Q. Code:545612

Reg. No. | | | | | | | | | | | | | |

M.E / M.TECH. DEGREE EXAMINATIONS, MAY 2024

Second Semester

CP22020- DEEP LEARNING

(Computer Science and Engineering)

(Regulation 2022)

TIME:3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	To implement feature Extraction from Image and Video Data	**3**
CO 2	To implement Image Segmentation and Instance Segmentation in Images	**3**
CO 3	To implement image recognition and image classification using a pretrained network (Transfer Learning)	**3**
CO 4	To implement traffic information analysis using Twitter Data	**3**
CO 5	To implement Autoencoder for Classification & Feature Extraction	**3**

PART- A (20x2= 40 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Compare and contrast Deep learning and machine learning.	**1**	**2**
2.	Illustrate the ways in which machine learning excels over deep learning.	**1**	**3**
3.	How is feature extraction done in deep learning?	**1**	**2**
4.	Implement tensor reshaping in deep learning. Demonstrate its significance.	**1**	**3**
5.	Interpret the purpose of an activation function in a neural network.	**2**	**2**
6.	Discuss the concept of overfitting in neural networks and methods to prevent it.	**2**	**2**
7.	Discuss the role of dropout regularization in neural networks.	**2**	**2**
8.	How does batch normalization help in training neural networks?	**2**	**2**
9.	How does max pooling help in reducing the dimensionality of feature maps in a CNN?	**3**	**2**
10.	Compare and contrast the architectures of LeNet-5, AlexNet, VGGNet, and ResNet.	**3**	**2**
11.	How backpropagation is applied through pooling layers in CNN?	**3**	**2**
12.	Describe the process of attention mechanism in RNNs and its role in improving the model's ability to focus on relevant parts of the input sequence.	**3**	**2**
13.	Discuss the working of a pre-trained model.	**4**	**2**
14.	How does a Bidirectional RNN Work? Discuss its advantages and disadvantages.	**4**	**2**
15.	How does LSTM address the vanishing gradient problem?	**4**	**2**
16.	Differentiate GRU and LSTM.	**4**	**2**
17.	Discuss the main advantages of Q-learning.	**5**	**2**

18.	How does Deep Q-Networks work? What is the significance of a target network in Deep Q-Networks?	**5**	**2**	
19.	What are some common issues and challenges faced in training GANs, and how do they affect its performance?	**5**	**2**	
20.	Compare and contrast traditional autoencoders with variational autoencoders.	**5**	**2**	

PART- B (5x 10=50Marks)

			Marks	CO	RBT LEVEL
21. (a)	How do deep learning and machine learning differ in terms of their architectural complexity, data requirements, feature engineering, and typical application domains? Illustrate the trade-offs between model accuracy and computational resource consumption, and provide examples of real-world scenarios where one approach might be preferred over the other.		**(10)**	**1**	**3**
	(OR)				
(b)	**(i)**	Describe the concept of element-wise tensor operations and discuss the implementation of each operation.	**(5)**	**1**	**3**
	(ii)	Discuss the purpose of tensor concatenation and provide a scenario where concatenation is significant and is applied in deep learning tasks.	**(5)**	**1**	**3**
22. (a)	What is backpropagation and how is it used in training neural networks? Explain Back propagation with its algorithm.		**(10)**	**2**	**2**
	(OR)				
(b)	**(i)**	Discuss the Adam optimizer and its key components.	**(5)**	**2**	**2**
	(ii)	Interpret overfitting and underfitting in the context of neural networks.	**(5)**	**2**	**2**
23. (a)	Demonstrate the process of constructing a Convolutional Neural Network by detailing the various types of layers involved. Explain the role of hyperparameters in designing a CNN.		**(10)**	**3**	**3**
	(OR)				
(b)	Illustrate the principles of the Vector Space Model in NLP, focusing on how text is represented in a high-dimensional space for tasks such as information retrieval and document similarity.		**(10)**	**3**	**3**

24. (a)	Describe the Long Short-Term Memory networks. Discuss how the embedding layers, input pre-processing, and hyperparameter tuning are used in optimizing an LSTM model for sentiment analysis.	**(10)**	**4**	**3**
	(OR)			
(b)	Explain the architecture of Gated Recurrent Units highlighting how they address some of the limitations of traditional Recurrent Neural Networks.	**(10)**	**4**	**3**
25. (a)	Discuss the architecture and working principles of Generative Adversarial Networks. How do the generator and discriminator components interact during the training process to create realistic synthetic data?	**(10)**	**5**	**3**
	(OR)			
(b)	Illustrate the architecture and functioning of autoencoders in the context of feature learning.	**(10)**	**5**	**3**

PART- C (1x 10=10Marks)

(Q.No.26 is compulsory)

		Marks	CO	RBT LEVEL
26.	Digit classification is a fundamental task in machine learning and computer vision. Explore the challenges associated with real-world digit classification scenarios, such as dealing with diverse writing styles, noisy data, and handling large-scale datasets. Discuss the design considerations and architectural choices involved in constructing a suitable neural network for digit classification tasks. Evaluate the role of activation functions, regularization techniques, and optimization algorithms in fine-tuning the neural network architecture for improved accuracy and generalization.	**(10)**	**3**	**5**

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