Code: 20A05703c

R20

B.Tech IV Year I Semester (R20) Regular Examinations December/January 2024

DEEP LEARNING

(Common to IT, AI&DS, CSE (DS) & CSE)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a)	Define a scalar and give an example of its use in linear algebra.	2M
(b)	What is conditional probability, and how is it calculated?	2M
(c)	Define overfitting in the context of machine learning and suggest one technique to mitigate it.	2M
(d)	What is the role of gradient descent in training machine learning models?	2M
(e)	Discuss the benefits of sparse representations in deep learning models.	2M
(f)	Define semi-supervised learning and discuss its advantages when labeled data is limited.	2M
(g)	Describe the purpose of pooling layers in CNNs and how they reduce the spatial dimensions of feature maps.	2M
(h)	Provide an example of an application where the convolution operation is commonly used.	2M
(i)	Explain the basic idea behind Recurrent Neural Networks (RNNs) and their use in sequential data processing.	2M
(j)	Define what an autoencoder is and how it is used in unsupervised learning.	2M

PART – B

(Answer all the questions: 05 X 10 = 50 Marks)

2	Discuss how eigenvalue decomposition is used in machine learning algorithms. Provide an example of its application in dimensionality reduction or recommendation systems.	10M
	OR	
3	Discuss the application of information theory in machine learning. Explain how entropy is used to measure uncertainty.	10M
4	Describe the challenges associated with hyper parameter tuning in machine learning models. Explain techniques for hyper parameter optimization.	10M
	OR	
5	Discuss the steps involved in training a neural network using stochastic gradient descent (SGD). Include the role of loss functions and regularization techniques.	10M
6	Discuss the challenges faced during the training of deep neural networks and describe optimization strategies to address these challenges.	10M
	OR	
7	Explain the role of various optimization algorithms, including stochastic gradient descent (SGD), in training deep neural networks.	10M
8	Discuss the concept of structured outputs in the context of CNNs. Provide examples of tasks where structured outputs are important.	10M
	OR	
9	Discuss the benefits of unsupervised feature learning in the context of CNNs, such as using auto encoders or generative adversarial networks (GANs) for feature extraction.	10M
10	Explain the role of gated recurrent units (GRUs) and long short-term memory (LSTM) units in mitigating the vanishing gradient problem.	10M
	OR	
11	Discuss the concept of adversarial training in the context of Generative Adversarial Networks (GANs) and how GANs can be used to create realistic data samples.	10M

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Code: 20A05703c

R20

B.Tech III Year I Semester (R20) Supplementary Examinations August 2023

DEEP LEARNING

(Common to CSE (AI) & CSE (AI&ML))

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1		Answer the following: (10 X 02 = 20 Marks)	
	(a)	What is principal component analysis?	2M
	(b)	State the Bayes' rule.	2M
	(c)	What is forward propagation?	2M
	(d)	What is curse of dimensionality?	2M
	(e)	What is role of regularization in the context of deep learning?	2M
	(f)	What is data augmentation?	2M
	(g)	What is the use of the convolution layer in CNN?	2M
	(h)	What is significance of pooling layers in a CNN?	2M
	(i)	What is recurrent neural network?	2M
	(j)	What is recursive neural network?	2M

PART – B

(Answer all the questions: 05 X 10 = 50 Marks)

2		Find the singular value decomposition for matrix $A = \begin{bmatrix} 1 & 0 & 1 \\ -1 & 1 & 0 \end{bmatrix}$.	10M
		OR	
3	(a)	Explain in detail the Dirac distribution and the empirical distribution.	5M
	(b)	Explain how derivatives help in the process of gradient descent.	5M
4	(a)	Write a note on Occam's razor and Vapnik-Chervonenkis dimension.	5M
	(b)	Illustrate the Gaussian distribution's variance estimators.	5M
		OR	
5	(a)	Explain briefly about support vector machines.	5M
	(b)	Give a brief overview of stochastic gradient descent.	5M
6	(a)	Explain the difference between L2 and L1 parameter regularization.	5M
	(b)	Explain in detail parameter tying and parameter sharing.	5M
		OR	
7	(a)	Briefly explain how learning differs from pure optimization.	7M
	(b)	Write a short note on Momentum.	3M
8		Explain briefly the terms convolution, pooling layer, padding, activation function, and fully connected layer.	10M
		OR	
9		Explain in detail and highlight some useful properties of the functions used in neural networks.	10M
10		Describe in detail how to compute the gradient in a recurrent neural network.	10M
		OR	
11		Write short notes on (i) Auto encoders (ii) Deep generative models.	10M

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Code: 20A05703c

R20

B.Tech III Year I Semester (R20) Regular & Supplementary Examinations January 2024

DEEP LEARNING

(Common to CSE (AI) and CSE (AI&ML))

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1		Answer the following: (10 X 02 = 20 Marks)	
	(a)	What is Hadamard product of two matrices? Give an example.	2M
	(b)	How is the probability distribution of continuous variables described?	2M
	(c)	Define the task of Classification. Give an example.	2M
	(d)	Differentiate Supervised and Unsupervised Learning.	2M
	(e)	Explain Bagging.	2M
	(f)	What is Batch Normalization?	2M
	(g)	What is convolution operation?	2M
	(h)	List and briefly explain the components of a convolutional neural network.	2M
	(i)	What are auto encoders?	2M
	(j)	What are Bidirectional Recurrent Neural Networks?	2M

PART – B

(Answer all the questions: 05 X 10 = 50 Marks)

2		Explain Eigen Decomposition and Singular Value Decomposition of a matrix.	10M
		OR	
3		Explain Gradient Descent technique.	10M
4	(a)	What are function estimators? Explain the parameters used for analysing an estimator.	3M
	(b)	Explain Support Vector Machines.	7M
		OR	
5	(a)	How is learning in neural network different from learning linear models?	3M
	(b)	Explain the cost functions used for training a neural network.	7M
6	(a)	Explain Adversarial training.	6M
	(b)	Explain the different Dataset Augmentation techniques.	4M
		OR	
7	(a)	Explain any three challenges encountered when neural networks are to be optimized.	6M
	(b)	Explain AdaGrad algorithm.	4M
8	(a)	What is the purpose of the pooling layer? Explain with examples pooling functions that can be used.	7M
	(b)	Explain the effect of zero-padding the input.	3M
		OR	
9	(a)	With appropriate examples explain the different formats of data that can be used with convolution networks.	7M
	(b)	What is the role of sparse interactions in convolutional neural networks?	3M
10	(a)	Explain unfolding a computational graph.	6M
	(b)	Explain recursive neural network.	4M
		OR	
11	(a)	Explain the encoder-decoder architecture.	6M
	(b)	Explain the learning algorithm for Boltzmann machines.	4M

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