

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Summer 2023 - 24 Examination

Semester: 6
Subject Code: 203105399
Subject Name: Machine Learning

Date: 29/04/2024
Time: 10:30 am to 01:00 pm
Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1	Objective Type Questions - (Fill in the blanks, one word answer, MCQ-not more than Five in case of MCQ) (All are compulsory) (Each of one mark)	(15)	C O	PO	Bloom's Taxonomy
1.	_____ gradient descent is another variation of gradient descent where the gradient is computed using the entire data set		2	1	Knowledge (Recall)
2.	Combining predictions from multiple models can often lead to better results. This is called an _____ method.		2	3	Recall
3.	Three common activation functions include _____, _____, _____		1	1	Recall
4.	_____ normalizes the activations of each layer across mini-batches during training		1	4	Knowledge
5.	To improve a model's performance, we adjust its internal settings. The process is called _____.		2	1	Knowledge (Recall)
6.	What is a widely used optimization algorithm in Neural Networks?		4	2	Application
7.	What type of models combine multiple weak learners to create a stronger model?		2	2	Understanding
8.	What are the formulae for precision and Recall?		1	3	Knowledge
9.	Which type of Neural Network is commonly used for image classification?		2	4	Knowledge (Recall)
10.	What is one advantage of using the ReLU activation function compared to Sigmoid?		2	5	Knowledge
11.	Which activation function is known to suffer from the vanishing gradient problem: a) Sigmoid b) ReLU c) Leaky ReLU d) tanH		4	2	Understanding
12.	What is the key difference between a hard margin and a soft margin Support Vector Machine (SVM):		2	4	

	a) Hard margin allows for no misclassification, soft margin allows some. b) Hard margin uses linear decision boundaries, soft margin uses non-linear. c) Hard margin is for binary classification, soft margin is for multi-class. d) Hard margin requires labeled data, soft margin does not.				
13.	Convolutional Neural Networks (CNNs) are particularly effective for: a) Text classification b) Image recognition c) Time series forecasting d) All of the above		3	4	Application Understanding
14.	What is the main purpose of using L1 regularization in linear regression: a) Reduce variance b) Reduce bias c) Perform feature selection d) Improve model interpretability		2	3	Understanding , Knowledge
15.	When using pre-trained models for transfer learning in CNNs, which part of the network is typically frozen (not updated during training): a) All layers are frozen b) Only the final output layer is frozen c) Only the first convolutional layers are frozen d) The freezing strategy depends on the specific task		3	2	Knowledge
Q.2	Answer the following questions. (Attempt any three)	(15)			
A)	Explain the difference between accuracy, precision, and recall in the context of classification problems.		3	5	Remembering
B)	Describe the working of L1(Lasso) and L2(Ridge) regularization.		4	7	Understanding
C)	Explain the formulation of precision, recall and accuracy score with the help of confusion matrix.		2,3	8	Application, Understanding
D)	Brief about transfer learning , justify your answer with one appropriate example.				Application
Q.3	A) Explain the concept of overfitting and underfitting in machine learning models. Discuss different techniques used to address these issues, providing examples for each technique.	(07)	5	10	Understanding
	B) Describe L1 regularization (LASSO regression) and L2 regularization (ridge regression) in linear regression. How do these techniques work and what are their benefits in terms of model performance and interpretability?	(08)	1,4	8	Remembering, Understanding
	OR				
	B) What framework would you recommend for implementing an Artificial Neural Network (ANN) for handwritten digit classification, and how would you outline the steps involved in constructing such a model using your suggested framework?	(08)	4	7,9	Application

Q.4	Explain the role of activation functions in neural network, Brief the following activation functions Sigmoid , Leaky Relu and SoftMax.	(07)	2	3,5	Understanding , Application
	OR				
A)	Explain the role of forward propagation and backpropagation in training Convolutional Neural Networks (CNNs). Discuss how these processes work together to optimize the network's performance	(07)	3	5	Understanding
B)	Briefly describe the concept of ensemble methods in machine learning. Explain how techniques like bagging and boosting can improve the performance of individual models.	(08)	2,4	6,10	Application