

III SEMESTER M.C.A END SEMESTER EXAMINATIONS, JANUARY 2021

SUBJECT: MACHINE LEARNING
[MCA 5152]
REVISED CREDIT SYSTEM

(02/01/2021)
Time: 3 Hours

Instructions to Candidates:

❖ Answer ALL the questions.

- * Missing data may be suitable assumed.
- IA With suitable diagrams and examples, Compare and contrast between

 i. Supervised Learning vs. Reinforcement Learning

 ii. Neural Networks vs. Convolutional Neural Networks.

 iii. Parametric vs. Non Parametric Models

 iv. Bias vs. Variance

 v. Pre-pruning vs. Post pruning in Decision Trees.

 IB With respect to Regression models, explain the concepts of

 i. Auto correlation

 ii. Collinearity

 iii. Heteroscedasticity

 IC What is Inductive Bias? List any two biases that can be imposed on a machine learning model

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MAX. MARKS: 50

| | Use the Naïve Bayesian | | | | | 5 | | | |
|------|--|--|---|---|--------------------------------|----------|--|--|--|
| | on the predictor variable | les of Refund, Ma | arital Status | and Taxab | le Income. | | | | |
| | The test instance is Ref | fund='No', Marita | al Status='I | Divorced' ar | nd Taxable | | | | |
| | income is 140K. Consider the following data set: | | | | | | | | |
| | Tid Refund Marital Taxable | | | | | | | | |
| | | Status | Income | Evade | | | | | |
| 18/9 | te Ye | 444.024.14 | 125K | No No | | | | | |
| | 2 No 3 No | | 70K | No | | | | | |
| | 4 Ye | Married | 120K | No | | e- (a.)) | | | |
| - | 5 No | Section 1981 | 95K 60K | Yes | | | | | |
| | 6 No | The state of the s | and the second | No | | - 4m | | | |
| T | B No | Single | 85K | Yes | , , , ,,,,,, | | | | |
| | 9 No | | 75K | No | | | | | |
| | | 10 No Single 90K Yes | | | | | | | |
| | For taxable income: | | | | | | | | |
| | For taxable income: | | | | | | | | |
| | | sample mean=11 | 0, sample v | ariance=29 | <i>75</i> . | | | | |
| | For EVADE = No: the | | | | | | | | |
| | | | | | | | | | |
| | For EVADE = No: the For EVADE = Yes: the | e sample mean=90 | 0, sample vo | ariance=25. | P | 2 | | | |
| В | For EVADE = No: the For EVADE = Yes: the Consider the simple ne | e sample mean=90 | 0, sample vo | ariance=25. | on with two | 3 | | | |
| В | For EVADE = No: the For EVADE = Yes: the Consider the simple ne variables (0.5,0.3) is in | e sample mean=90 cural network show | o, sample vo wn below. A | An observation What is the | on with two | 3 | | | |
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| A 0 B 8 0 C 2 6 0 D 5 4 8 0 E 10 9 1 7 0 I. Perform single-link, Agglomerative clustering on the following distance matrix. II. Represent the clustering using a Dendrogram. | 3A | | | Item | Α | В | С | D | E | | | 5 |
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| | | | | | | | | | | | | |
| TAMANAN TO THE TAME TO THE TAM | | | | | | . Cooiit | are pr | obtem s | siaiciile | iii u | sing a 2- | |
| | | | | | | | | | | | | |

| 5A | I. Write a Linear Cost Functio | n for each of | the following | ng statements. Us | e 5 | | | |
|-------|---|----------------|---------------|--------------------|------|--|--|--|
| JA | Y for estimated costs and X | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | (iii) Utilities will have a minimum charge of \$900, plus a charge of \$0.08 per kilowatt hour. | | | | | | | |
| | 1 | | | | | | | |
| | (iv) Machine operating costs include \$220,000 of machine depreciation per year, plus \$75 of utility costs for each day of the | | | | | | | |
| | | | | | | | | |
| | machinery is in operation. | | | | | | | |
| | II. Write the pseudocode for cost function in Gradient Descent | | | | | | | |
| | algorithm. | T - 1 - C41 | alogges ho | vo the semple size | es 3 | | | |
| 5B | We have 2 classes: C1 and C2. Each of these classes have the sample sizes | | | | | | | |
| | of m, n respectively. The following data is given for each of the samples: | | | | | | | |
| | μx | μ _y | σx | <u>Gy</u> | | | | |
| | Class C1 -0.12 | +0.67 | 4.23 | 0.78 | | | | |
| | Class C2 +0.57 | -0.32 | 3.54 | 1.23 | | | | |
| | Assuming the samples of each class follow a Normal Distribution, | | | | | | | |
| | Determine the class to which the tuple (2.5, 3.5) belongs to using the method | | | | | | | |
| | of Maximum Likelihood Estimation. | | | | | | | |
| 5C | Suppose the time required to build a computer is normally distributed with | | | | | | | |
| 50 | a mean of 50 minutes and a standard deviation of 10 minutes. What is the | | | | | | | |
| | probability for the assembly time of a computer to be between 45 and 60 | | | | | | | |
| | minutes? | | | | | | | |
| A. S. | ininutes! | | | | | | | |

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