Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2019

EC3ET05 / EI3ET05 Introduction to Machine Learning

Programme: B.Tech. Branch/Specialisation: EC/EI

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated.Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. This supervised learning technique can process both numeric and categorical input attributes. **1**

(a) Linear regression (b) Bayes classifier

(c) Logistic regression (d) Back propagation learning

ii. Which of the following methods do we use to best fit the data in Logistic Regression? **1**

(a) Least Square Error (b) Maximum Likelihood

(c) Jaccard distance (d) Both (a) and (b)

iii. A perceptron is: **1**

(a) A single layer feed-forward neural network with pre-processing

(b) An auto-associative neural network

(c) A double layer auto-associative neural network

(d) A neural network that contains feedback

iv. An artificial neuron receives n inputs $x_1, x_2, \ldots\ldots\ldots\ldots x_n$ with weights $w_1, w_2, \ldots\ldots\ldots\ldots w_n$ attached to the input links. The we ighted sum_____ is computed to be passed on to a non-linear filter F called activation function to release the output. **1**

(a) S w_i (b) S x_i

(c) S w_i+ S x_i (d) S w_i* x_i

v. The effectiveness of an SVM depends upon: **1**

(a) Selection of Kernel (b) Kernel Parameters

(c) Soft Margin Parameter C (d) All of these

P.T.O.

vi. The cost parameter in the SVM means: **1**
(a) The number of cross-validations to be made
(b) The kernel to be used
(c) The tradeoff between misclassification and simplicity of the model
(d) None of these

vii. _____ is frequently referred to as k-means clustering. **1**
(a) Non-hierarchical clustering
(b) Optimizing partitioning
(c) Divisive clustering
(d) Agglomerative clustering

viii. Which of the following algorithms cannot be used for reducing the dimensionality of data? **1**
(a) t-SNE (b) PCA (c) LDA False (d) None of these

ix. Deep learning can be applied to which of the following NLP tasks? **1**
(a) Machine translation
(b) Sentiment analysis
(c) Question Answering system
(d) All of the above

x. An agent in a reinforcement learning is: **1**
(a) Person (b) Reward (c) Algorithm (d) Training data

Q.2 i. What do you mean by machine learning? Discuss the important objectives of Machine Learning. **2**

ii. Differentiate between Supervised, Unsupervised and Reinforcement Learning. **3**

iii. What do you mean by linear regression? Derive the formulas for regression coefficients used in Simple linear and multiple linear regression. **5**

OR iv. The values of independent variable and dependent variables are given below: **5**

X	0	1	2	3	4
Y	2	3	4	5	6

Find the least square regression line Y = a+bX. Estimate the value of Y for X=10.

Q.3 i. Differentiate between Feed Forward and Feed Backward networks. **2**

ii. What are biological neurons? Explain the structure of biological and artificial neurons in detail. **8**

OR iii. Explain error back propagation algorithm with its limitations, characteristics and applications. **8**

Q.4 i. Differentiate between Binary, Multi class and Multi Label classification. **3**

ii. What is Support Vector Machine? Explain its key terminologies. How to compute the margin? **7**

OR iii. Discuss K Nearest Neighbour algorithm for classification with help of a suitable example. **7**

Q.5 i. What is a recommender system? Write various methods used in recommendation system. **4**

ii. Explain in detail Principal Component Analysis for dimension reduction. **6**

OR iii. Explain K-means algorithm for clustering with the help of a suitable example. **6**

Q.6 Attempt any two:

i. Explain reinforcement learning in detail along with the various elements involved in forming the concept. **5**

ii. Describe Back propagation Through Time (BPTT) also explain how it differs from traditional back propagation. **5**

iii. Write a brief note on Deep learning and its applications. **5**

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Marking Scheme

EC3ET05 / EI3ET05 Introduction to Machine Learning

Q.1	i.	This supervised learning technique can process both numeric and categorical input attributes. (a) Linear regression		**1**
	ii.	Which of the following methods do we use to best fit the data in Logistic Regression? (b) Maximum Likelihood		**1**
	iii.	A perceptron is: (a) A single layer feed-forward neural network with pre-processing		**1**
	iv.	An artificial neuron receives n inputs $x_1, x_2, \ldots\ldots\ldots\ldots x_n$ with weights $w_1, w_2, \ldots\ldots\ldots\ldots w_n$ attached to the input links. The we ighted sum_____ is computed to be passed on to a non-linear filter F called activation function to release the output. (d) S $w_i * x_i$		**1**
	v.	The effectiveness of an SVM depends upon: (c) Soft Margin Parameter C		**1**
	vi.	The cost parameter in the SVM means: (c) The tradeoff between misclassification and simplicity of the model		**1**
	vii.	_____ is frequently referred to as k-means clustering. (a) Non-hierarchical clustering		**1**
	viii.	Which of the following algorithms cannot be used for reducing the dimensionality of data? (c) LDA False		**1**
	ix.	Deep learning can be applied to which of the following NLP tasks? (d) All of these		**1**
	x.	An agent in a reinforcement learning is: (b) Reward		**1**
Q.2	i.	Meaning machine learning	1 mark	**2**
		Objectives of Machine Learning	1 mark	
	ii.	Difference b/w Supervised, Unsupervised and Reinforcement Learning.		**3**
		At least three difference 1 mark for each	(1 mark * 3)	
	iii.	Linear regression	1 mark	**5**
		Derive the formula Simple linear	2 marks	
		Derive the formula multiple linear regression	2 marks	
OR	iv.	Find the least square regression line Y = a+bX. Estimate the value of Y for X=10.		**5**
		Table	2 marks	
		Formula	2 marks	
		Diagram	1 mark	
Q.3	i.	Difference b/w Feed Forward and Feed Backward networks		**2**
		At least four difference 0.5 mark for each	(0.5 mark * 4)	
	ii.	Biological neurons	2 marks	**8**
		Structure of biological neurons	3 marks	
		Structure of artificial neurons	3 marks	
OR	iii.	Error back propagation algorithm	2 marks	**8**
		Limitations	2 marks	
		Characteristics	2 marks	
		Applications	2 marks	
Q.4	i.	Difference b/w Binary, Multi class and Multi Label classification		**3**
		1 mark for each	(1 mark * 3)	
	ii.	Support Vector Machine	1 mark	**7**
		Key terminologies	2 marks	
		Computation the margin	4 marks	
OR	iii.	K Nearest Neighbour algorithm	2 marks	**7**
		Classification	3 marks	
		Example	2 marks	
Q.5	i.	Recommender system	2 marks	**4**
		Methods used in recommendation system	2 marks	
	ii.	Principal Component Analysis for dimension reduction.		**6**
		Diagram	2 marks	
		Explanation	4 marks	
OR	iii.	K-means algorithm for clustering	2 marks	**6**
		Example	4 marks	
Q.6		Attempt any two:		
	i.	Reinforcement learning	1 mark	**5**
		Elements involved in forming the concept	3 marks	
		Block diagram	1 mark	
	ii.	Back propagation Through Time (BPTT)	2 marks	**5**
		Difference b/w BPTT and traditional back propagation.	3 marks	
	iii.	Deep learning	2 marks	**5**
		Its applications	3 marks	

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