

2122

M. E. (Information Technology)
Third Semester
MEIT-3103: Machine Learning

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Part.

x-x-x

1	(a) What is the difference between classification and clustering? (b) What is the role of the learning rate parameter? (c) In which case, it is better to estimate theta/weights using normal equation method? (d) In what circumstances K means clustering does not work? (e) What do you understand by Independent component analysis?	(10)																												
Part A																														
2	(a) With the help of a numerical example explain gradient descent method for multiple linear regression. Also explain importance of positive and negative slope. (b) Derive equation for maximum likelihood and loglikelihood in case of logistic regression.	(5) (5)																												
3.	Explain maximum margin classifier with the help of a numerical example. Also calculate and draw negative plane, positive plane and hyperplane.	(10)																												
4.	Update weights W_1 & W_2 for one iteration for single hidden layer neural network. This network has two input nodes, two nodes in hidden layer and 1 node in output layer. If inputs are X_1, X_2 . Weights W_{11}, W_{12} & b_1 bias are connected to node 1 of hidden layer. Weights W_{21}, W_{22} & b_2 bias are connected to node 2 of the hidden layer. W_1, W_2 & b_2 are connected to output layer. $W_{11}=0.1, W_{21}=0.2, W_{12}=0.15, W_{22}=0.25, b_1=0.35, W_1=0.2, W_2=0.25, b_2=0.3, X_1=0.5, X_2=0.1, Y=0.1, \alpha=0.01$.	(10)																												
Part B																														
5.	Assign data points to two clusters in the following data using K means clustering.	(10)																												
	<table border="1"> <thead> <tr> <th>Points</th> <th>P1</th> <th>P2</th> <th>P3</th> <th>P4</th> <th>P5</th> <th>P6</th> </tr> </thead> <tbody> <tr> <td>X1</td> <td>1</td> <td>2</td> <td>8</td> <td>4</td> <td>6</td> <td>7</td> </tr> <tr> <td>X2</td> <td>1</td> <td>2</td> <td>7</td> <td>5</td> <td>4</td> <td>6</td> </tr> </tbody> </table>	Points	P1	P2	P3	P4	P5	P6	X1	1	2	8	4	6	7	X2	1	2	7	5	4	6								
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6.	(a) Explain EM algorithm with the help of a numerical example. (b) Consider one example of 3 hidden weather conditions Sunny, rainy and cloudy. Assume one weather condition persists for the whole day. Visible conditions are Umbrella and light wear cloths. Calculate probability $P(\text{light wear, Umbrella, Umbrella, Sunny, Rainy, Rainy})$ for the following probability tables. Assume Initial probabilities as: (Sunny=0.5, Rainy =0.3, Cloudy=0.2).	(5) (5)																												
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7	Explain the following (a) PCA (b) ICA	(10)																												

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