



MAHARAJA INSTITUTE OF TECHNOLOGY MYSORE
BELAWADI, SRIRANGAPATNA TALUK, MANDYA-571477
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(DATA SCIENCE)



TECHNICAL TALK ON
MACHINE LEARNING TO GENERATIVE AI: CONCEPTS, TOOLS, AND
REAL-TIME APPLICATIONS

Date: 13.09.2025

Venue: Class Theater CT-114 of Maharaja Institute of Technology Mysore

Chief Guests and Attendees: Ms. Harshitha Mahadevappa , Technical talk On : **Machine Learning To Generative Ai: Concepts, Tools, And Real-Time Applications**

Faculty, Staff, and Students of the Data Science Department

Technical talk Report: Machine Learning To Generative Ai: Concepts, Tools, And Real-Time Applications

1. Objectives:

- To understand the evolution of **Artificial Intelligence from Machine Learning to Generative AI**, including their core concepts and differences.
- To build strong foundational knowledge in the **mathematical and theoretical principles** that support Machine Learning and Deep Learning.
- To explore key **Machine Learning algorithms**, Deep Learning architectures, and Natural Language Processing techniques.
- To gain conceptual clarity on **Generative AI**, Large Language Models (LLMs), and Transformer-based architectures.
- To familiarize participants with **popular tools, frameworks, and platforms** used in modern AI and GenAI development.
- To demonstrate **real-time applications** of Generative AI through practical examples such as chatbots and text-to-image systems.
- To create awareness about **ethical, responsible, and practical considerations** while using Generative AI technologies.

2. Overview: The technical talk focused on delivering a comprehensive and structured understanding of Artificial Intelligence technologies, emphasizing the progression from Machine Learning to Generative AI. The session began with an explanation of the mathematical foundations required for AI/ML, stressing the importance of linear algebra, probability, statistics, and optimization.

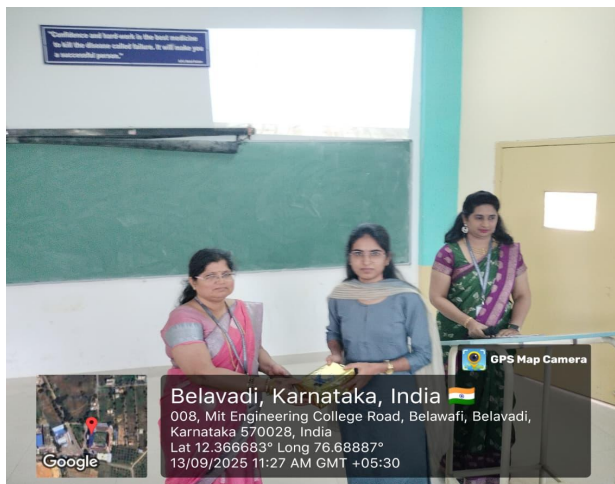
The talk then explored Machine Learning paradigms, detailing supervised, unsupervised, and reinforcement learning techniques along with commonly used algorithms. This was followed by an in-depth discussion on Deep Learning, highlighting the dominance of neural networks and the paradigm shift introduced by the Transformer architecture.

A significant portion of the session was dedicated to Natural Language Processing, covering preprocessing techniques, representation models, and sequence learning concepts. The final segment of the talk focused on Generative Artificial Intelligence, explaining how Large Language Models (LLMs) generate human-like content. The session concluded with demonstrations of real-time AI applications, tools used in industry, and best practices followed by data scientists to remain current in this rapidly evolving field.

3. Key Topics Covered:

- **Artificial Intelligence and Machine Learning Foundations:** The technical talk introduced Artificial Intelligence as the ability of machines to perform tasks requiring human intelligence and explained Machine Learning as a subset of AI that enables systems to learn from data. The session covered supervised, unsupervised, and reinforcement learning approaches and highlighted the importance of data preprocessing, feature engineering, and model evaluation in building accurate and reliable models.
- **Machine Learning Algorithms :**Key Machine Learning algorithms such as Linear and Logistic Regression, Decision Trees, Random Forests, k-Nearest Neighbours, Support Vector Machines, and Naive Bayes were discussed, along with unsupervised techniques like K-Means Clustering and Principal Component Analysis, emphasizing their applications in prediction, classification, and pattern discovery.
- **Deep Learning and Neural Networks:**The talk explained the fundamentals of neural networks and introduced CNNs and RNNs for image and sequence data. It highlighted the limitations of traditional architectures and presented the Transformer architecture as a breakthrough model that enables efficient learning through attention mechanisms.

- **Natural Language Processing (NLP):** This section covered essential NLP techniques including text preprocessing, representation methods such as Bag of Words, TF-IDF, and embeddings, and sequence modeling concepts like n-grams and attention. Applications such as text classification, machine translation, summarization, and chatbots were briefly discussed.
- **Generative Artificial Intelligence** Generative AI was presented as a technology capable of creating human-like content using Large Language Models based on Transformer architecture. Concepts such as self-attention, prompt engineering, fine-tuning, RLHF, and responsible AI practices were highlighted.
- **Tools, Frameworks, and Platforms:** The session introduced tools including Hugging Face Transformers, LangChain, Google Colab, Stable Diffusion, Gradio, and Streamlit, demonstrating how they support efficient development and deployment of AI and Generative AI applications.
- **Real-Time Applications and Demonstrations:** Real-time demonstrations included an AI chatbot using GPT-2 and a text-to-image generation system using Stable Diffusion, showcasing practical implementation and deployment of Generative AI solutions.



4. Outcomes:

At the end of the technical talk, participants were able to:

- Understand the **technical evolution of AI from Machine Learning to Generative AI.**
- Identify and explain the **working principles of ML, DL, NLP, and GenAI models.**
- Gain exposure to **industry-relevant AI tools and frameworks.**

- Understand the internal functioning of **Transformer-based Large Language Models**.
- Apply theoretical knowledge to **practical, real-time AI use cases**
- Develop a structured learning path for advancing in AI and Data Science.
- Recognize the importance of **ethical, fair, and responsible AI development**.

5. Conclusion: The technical talk successfully bridged the gap between foundational Machine Learning concepts and advanced Generative AI technologies. By combining theoretical explanations with real-time demonstrations, the session enabled participants to gain both conceptual clarity and practical insights.

The discussion on modern tools, deployment platforms, and real-world applications provided a clear understanding of how AI systems are built and used in industry today. Overall, the technical talk empowered participants with the knowledge and direction required to pursue advanced learning and research in Machine Learning, Deep Learning, Natural Language Processing, and Generative AI.

6. Acknowledgments: We extend our gratitude to the speakers, participants, and organizers for making this session a success.

CO-ORDINATORS SIGNATURES

H.O.D SIGNATURE