Subject Code:20CS751PE	SET-II	HT NO:			7	R					

CMR TECHNICAL CAMPUS

UGC AUTONOMOUS

B.Tech.VII Semester Regular End Examinations, November-2023

Deep learning

Common to CSM & CSD

Time: 3 Hours **Max. Marks: 70**

Note

i. This Question paper contains Part- A and Part- B.
ii. All the Questions in Part A are to be answered compulsorily.
iii. All Questions from Part B are to be answered with internal choice among them.

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PART-A

10 X 02 = 20 Marks

			Marks	CO	BL
1.	a	What is Radial basis function?	2M	CO1	L1
	b	Differentiate forward propagation and backward propagation?	2M	CO1	L1
	c	What is early stopping?	2M	CO2	L2
	d	Define virtual adversarial?	2M	CO2	L1
	e	What are the challenges in neural network optimization?	2M	CO3	L3
	f	Define sparse initialization?	2M	CO3	L2
	g	Explain briefly reverse correlation?	2M	CO4	L2
	h	Differentiate single channel and multi-channel?	2M	CO4	L5
	i	Explain conditional computation?	2M	CO5	L1
	j	What is dataset augmentation?	2M	CO5	L2

PART- B

5 X 10 = 50 Marks

			Marks	CO	BL
2.		Explain Back propagation algorithm?	10M	CO1	L2
		OR			
3	a	How Recursively Applying the Chain Rule to Obtain Backprop?	5M	CO1	L3
	b	Explain Differentiation outside the Deep Learning Community?	5M	CO1	L2

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4	a	Describe Semi-Supervised Learning	5M	CO2	L1
	b	How early stopping acts as a regularizer	5M	CO2	L4
		OR			
5		Explain Sparse Representations with a suitable example?	10M	CO2	L3
6		Briefly explain Parameter Initialization Strategies	10M	CO3	L2
		OR			
7	a	Explain RMSProp algorithm.	5M	CO3	L4
	b	Explain Broyden–Fletcher–Goldfarb–Shanno (BFGS) algorithm.	5M	CO3	L5
8		Explain about the neuroscientific basis for convolutional network.	10M	CO4	L2
		OR			
9	a	Explain the history of deep learning.	5M	CO4	L3
	b	Explain briefly efficient convolution algorithms.	5M	CO4	L1
10	a	Explain Neural Language Models	5M	CO5	L3
	b	Explain about Noise-Contrastive Estimation and Ranking Loss	5M	CO5	L2
		OR			
11		Explain about the application of deep learning in recommender systems.	10M	CO5	L2

CO : Course Outcomes

BL : Bloom's Taxonomy Levels **L 1 : Remembering** **L 2 : Understanding**

L 3 : Applying **L 4 : Analysing**

L 5 : Evaluating **L 6 : Creating**

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PART-A

10 X 02 = 20 Marks

			Marks	CO	BL
1.	a	How can the normal equations or gradient descent be used to find the optimal parameters for the feedforward network?	2	CO1	L3
	b	What are some common activation functions used for hidden units and what are their advantages and disadvantages?	2	CO1	L2
	c	What are some common data set augmentation techniques for different types of data, such as audio, text, image, and video?	2	CO2	L2
	d	What is the definition and the goal of adversarial training in deep learning?	2	CO2	L2
	e	How can the choice of initialization, learning rate, and regularization affect the optimization process and the final outcome?	2	CO3	L3
	f	List out various Parameter Initialization Strategies available.	2	CO3	L1
	g	What is the mathematical definition of convolution for two functions f and g	2	CO4	L1
	h	What are the differences between average pooling and max pooling	2	CO4	L3
	i	What are some of the applications of natural language processing in the real world	2	CO5	L2
	j	What are some of the challenges and limitations of deep learning speech synthesis?	2	CO5	L1

PART- B

5 X 10 = 50 Marks

			Marks	CO	BL
2.	a	How can you use dropout to reduce overfitting in a deep feed forward neural network?	5	CO1	L3
	b	List out some of the common problems and solutions of back-propagation such as vanishing or exploding gradients?	5	CO1	L2
		OR			
3	a	How can back-propagation be combined with differentiation algorithm such as automatic differentiation to improve the accuracy of the gradient computation?	5	CO1	L4
	b	What are some of the common Issues and solutions of back-	5	CO1	L3

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propagation through local minima and saddle points?

4	a	How can regularization be used to solve under-constrained problems, such as linear regression with more features?	5	CO2	L4
	b	Write about hard-wired form of parameter sharing that expresses shift-invariance in convolutional neural networks?	5	CO2	L3
		OR			
5	a	What is the main difference between bagging and boosting in terms of .combined predictions of multiple models?	5	CO2	L4
	b	How does the manifold tangent classifier use the learned tangents to regularize a neural net classifier as in tangent prop?	5	CO2	L5
6	a	What are some techniques to improve the convergence and stability of SGD, such as learning rate decay, momentum, and Nesterov accelerated gradient?	5	CO3	L3
	b	Consider you are developing a deep filtering framework for nonlinear filtering problems using a deep neural network. You want to use an adaptive learning rate algorithm that can deal with the high-dimensional and nonconvex optimization landscape. Which algorithm would you use and why?	5	CO3	L5
		OR			
7	a	Explain the concept of natural gradient and how it differs from the ordinary gradient. How does it relate to the Fisher information matrix and the Kullback-Leibler divergence?	5	CO3	L4
	b	Explain the concept and motivation of batch normalization and how it can improve the optimization and generalization of deep neural networks.	5	CO3	L4
8	a	Discuss the applications and challenges of using random or unsupervised features in CNN for face recognition and semantic segmentation.	5	CO4	L3
	b	Describe the main components and operations of a CNN. Explain how each component contributes to the learning and performance of the network.	5	CO4	L4
		OR			
9	a	How does stride affect the output size and computational efficiency? Give some examples of applications that benefit from using large or small strides.	5	CO4	L4
	b	What are some design considerations and trade-offs for developing mega-kernels for convolution?	5	CO4	L4
10	a	How can communication, synchronization, and load balancing be optimized for large-scale deep learning training?	5	CO5	L3
	b	Explain the architecture and working of CNN models: AlexNet, VGG	5	CO5	L4
		OR			
11	a	Discuss some existing frameworks and systems that support large-scale deep learning training.	5	CO5	L3
	b	Explain the architecture and working of CNN models: ResNet, and YOLO.	5	CO5	L4

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