



DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

EVENT – Deep Learning – An Industrial Perspective

Venue : IBM Lab, AIML Department

Time : 9:30 AM to 4 :30PM



Department of Artificial Intelligence & Machine Learning

Organises

A workshop on

Deep Learning-An Industrial Perspective

 06 June 2024 | 09.30 AM - 04.30 PM

 IBM Lab

 6th Semester Students

Resource Person

Dr. Priyanka Kanupuru

Data Scientist , UST(Applied Materials)



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INTRODUCTION

On June 6th, Dr. Priyanka Kanupuru conducted a deep learning workshop in the AIML department's IBM Lab. The workshop provided an in-depth exploration of advanced deep learning techniques and their practical applications. Participants were introduced to cutting-edge tools and frameworks, enhancing their understanding of neural networks, model optimization, and deployment strategies. Through hands-on sessions and interactive discussions, Dr. Kanupuru facilitated a comprehensive learning experience, empowering attendees with the knowledge and skills needed to tackle complex challenges in artificial intelligence and machine learning. This report summarizes the key highlights and takeaways from the workshop.

WORKSHOP OVERVIEW

The workshop was meticulously structured into two main sections to ensure a thorough understanding of deep learning and its applications. The first section focused on theoretical and practical components essential for deep learning fundamentals, while the second section was dedicated to hands-on practice sessions using google colab.

FIRST SECTION: FUNDAMENTALS OF DEEP LEARNING AND COMPONENTS

During the deep learning workshop, Dr. Priyanka Kanupuru delivered an extensive overview on various components of deep learning, providing participants with a thorough understanding of the underlying concepts and practical implementations. The session began with an introduction to deep learning architecture, emphasizing the importance of neural networks.

1. **Activation Functions:** One of the critical components discussed was the role of activation functions in neural networks. Dr. Kanupuru highlighted the significance of activation functions in introducing non-linearity into the model, which allows the network to learn and model complex data. She elaborated on commonly used activation functions such as the sigmoid function.

2. **RNN :** The session also delved into Recurrent Neural Networks (RNNs), a specialized type of neural network designed for sequential data. Dr. Kanupuru explained that RNNs have connections that form directed cycles, allowing information to persist and be used in subsequent steps of the sequence. She pointed out that RNNs face challenges such as the vanishing and exploding gradient problems, which can hinder their ability to learn long-term dependencies.

3. **The major problem of RNN** : To address these issues, Dr. Kanupuru introduced solutions like Long Short-Term Memory (LSTM) networks and Gated Recurrent Units (GRUs). LSTMs, in particular, incorporate memory cells and gating mechanisms to regulate the flow of information, enabling the network to capture long-term dependencies more effectively.

4. **Auto-encoders** : Another advanced topic covered was auto-encoders, a type of neural network used for unsupervised learning. Dr. Kanupuru explained that auto-encoders consist of an encoder and a decoder. She provided insights into the architecture of auto-encoders and discussed variations like denoising auto-encoders and variational auto-encoders.

SECOND SECTION: HANDS-ON SESSION

The hands-on session on deep learning components, meticulously guided by Dr. Priyanka Kanupuru, offered participants an immersive and practical experience in implementing a range of advanced techniques. The session commenced with image scaling, a fundamental pre-processing step essential for normalizing input data across different scales, thereby improving the efficiency and accuracy of deep learning models. Participants learned to resize and standardize images, ensuring consistency in model training and evaluation processes.

Next, the focus shifted to auto-encoders, where attendees built and trained models to compress data into a lower-dimensional latent space and subsequently reconstruct it. This exercise highlighted the utility of auto-encoders in tasks such as dimensionality reduction and feature extraction. Participants then progressed to denoising auto-encoders, where they introduced noise to input images and trained the models to recover the original, clean images. This hands-on practice demonstrated the robustness of denoising auto-encoders in handling noisy data and enhancing image quality.

A significant portion of the session was dedicated to attention mechanisms. Participants implemented attention layers within neural networks, gaining insights into how these mechanisms improve the performance of models in tasks like natural language processing and machine translation by dynamically weighing the importance of different input elements.

The session also delved into Long Short-Term Memory (LSTM) networks, where attendees worked on projects involving sequential data. Through these projects, they learned how LSTMs mitigate the vanishing gradient problem and effectively retain information over extended periods, making them ideal for tasks such as language modeling, speech recognition, and financial forecasting.

Throughout the hands-on session, Dr. Kanupuru emphasized the practical application of these deep learning components, providing step-by-step guidance and real-world examples. Participants used Google Colab to visualize results and tweak parameters in real-time.

INTERACTIVITY AND ENGAGEMENT

The session had a great degree of interaction, which improved the educational process considerably. Throughout the workshops, Dr. Priyanka Kanupuru encouraged attendees to raise questions and have meaningful conversations. Through practical problem-solving and coding tasks, students were able to put the concepts they were learning to use right away. Because the course was participatory, attendees were guaranteed to participate fully, which made the sessions lively and interesting.

FEEDBACK FROM PARTICIPANTS

The participants' responses were extremely positive. The workshop's practical approach and well-defined, sequential instructions were highly valued by the students. Many said they were thrilled to have the new abilities and could not wait to use them in their next coursework and personal endeavours. Particularly appreciated were the workshop's practical components and Dr. Priyanka Kanupuru's captivating teaching style.

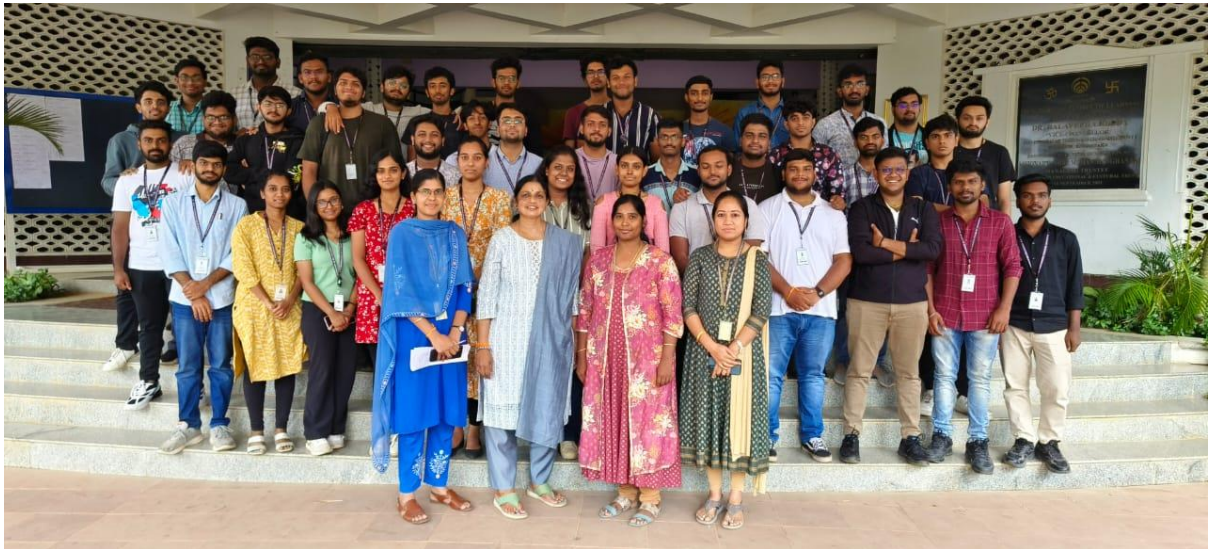
CONCLUSION

The deep learning workshop led by Dr. Priyanka Kanupuru at the IBM Lab concluded with participants gaining a comprehensive understanding of both the theoretical and practical aspects of advanced deep learning techniques. Through detailed sessions on neural network components, activation functions, recurrent neural networks, and autoencoders, attendees were equipped with the knowledge to tackle complex AI challenges. The hands-on exercises, particularly those involving image scaling, autoencoders, denoising, attention mechanisms, and LSTM networks, provided invaluable practical experience. By the end of the workshop, participants were well-prepared to apply these cutting-edge methodologies to their own projects and research, enhancing their capabilities in the rapidly evolving field of artificial intelligence. This workshop not only deepened their technical expertise but also inspired innovative thinking and collaboration, setting the stage for future advancements in deep learning.

ACKNOWLEDGEMENT

We would like to extend our heartfelt gratitude to Dr. Priyanka Kanupuru for her exceptional leadership and expertise in conducting this deep learning workshop. Her insightful presentations and patient guidance were instrumental in making this event a resounding success. We also wish to thank the HOD and faculty members of the AIML department for their unwavering support and contributions, which ensured the smooth organization and execution of the workshop. Finally, our sincere appreciation goes to all the participants for their active engagement and enthusiasm. The dedication of the participants made this workshop a truly enriching experience for everyone involved.





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