

COMMUNIQUE

JULY 2024







Recent Events

Workshop on Data Science and Artificial Intelligence

The first edition of the Workshop on Data Science and Artificial Intelligence was conducted from April 9th to 15th, 2024, at the Brij Disa Centre for Data Science and Artificial Intelligence at the Indian Institute of Management, Ahmedabad. The summer school saw participation from more than 100 participants from both industry and academia and focused on upskilling them with knowledge about cutting-edge techniques in modern Applied Statistics, Data Science, and Artificial Intelligence. Sessions covered essential concepts in Regression Analysis, Bayesian Analysis, Deep Learning and Neural Networks, Graphical models, Causal inference, Optimization, High-Dimensional Data, Text Mining and Sentiment Analysis. In-class learnings were supplemented with guest lectures from industry experts and participant experience sharing. The workshop was successful in developing a holistic understanding of the role of modern statistics in business and research among the participants.

Workshop Chairpersons



Prof. Dhiman BhadraAssociate Professor of Operations and Decision Sciences



Prof. Karthik SriramAssociate Professor of Operations and Decision Sciences



Course Instructors:

Prof. Dhiman Bhadra, Prof. Karthik Sriram, Prof. Ankur Sinha, Prof. Samrat Roy, Prof. Diptesh Ghosh, Prof. Arnab Laha and Prof. Adrija Majumdar

Highlights

The workshop also featured engaging guest lectures by Deep Mukherjee from BCG X, who highlighted Al's role in financial services, Kamiya Motwani from Walmart Global Tech, who discussed Al in retail personalization, and Rahim Baig from Zalando, who explored the potential of generative Al in business. These sessions provided participants with a comprehensive understanding of the current landscape and future potential of Data Science and Al. Participants engaged with professionals who shared their experiences and discussed the challenges faced in the field, providing practical knowledge and actionable insights.

Through interactive sessions and practical exercises, attendees examined how to implement data science and AI for enhanced decision-making, process optimization, and fostering innovation. The event not only emphasized the development of technical skills but also highlighted the importance of managing data quality and addressing algorithmic bias to ensure the ethical and effective application of AI technologies.



Guest Speakers:

Deep Mukherjee (BCG) | Kamiya Motwani (Walmart Global Tech) | Rahim Baig (Zalando - Germany)

Large Scale Optimization (LSO) Summer School 2024









The Brij Disa Centre for Data Science and Artificial Intelligence at the Indian Institute of Management Ahmedabad, in partnership with the Department of Management Studies at the Indian Institute of Technology Roorkee, successfully organized the fourth edition of the Large Scale Optimization (LSO) Summer School. The event took place from May 18th to May 26th, 2024, building on the successes of previous editions held at IIM Indore (2019), IIM Ahmedabad (2022), and IIT Kanpur (2023). The summer school received enthusiastic participation from academia and industry, highlighting the growing interest in advanced optimization techniques.

Optimization remains a critical discipline within operations research, influencing fields such as computer science, economics, and industrial engineering. Large-scale optimization problems, which involve numerous variables and constraints, are particularly challenging and have significant real-world applications in supply chain management, logistics, telecommunications, and more. The primary goal of the summer school was to equip participants with the skills to uncover and leverage hidden special structures in these problems, enabling more efficient solutions through methods like relaxation and decomposition.



Course Instructors:

Prof. Yogesh Agarwal, Prof. Faiz Hamid, Prof. Sachin Jayaswal, Prof. Ashutosh Mahajan, Mr. Guneshwar Anand, Prof. Amit Kumar Vatsa, Prof. Shuvabrata Chakraborty, Prof. Manu Kumar Gupta, Prof. Sumit Kumar Yadav, Prof. Sriram Sankaranarayanan, Prof. Reshma Chandrasekharan, Prof. Saurabh Chandra

About the summer school

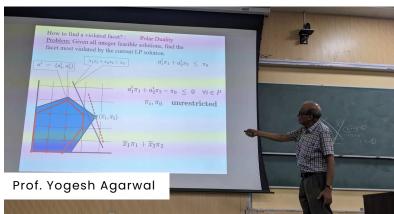
During the summer school, participants were introduced to a variety of techniques for solving complex optimization problems. The program emphasized methods such as cutting planes, valid inequalities, branch-and-bound frameworks, and polar duality for integer programming. Participants explored advanced topics including Complexity Theory, integer games, mixed integer nonlinear programming (MINLP), column generation, Bender's decomposition, Lagrangian relaxation, and heuristics for combinatorial problems. These methods are essential for breaking down large-scale problems into more manageable sub-problems, solving them efficiently, and then integrating the solutions to address the original problem comprehensively.

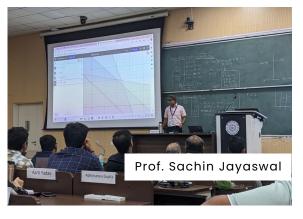
The program also included practical sessions on modeling and solving optimization problems using software tools like AMPL, CPLEX, and Gurobi. Participants were encouraged to engage in hands-on exercises, coding assignments, and presentations, facilitating a deeper understanding of theoretical concepts and their practical applications. Moreover, the summer school fostered an environment for sharing high-quality research papers and engaging in discussions, furthering innovation in the field of large-scale optimization.

Participants also presented their research, covering diverse topics such as vaccine distribution network design, train operations analysis, measurement of online Advertising Effectiveness and inland waterways transportation optimization.

The LSO Summer School 2024 not only provided participants with valuable knowledge and practical skills but also fostered a collaborative environment for advancing research in large-scale optimization. The event's success underscores the importance of continuous learning and innovation in tackling complex optimization challenges.









LSO 2025 at IITB. For further updates, Scan the QR code alongslide and join us on LinkedIn

How are Metaverse and AI redefining the fan experience?



SAMEER JAIN

Sameer is currently serving as a Business Analyst at EXL, specializing in their Sports and Media practice. His keen interest lies in exploring what transformation analytics might bring to the sports world.



MAYANK PAWAR

Mayank is a Senior Consultant in the Sports and Media Analytics division of EXL specializing in leveraging data-driven insights to optimize sports strategy and analytics.

Re-defining the fan experience

A jam-packed stadium with the fans cheering for their teams amidst a boisterous atmosphere will always be important for a sport. It is, for many, the real essence of sport. Al and Metaverse platforms, however, are changing the experience for fans by delving into unused data. The data from a Formula One car's 120 sensors, player reactions and crowd acoustic data in tennis, player match-up data in cricket, and advanced analytics are some examples of data being used to create an Al and Metaverse powered future for sports organizations and fans.

Recent Advances in the AI Experience

Recent advances in AI technology have revolutionized the fan experience in sports and entertainment, particularly within the emerging realm of the Metaverse. Customized video highlights, powered by generative AI, are reshaping how fans relive memorable moments in sports. Leagues such as the NBA are using AI-generated highlight reels to cater to individual preferences, allowing fans to revisit specific player performances or game moments that resonate with them.⁽¹⁾ Additionally, AI models such as ChatGPT and DALL-E are empowering sports media outlets to create dynamic content. ChatGPT provides nuanced responses to fan queries, while DALL-E generates custom images based on user requests, driving the creation of compelling marketing materials, news articles, and multimedia content.⁽²⁾

Moreover, virtual meet-and-greets within the Metaverse have become a popular way for fans to interact with their favorite players. The NFL and NBA have embraced this trend, enhancing the experience with Augmented Reality (AR) features using Generative AI. NFTs and collectibles have also gained traction, with platforms such as NBA Top Shot offering unique digital collectibles tied to iconic sports moments. Immersive experiences, facilitated by collaborations between sports organizations and blockchain-based platforms, allow fans to participate in virtual races and own digital racehorses. Furthermore, The Masters golf tournament has leveraged the power of AI to produce personalized audio commentary for over 20,000 (3) video clips.

Another example of untapped data potential is Formula 1's collaboration with AWS. Analyzing the 65 years of historical data using AI and ML offers in-depth analysis, insight, and predictions for the current in-race action. FI and AWS are transforming the fan experience during a race by utilizing the millions of data points

transmitted from the car. Applying data analytics on the timing data, F1 presents visual insights to fans to objectively analyze team and driver performance, pit stop strategy, and tactics that would impact the outcome. AWS-backed Pit-lane performance, start analysis, undercut threat, and braking analysis statistics empower fans to delve deeper into the sport, forming a close-knit relationship. (4)

Such initiatives help forge an engaging relationship with the fans at home through a detailed and immersive storytelling experience. It keeps the fans hooked on their screens resulting in increased interactions from viewers, which translates into better viewership and, thereby, eventually business success. During Wimbledon, Spark Compass which is a communication platform that enables fan engagement and develops new communication channels, along with IBM Watson created an immersive AR experience. Activated plaques, sponsor pop-up stands, and printed directories were used, garnering a footfall of 69 million visitors to this one-of-a-kind digital experience comprising 98% more mobile visits, 110 million video views (a 25% increase), and a 24% increase in social media audience. (3)

Evolving preferences of Gen Z and younger sports fans

52 percent of Gen Z consider themselves sports fans, but 79 percent admit that they do not watch live games (5). While the previous generation could sit through a 3-4 hour match the newer generation, due to the advent of social media and indifferent attention spans experiences disinterest and impatience. Through video games like FIFA, Formula 1, and NBA the sports industry has been in and around the Metaverse technology. Having said that, building an interactive and immersive Metaverse experience to engage enthusiasts in a long-term relationship as opposed to creating blockbuster video game franchises is a different ball game altogether.



All sports fans complain about the minimal number of direct interactions between the teams/players and viewers. There are avenues like fantasy sports and betting for fans but fail to generate any substantial impact. Live sports can leverage the interactive nature of the Metaverse to elevate fan engagement and build strong long-term relationships. (4)

High-intensity sports with thrill and excitement keep the fans glued on their screens like nothing else. The Metaverse presents an opportunity for the sports industry to truly involve the fans in these pulsating moments in a previously unimaginable way. Building such an ecosystem is indeed a huge task, but it is imperative to start constructing the building blocks of this mega Metaverse now. This will help the sports industry utilize the matchday excitement and anticipation even during the off-season and mid-season slumps.

Way forward

The forthcoming era of Al-driven fan experiences promises an exciting horizon filled with numerous possibilities. Hyper-personalization is set to revolutionize engagement, with Al tailoring content, merchandise recommendations, and event invitations according to individual preferences. It is also expected that Algenerated content will power marketing campaigns and social media engagement, while blockchain technology will deepen fan engagement through ownership of digital assets and smart contracts. In essence, Al-driven fan experiences will seamlessly integrate into our daily lives, providing personalized, interactive, and immersive connections to the sports we cherish.

Sports analytics will be the backbone of all these new developments across various sports. Sport analytics will streamline the strategic goals for organizations, technology, and fan engagement.

Data and Analytics will be crucial to understand fan needs and preferences and their alignment with the goals of the sports industry. The future of AI and Metaverse in sports hinges on how the millions of critical data points are leveraged through sports analytics and data models.

An AI and Metaverse future in sports backed by strong data analytics will provide sports organizations with new advancements, establish stronger bond with fans all over the world, and provide new revenue sources. It will transform how sports organizations operate and how fans interact with their beloved sport. Prioritizing strategic projects would not only maintain future viewership but also create a new age of sports broadcasting. Concentrating on building a long-term sustainable relationship with fans through continuous interaction will turn the sports industry into a Metaverse power player.



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Lights, Camera, AI:

How has the inception of AI disrupted the film industry



ROMIKA DHINGRA

Romika Dhingra is a Research Associate at the Brij Disa Centre for Data Science and Al. She has an MBA in Finance and Marketing from IGDTUW, New Delhi and a B.com from St Bedes' College, Shimla. Her research interests include consumer behavior, sustainability, marketing strategy, and analytics.



In a starry world, captivating the imagination and hearts of millions, films have been a powerful medium for storytelling, shaping cultures, and reflecting the zeitgeist of different eras. From the human experience to the world beyond- cinema has been a forerunner of how the collective consciousness is shaped and weaves itself in the fabric of society. But cinema as we know is undergoing a silent revolution. Welcome to the future that filmmakers once imagined, but this revolution has brought us to an intersection of imagination vs. technology and of man vs. machine. Extreme efficiency, workflow integration, and everything one can imagine is just a click away but that raises the question of- what this means for the future of film-making as we know it. Not only does it lead to potential challenges but also raises various ethical questions.

The Inception

In the last decade, there are very few industries that have not been taken by a storm by AI and cinema is no different. From Pixels to algorithms, AI has transformed the way stories are shaped, shared, and ultimately sold. From script writing, and editing to screening and marketing, AI is now being woven like a thread in the fabric of what ultimately becomes a film.

The infiltration of AI begins as soon as the script-writing process starts- the algorithm is fed with prompts, ideas, and scripts to analyze, create, and project an idea of the themes, changes, and ultimately the chances of box-office success. Various film houses such as Disney+ and 20th Century Fox have been using software such as ScriptBook to use "natural language processing" to analyze scripts, help with dialogues and create alternative storylines. A predictive model with unlimited data-driven creativity streamlines the heavy process of scriptwriting. Warner Brothers and Sony are one of many to use "cinelytic", an advanced AI software that helps create predictive financial models, casting, and logistic decisions in the pre-production stages of a film. In recent films like Indiana Jones, Morgan, and Late Night with the Devil, AI was extensively used to edit, create designs, de-age actors, and create action scenes via VFX . (3)(4) The introduction of these sophisticated graphic tools in filmmaking, powered by AI capabilities, is revolutionizing the visualization of scenes and also saving money and manpower. A movie is made up not only of its graphics but also its musical score and new AIs such as Flow Machines compose music and streamline the process of music creation in a film. In case an actor passes away before the release of a film or a sequel needs to be shot, AI helps in creating their near-perfect replicas as seen in films like Star Wars, The Mandolin, or Cyberpunk 2077. (6)

There is an ongoing democratization of film-making because the introduction of text-to-video softwares, such as DALL-E and SORA, has truly changed the world of movie-making. Now people with limited understanding of complex industry standards softwares can easily express themselves. All these changes reduce time and cost, increase efficiency, streamline effort, and overall reduce the time of content creation.

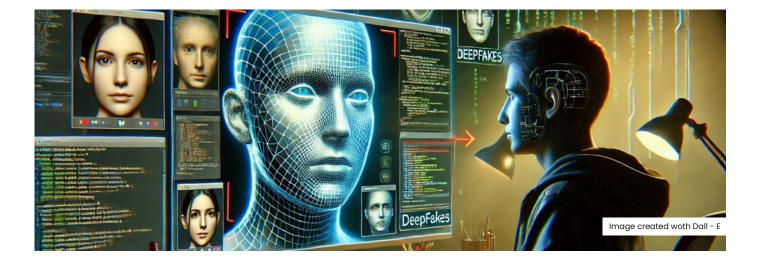
The bad, the ugly, and the future

Although the advent of Al has brought forward a modernization in the film industry as never seen before, it also opens a Pandora's box full of moral, ethical, and legal obligations and questions.

A film is not just a collection of pictures and sounds but rather a celebration of the experiences and stories lived or imagined by people. The appeal of cinematography is not limited to how it looks but rather comes from depth, process, emotion, and a lifelong experience and choices that eventually transpires into a film. Al lacks these individualized experiences. Many have pointed out that Al is trained on the ideas of the past and currently lacks the technology to create something truly new or unique. Some directors believe that the output created is based on an amalgamation of previous people's work. There is no new thought but rather the thought of others which have been filtered through the algorithms of different Al giants.

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The act of altering photographs is not a new phenomenon but the advancements in digital recording and editing methods in recent decades have significantly simplified the creation of counterfeit visual and audio material such as the "deep fakes". Deep fakes can be generated without the need for any human supervision and are created using recycled generative adversarial networks wherein the likeliness of a person, character, or object can be created and used for content.⁽⁷⁾ This is harrowing for actors, politicians, and the common man alike. It not only raises an ethical question of consent, privacy, and personal space but also a legal conundrum where deep fakes are used for monetary extortion, political influence, and sexual exploitation .⁽⁷⁾ In a country as deeply intertwined with politics and Bollywood as ours— deep fakes pose an even deeper risk concerning polarization, misinformation, and undue influence. Recently bollywood actors like Ranveer Singh and Aamir Khan had to file cases against the use of their likeness without consent.⁽⁸⁾



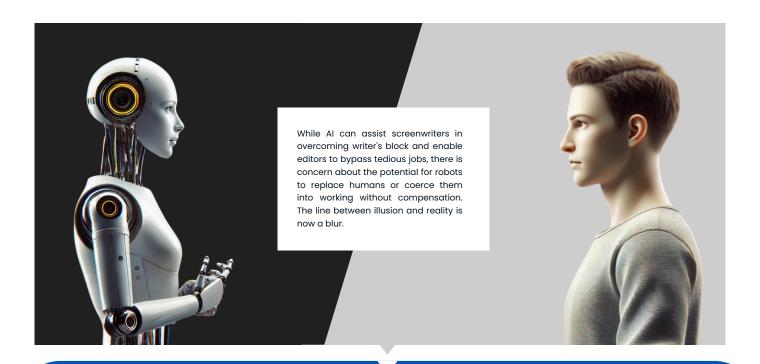
In the US, one of the largest and longest protests in Hollywood in recent times- SAG- AFTRA protests against AMPTP started as a boycott against the rising use of AI in film and TV production. The concern against the use of an actor's likeness with the help of AI without compensation, the writer's loss of credit in scripts, and the loss of employment altogether in the era of machines was echoed throughout. The main demand sought by the protestors was legal and creative control over AI as well as credit when any source material is used to train AI for scripts, video games, etc.⁽⁹⁾ This underscores the fear in the hearts of many workers as they step into the new world of cinema.

With the inception of AI in films, there is also a major criticism against new content available in the market- it is simply too much. We are currently living in an era where we are bombarded with content which leads to a paradox of choice. In recent times, people have complained about the redundancy found in AI-generated content and the surrealness of it can also make people uncomfortable.

The arrival of AI poses a rather dire and interesting question for the world and the industry alike- do people own their AI likeness or can/should they get paid for it? When an actor passes away, who does his likeness belong to-his estate, or is it free to be used by all? With every major AI company facing serious copyright violation charges in court, whether future generations will view these companies as luddites or revolutionaries remains to be seen. Morality is the point of contention when it comes to the use of AI in films and this commodification of voice, face, etc. is creating consequences we are yet to discover.

Back to the future: what lies ahead?

The extensive use of AI in the film industry is no longer a question of whether it will happen but rather WHEN will it happen. Artificial intelligence has the potential to greatly streamline the process of working with digital effects in the future, heralding a completely new era in film history but the question arises- where do we draw the line between ethical consideration and entertainment?



The advent of AI in films is a question that is yet to be answered. Is it going to be unsettling and morally questionable or is it the new normal?

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Upcoming Events

IIMA-ORSI Competition on Practice of Management Science and Analytics





The Brij Disa Centre for Data Science and Artificial Intelligence at the Indian Institute of Management, Ahmedabad (IIMA), in collaboration with the Operational Research Society of India (ORSI) Ahmedabad Chapter, is delighted to announce the IIMA-ORSI Competition on Practice of Management Science and Analytics for the year 2024-25. This prestigious competition, modeled after the Franz Edelman Award of INFORMS, USA, aims to recognize and reward outstanding applications of Operations Research (OR), Management Science, and Analytics in practice within India.

Objectives

The primary goal of this competition is to highlight and reward exemplary practical applications that have made significant impacts in the industry. Unlike academic awards that focus on theoretical contributions, this competition prioritizes real-world solutions with tangible benefits, such as financial gains or policy changes.

Eligibility Criteria

- **Scope:** The competition is open to organizations located in India, including multinational corporations (MNCs) with substantial operations in the country.
- Authors: The lead author and corresponding author must be based in India.
- **Disclosure:** Full disclosure of the client organization is mandatory. Anonymous submissions will not be accepted.
- **Submission Requirements:** A detailed technical paper (approximately 8000 words) must be submitted by October 2024. This paper should be accompanied by a validation letter from senior management confirming the implementation and impact of the work.

Submission and Evaluation

Participants are required to submit a two-to-three page summary (around 1500 words) by August 31, 2024. This summary should outline the problem addressed, the OR/MS/Analytics methodology used, and the financial and policy impacts achieved. Finalists will be selected based on these summaries, followed by a rigorous verification process involving senior management and independent judges.

Key Dates

- Entry Submission Deadline: August 31, 2024
- Semifinalist Selection: September 21, 2024
- Finalist Selection: November 15, 2024
- Technical Paper Submission Deadline: December 15, 2024
- Presentation at IIMA: January 12, 2025
- Winner Announcement: January 12, 2025



Presentation and Publication

Finalists will be invited to present their work at IIMA in January 2025. The presentations will be evaluated by a panel of top researchers and practitioners from corporate India and academia. The winning entry will be announced during the presentation event, and selected papers will be published in the esteemed journal OPSEARCH, co-published by Springer.

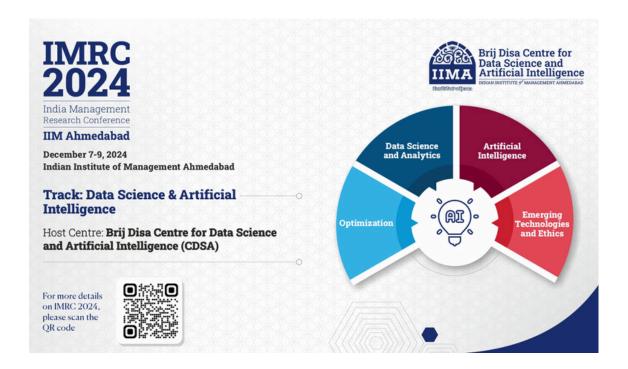
For further updates about the IIMA ORSI Competition Scan the QR code below to visit the official website and join us on LinkedIn.



IIMA ORSI Official website

IIMA - IMRC Conference

Brij Disa Centre for Data Science and Artificial Intelligence (CDSA) is participating in India Management Research Conference (IMRC), a three-day mega event organized by IIM Ahmedabad. At IMRC, CDSA will host an independent track on Data Science & Artificial Intelligence (DS&AI), providing a platform to research scholars, academics, and industry practitioners to showcase their research and opportunity to network.



At IMRC, keynote speakers from academia and industry will deliver talks on recent trends and ongoing cutting-edge research in DS & Al. Attendees are supposed to gain extremely valuable insights from the knowledge shared by these experts. To enhance the learning experience for attendees, CDSA will offer workshops and tutorials on DS & Al tools and techniques, providing hands-on practice of these tools.

In CDSA-led track, participants will present their research with DS & AI concepts applied in various business research topics including but not limited to:

- Big Data analytics techniques
- User and enterprise-generated content analytics
- · Analytics for emerging technologies
- · Business applications of deep learning
- · Analytics for social good
- Ethical and legal issues in analytics
- Social media analytics
- Future of work,
- GenAl for business,
- · Image and video analytics in business

- · Supply chain analytics
- · Retail analytics
- Assortment optimization
- Dynamic pricing and nonlinear pricing
- · Logistics optimization
- Supply chain optimization
- Algorithms for multi-period optimization
- Network algorithms
- Causal inference

For further updates about the IMRC Competition

Visit the official website - https://conference.iima.ac.in/imrc2024/

Webinars and Seminars

Hybrid seminar on: Data Science in Banking



About the speaker:

With nearly 20 years of extensive experience in the financial risk and banking sectors, Deep Mukherjee has held pivotal roles at Fitch Ratings, American Express, and currently serves as the Associate Director of Risk Management & Data Science at BCG Gamma, BCG's Data Science and Advanced Analytics unit. His tenure as Chief Product Officer at TransUnion CIBIL, India's largest credit bureau, further solidifies his expertise in credit risk management.

A regular contributor to esteemed financial publications such as the Economic Times, Business Standard, Bloomberg Quint, and Mint, Deep Narayan Mukherjee also shares his insights as a visiting faculty member at IIM Calcutta.

Highlights:

Predictive and generative AI are revolutionizing decision-making, customer engagement, and risk assessments. In banking, AI applications extend to compliance automation, fraud management, and customer personalization. However, overcoming data complexity and balancing the accuracy-explainability trade-off are critical challenges. Advanced AI tools, such as Early Warning Systems for credit risk and fraud detection models, highlight AI's pivotal role in predictive analytics. AI in Finance is not just enhancing processes; it's transforming our understanding and utilization of data in banking.

Hybrid seminar on: Personalization in Retail



About the speaker:

Kamiya Motwani is the Director of Data Science for the Personalization and Recommendations team at Walmart Global Tech. Kamiya leads a team of strong applied scientists who leverage Artificial Intelligence (AI) and Machine Learning (ML) to develop data-driven recommendation engines that manifest across a customer's journey at Walmart. Prior to Walmart, Kamiya has worked at Oracle Corporation and Yahoo Inc. She holds a master's degree in Computer Science from the University of Wisconsin-Madison and a bachelor's degree in Computer Science from BITS Pilani. Kamiya has also filed several patents and published papers at premier conferences including NIPSIEEE and ICASSP.

Abstract:

The talk started with an overview of Walmart's customer-centric approach, which aims to make the shopping journey more convenient and personalized. It provided an overview of the usage of AI in the customer's shopping journey – from online browsing to order fulfillment. Following this, it deep-dived into the usage of AI for personalizing the customer journey – where AI/ML models are leveraged to develop data-driven recommendation engines that manifest across the customer journey – covering cases like personalized recommendations in online carousels, along with a graph neural network-based end-to-end system for predicting substitutions. Finally, the talk ended with how the usage of a strong AI ecosystem in such use cases fundamentally enhanced the customer journey.

Hybrid seminar on: Rethinking ML Problem Formulation for Maximizing Business Impact



About the speaker:

Rahim Baig is the Team Lead - Product Analytics at Zolando and the esteemed author of "Optimizing AI ML Solutions." With a rich background in AI, Deep Learning, and Machine Learning, Rahim brings a wealth of expertise to his role at Zolando. His extensive knowledge and hands-on experience in the field have made him a sought-after speaker and educator.

At Zalando, Rahim focuses on leveraging data science techniques to optimize marketing strategies and enhance platform performance. His ability to translate complex AI and ML concepts into practical applications for business impact sets him apart as a leader in the industry. Rahim's passion for education and his commitment to advancing the field of data science make him a unique and valuable resource for those looking to deepen their understanding of AI and machine learning.

Highlights:

Mr. Baig engaged the audience with compelling discussions on the importance of proper problem formulation in AI/ML to achieve high-impact solutions. Highlighting the common pitfalls that lead to the failure of data science projects, he emphasized on aligning solutions with business outcomes and the necessity of crafting data-driven solutions from the ground up. Through examples like text deduplication in e-commerce and customer churn prediction for apps, he illustrated the strategic transformation from mere problem identification to crafting scalable and effective AI/ML models.

Hybrid seminar on: Generative AI



About the speaker:

Rahim Baig is the Team Lead - Product Analytics at Zolando and the esteemed author of "Optimizing AI ML Solutions." With a rich background in AI, Deep Learning, and Machine Learning, Rahim brings a wealth of expertise to his role at Zolando. His extensive knowledge and hands-on experience in the field have made him a sought-after speaker and educator.

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Highlights:

Mr. Baig explored the transformative potential of Large Language Models (LLMs) in business. He walked us through the evolution of text handling technologies and the promising applications of Generative AI from simple problem-solving to complex decision-making processes. Discussing both the capabilities and challenges of LLMs, including issues like hallucination and bias, he provided insights into advanced strategies like Retrieval Augmented Generation to enhance model reliability and effectiveness.

Chairpersons



Ankur Sinha



Sriram Sankaranarayanan

Executive Committee



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Sanjiv Das



Sunil Gupta

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