implications for governance and food security. By monitoring real-time procurement and supply chain dynamics, governments can improve traceability, optimize resource allocation, and mitigate risks of shortages or disruptions. This study demonstrates how emerging technologies such as XAI and the Metaverse can reshape agricultural supply chains, strengthen food security, and support sustainable farming practices. In the future, the framework can be expanded into a comprehensive virtual market platform, offering a transparent, interactive, and farmer-friendly decision-support system for resilient agricultural economics.
Based on your abstract, here's a refined set of **keywords** that capture the scope and themes effectively:
Keywords: Explainable Artificial Intelligence (XAI), Metaverse, Crop Price Prediction, Machine Learning, Agricultural Supply Chain, Food Security, Sustainability

ACADEMIC PERFORMANCE PREDICTION THROUGH CLASSIFICATION ALGORITHMS OF MACHINE LEARNING

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Abstract:

Student academic performance prediction has become a central focus within educational data mining and learning analytics, as it directly supports the advancement of student-centered learning environments. The ability to accurately forecast academic outcomes enables institutions to detect at-risk learners early, design personalized interventions, optimize resource allocation, and improve overall educational quality. In this study, classification-based machine learning algorithms are applied to predict student performance by leveraging a wide range of features, including demographic profiles, socio-economic conditions, class attendance, continuous assessment records, and prior academic achievements.

A set of supervised learning techniques—namely Logistic Regression, Decision Trees, Random Forest, Naïve Bayes, and Support Vector Machines—are systematically implemented and compared using key performance evaluation metrics such as accuracy, precision, recall, F1-score. Data preprocessing methods, including normalization, handling of missing values, dimensionality reduction, and feature selection, are employed to ensure improved model stability and reduced data noise. Experimental results highlight that ensemble approaches, particularly Random Forest and Gradient Boosting, consistently outperform individual classifiers in terms of predictive accuracy and generalization capability.

The analysis of feature importance further reveals that continuous assessment scores, attendance percentage, and study-related behavioral attributes emerge as the most influential determinants of student outcomes. These insights not only validate the role of formative evaluations and consistent participation but also emphasize the need to track non-cognitive factors in predictive modeling.

Moreover, the integration of classification algorithms into institutional academic support systems can serve as an effective decision-support mechanism, enabling proactive and data-driven strategies for academic planning, retention improvement, and student success.

The findings underscore the practical significance of machine learning-driven prediction models in higher education, demonstrating their potential to transform traditional educational practices into adaptive and intelligent frameworks. Future research directions include the incorporation of deep learning architectures for modeling complex patterns, the adoption of explainable AI (XAI) techniques to enhance interpretability for educators, and the utilization of real-time data streams from learning management systems and digital platforms. Such advancements will further strengthen the applicability, transparency, and reliability of predictive models, ultimately contributing to a more personalized and inclusive educational experience.

Keywords: Academic Performance Prediction, Machine Learning, Classification Algorithms, Educational Data Mining, Student Performance, Random Forest, Data- Driven decision making

INTEGRATING AI AND ANALYTICS IN HUMAN RESOURCE MANAGEMENT: A THEORETICAL PERSPECTIVE

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ABSTRACT:

The recent advancements in the technologies have changed the perspective of organisations to manage their workforce planning, specially within increasing virtual and hybrid work environments. Amongst the various new technologies, artificial intelligence (AI) and analytics are gaining significant attention because these are assumed to have enormous potential to transform the way conventional human resource management (HRM) operates. Many organisations are turning to AI-driven tools to attain support in laborious processes, including recruitment, workforce planning, employee engagement, learning and development, and performance management. At the same time, increasing use of analytics allows HR professionals to make evidence-based decisions by identifying different combinations of patterns, predict the outcomes, and enhancing efficiency in people-related processes and matters. Despite the growing momentum of inclusion of AI and analytics in organisational systems, existing literature reveals that the integration of AI and analytics in HRM remains disconnected, with research largely emphasising recruitment while underexploring other critical domains of HR practices.

A review of the literature on the subject indicates that various organisations have started using AI to make hiring easier by automating tasks like candidate sourcing, resume screening, and interview scheduling, which helps save time and improve efficiency in recruitment and selection. Apparently, Predictive analytics has also shown promise in forecasting workforce requirements and in observing skill shortages and gaps, which allows organisations to engage in proactive workforce planning. Furthermore, AI-based platforms are now making it possible for candidates and employees to get ongoing, flexible training that adapts to their needs. Yet, these applications are used in isolated ways, with little evidence of comprehensive frameworks for the full cycle of HR transformation.

The review also highlights several gaps and challenges. Primarily, there is a lack of longitudinal studies to assess the long-term implications of AI adoption on employee performance, organisational culture, and overall productivity. Furthermore, there are ethical concerns such as algorithm bias, privacy of data, transparency, and fairness in AI-driven HR processes remain under researched. Lastly, while much of the discussion has been centred on recruitment lately, the areas such as employee engagement, workforce well-being, and human-AI collaboration in decision-making are not addressed in depth. The scope is considered to be limited as HR leaders are still exploring to fully rely on AI and analytics as effective tools for managing people and strategy.

From a theoretical perspective, the use of AI and analytics in HRM can be truly transformative, triggering a major transformation in how organisations manage their people and talent. The online platforms powered by AI can facilitate continuous performance monitoring, real-time feedback, and employee sentiment analysis, enabling HR managers to respond proactively to workforce needs. Analytics adds to this strength by giving insights into workforce trend inputs, possibilities of employee turnover, and levels of engagement. AI and analytics create an opportunity for HR to evolve into a more strategic, data-driven, and human-centred function if combined. However, to achieve this potential, organisations must overcome both technical and human challenges, such as gaining employee trust, promoting inclusivity, and setting up ethical guidelines for ethical adoption of AI.

This study contributes to this theory by bringing together existing research and pointing out gaps that need attention for better integration of AI and HR analytics. It suggests that, in future, studies should create holistic frameworks that link different HR functions, look at long-term results, and consider the ethical use of AI. With this approach, HRM can move past routine efficiency and work toward sustainable, inclusive, and flexible systems for managing employees using AI and Analytics.

This study explores how AI and analytics can be used in HR practices to improve traditional people management practices. It reviews existing studies to understand current uses, benefits, and challenges, and points out gaps in research. The goal is to build a clear idea of how AI can support HR functions like hiring, workforce planning, performance management, employee engagement, and learning in digital contexts.

The review shows that AI use in HR is increasing, but most research focuses only on recruitment, with little attention to other HR functions. There is also limited evidence on its long-term effects on workforce efficiency, employee trust, and organisational culture. Several gaps were identified, such as insufficient focus on ethical implications, fairness, and the evolving role of HR professionals in AI-driven workplaces. Overall, AI and analytics have great potential, but their integration in HR processes is still in the early stages and needs more comprehensive study.

Keywords: Artificial Intelligence (AI), HR Analytics, Human Resource Management (HRM), Recruitment and Selection, Workforce Planning, Performance Management, Employee Engagement, Learning and Development, Ethical AI in HR

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