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Question Paper Code:U5312

M.E. DEGREE EXAMINATION, APRIL / MAY 2025

Elective

Computer Science and Engineering

21PCS512- DEEP LEARNING TECHNIQUES

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. What is the role of regularization in deep learning models? CO1- U
2. What is a feed forward deep network? CO1- U
3. What is the main difference between recurrent neural networks (RNNs) and feed forward networks? CO1- U
4. Apply average pooling with a 2x2 filter on a 4x4 matrix of your choice and show the result. CO2- App
5. What is the difference between Bayesian Networks and Markov Random Fields? CO1- U
6. How do Monte Carlo methods assist in probabilistic inference? CO1- U
7. What role does Gibbs Sampling play in training an RBM? CO1- U
8. is the significance of energy-based models in Boltzmann Machines? CO1- U
9. Apply a default baseline model to classify a sample dataset and calculate the baseline accuracy. CO2- App
10. What factors determine whether more data should be gathered for a machine learning model? CO1- U

PART – B (5 x 16= 80 Marks)

11. (a) Explain the differences between Supervised and Unsupervised Learning with suitable examples CO1- U (16)

Or

- (b) Using an unsupervised learning approach, cluster customer transaction data to identify spending patterns. Explain the methodology and the impact of different hyper parameter settings CO1- U (16)
12. (a) Implement an approximate search algorithm using a deep learning model to retrieve similar sentences from a large text corpus. Given a query sentence, the model should return the top 5 most similar sentences. Compare the efficiency of approximate search with traditional keyword-based search methods. Explain your choice of neural network architecture. CO1- U (16)
- Or
- (b) Explain the Convolution Operation in Convolutional Neural Networks (CNNs). How does it help in extracting features from input data? CO1- U (16)
13. (a) Explain the concept of Structured Probabilistic Models. How these models are different from unstructured models, and what are their key advantages? CO1- U (16)
- Or
- (b) Explain how probabilistic graphical models can be used to infer missing data. Implement a structured approach and compare it with an unstructured learning method. CO1- U (16)
14. (a) Apply deep Boltzmann machine training procedure used to classify the MNIST dataset CO2- App (16)
- Or
- (b) Apply a Boltzmann Machine to predict stock market trends based on historical data. Explain how the model learns temporal dependencies and compare it with LSTMs. CO2- App (16)
15. (a) Explain both a simple logistic regression model and a deep neural network for sentiment classification in NLP. Compare their performance using various evaluation metrics and explain under what conditions a baseline model might be preferable. CO1- U (16)
- Or
- (b) Describe the steps needed to measure the performance of a deep learning model with example CO1- U (16)