Deep Learning

Course Outcome:

1. Understand the drawbacks of traditional machine learning methods and recognize the need for deep learning in solving complex problems.
2. Explain the evolution of artificial intelligence from the spring to winter phases and understand the biological inspiration behind deep learning models.
3. Analyze the functioning of McCulloch Pitts Neuron and Perceptron in building the foundation of artificial neural networks.
4. Utilize the power of a network of Perceptrons and Sigmoid neurons in solving classification and regression problems.
5. Demonstrate the learning parameters and backpropagation algorithm in feedforward neural networks for optimizing the model performance.
6. Implement various optimizers such as gradient descent and its variations for training deep neural networks efficiently.
7. Compare and contrast train error versus test error to avoid overfitting, and apply techniques like dataset augmentation, early stopping, dropout, and batch normalization.
8. Evaluate the convolution and pooling operations in Convolutional Neural Networks (CNN) for image classification tasks.
9. Illustrate the backpropagation process in CNN and review successful applications on the ImageNet dataset.
10. Apply transfer learning techniques to leverage pre-trained models for building efficient deep learning solutions.
11. Understand the concept of Recurrent Neural Networks (RNN) and Long Short Term Memory (LSTM) networks for sequence modeling tasks.
12. Identify and address the issues like vanishing gradient and exploding gradient in RNN for better performance.
13. Implement Generative Adversarial Networks (GAN) for generating realistic data and explore key terminologies such as Large Language Model (LLM) and Embeddings.
14. Develop applications in Generative AI using techniques like fine-tuning and prompt engineering.
15. Apply deep learning algorithms in real-world applications such as computer vision and natural language processing for solving practical problems.