BE / CMPN / SEM-VII / C-2019 / DEC. 2023

Paper / Subject Code: 42171 / MACHINE LEARNING

Time: 3hrs

N.B. : **(1) Question No 1 is Compulsory.** **[Total Marks:80]**

(2) Attempt any three questions out of the remaining five.

(3) Assume suitable data, if required and state it clearly.

Q1 Attempt any **FOUR** from the following

A Explain how to choose the right algorithm for machine learning application. [20]

B Explain Linear Discriminant Analysis.

C Explain any five performance measures along with example.

D Differentiate between Logistic regression and Support vector machine.

E Explain the following Receiver operating characteristics curve and Area under curve.

Q2 A Explain clustering with minimal spanning tree with reference to Graph based clustering.

B Explain the terms overfitting, underfitting, bias & variance tradeoff w.r.t. Machine Learning. [10]

Q3 A Explain the concept of regression and enlist its types. A clinical trial gave the data for BMI [10] and Cholesterol level for 10 Patients as shown in table below. Identify the machine learning [10] method used to solve the above problem and predict the likely value of Cholesterol level for someone who has BMI of 27.

BMI	17	21	24	28	14	16	19	22	15	18
Cholesterol	140	189	210	240	130	100	135	166	130	170

B Explain the necessity of cross validation in Machine learning applications and K-fold cross validation in detail. [10]

Q4 A Explain support vector machine as a constrained optimization problem.

B Explain the concept of decision tree. Consider the dataset given in a table below. The dataset [10] has 3 features as Past Trend, Open interest, Trading volume and one class label as Return. [10] Compute the Gini Index for all features and specify which node will be chosen as a root node in decision tree.

Past Trend	Open Interest	Trading Volume	Return
Positive	Low	High	Up
Negative	High	Low	Down
Positive	Low	High	Up
Positive	High	High	Up
Negative	Low	High	Down
Positive	Low	Low	Down
Negative	High	High	Down
Negative	Low	High	Down
Positive	Low	Low	Down
Positive	High	High	Up

Q5 A Explain kernel Trick in support vector machine.

B Explain different ways to combine classifiers. [10]

Q6 Write any **TWO** from the following [10]

A Explain multiclass classification techniques. [20]

B Explain in detail Principal Component Analysis for Dimensionality reduction

C Explain DBSCAN algorithm along with example

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BE / SEM-VII / CMPH | C-2019 | DEC 2023

Time: 03 Hours **Marks: 80**

Note: 1. Question 1 is compulsory
2. Answer any three out of the remaining five questions.
3. Assume any suitable data wherever required and justify the same.

Q1 a) What is the basic difference between traditional RDBMS and Hadoop? [5]

b) What are the 3 V's of big data? Give two big data case studies indicating respective V's with justification. [5]

c) Explain how node failure is handled in Hadoop. [5]

d) List down all six constraints that must be satisfied for representing a stream by buckets using DGIM algorithm with examples. [5]

Q2 a) Describe the four ways by which big data problems are handled by NoSQL. [10]

b) Write a map reduce pseudo code to multiply two matrices. Apply map reduce working to perform following matrix multiplication. [10]

$$M = \begin{matrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{matrix} \quad X \quad V = \begin{matrix} 1 \\ 2 \\ 3 \end{matrix}$$

Q3 a) Suppose the stream is S = {4, 2, 5 ,9, 1, 6, 3, 7}. Let hash functions h(x) = x + 6 mod 32 for some a and b, treat result as a 5-bit binary integer. Show how the Flajolet- Martin algorithm will estimate the number of distinct elements in this stream. [10]

b) i. Create a data frame from the following 4 vectors and demonstrate the output: [10]

```
emp_id = c (1:5)
emp_name = c("Rick","Dan","Michelle","Ryan","Gary")
start_date = c("2012-01-01", "2013-09-23", "2014-11-15", "2014-05-11", "2015-
    03-27")
salary = c(60000, 45000, 75000, 84000, 20000)
```

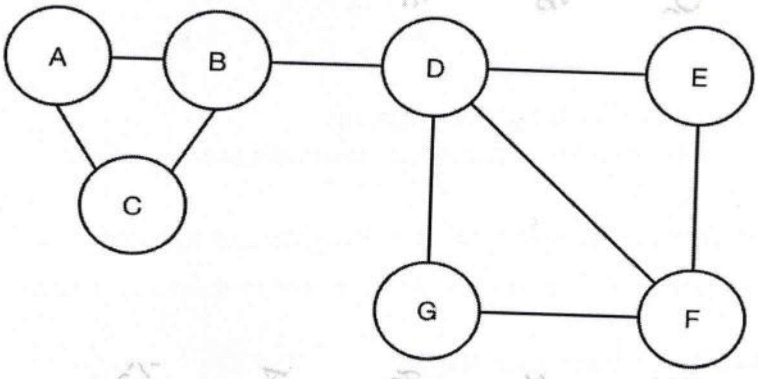
ii. Display structure and summary of the above data frame.
iii. Extract the emp_name and salary columns from the above data frame.
iv. Extract the employee details whose salary is less than or equal to 60000.

Q4 a) Explain Map Reduce execution pipeline with suitable example [10]

b) Explain DGIM algorithm for counting ones in a stream with example. [10]

Paper / Subject Code: 42172 / BIG DATA ANALYTICS

Q5 a) Determine communities for the given social network graph using Girvan-Newman algorithm. [10]



b) List and explain various functions that allow users to handle data in R workspace with appropriate examples. [10]

Q6 a) i. What are the advantages of using functions over scripts? [10]

ii. Suppose you have two datasets A and B.
Dataset A has the following data: 6 7 8 9.
Dataset B has the following data: 1 2 4 5.
Which function is used to combine the data from both datasets into dataset C.
Demonstrate the function with the input values and write the output.

b) How recommendation is done based on properties of the product? Explain with the help of an example. [10]

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Paper / Subject Code: 42175 / NATURAL LANGUAGE PROCESSING (DLOC - III)

BE / SEM-VIII / CMPH | C-2019 | DEC 2023

Duration: 3hrs **[Max Marks: 80]**

N.B.: **(1) Question No 1 is Compulsory.**
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

1 Attempt any FOUR **[20]**

a What is the rule-based and stochastic part of speech taggers?

b Explain Good Turing Discounting?

c Explain statistical approach for machine translation.

d Explain with suitable example the following relationships between word meanings: Hyponymy, Hypernymy, Meronymy, Holynymy

e What is reference resolution?

2 a Explain FSA for nouns and verbs. Also Design a Finite State Automata (FSA) for the words of English numbers 1-99. **[10]**

b Discuss the challenges in various stages of natural language processing. **[10]**

3 a Consider the following corpus **[10]**

<s> the/DT students/NN pass/V the/DT test/NN<\s>
<s> the/DT students/NN wait/V for/P the/DT result/NN<\s>
<s> teachers/NN test/V students/NN<\s>

Compute the emission and transition probabilities for a bigram HMM. Also decode the following sentence using Viterbi algorithm.
"The students wait for the test"

b What are five types of referring expressions? Explain with the help of example. **[10]**

4 a Explain dictionary-based approach (Lesk algorithm) for word sense disambiguation (WSD) with suitable example. **[10]**

b Explain the various challenges in POS tagging. **[10]**

5 a Explain Porter Stemming algorithm in detail. **[10]**

b Explain the use of Probabilistic Context Free Grammar (PCFG) in natural language processing with example. **[10]**

6 a Explain Question Answering system (QAS) in detail. **[10]**

b Explain how Conditional Random Field (CRF) is used for sequence labeling. **[10]**

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Paper / Subject Code: 42177 / BLOCK CHAIN (DLOC - IV)

BE | Sem-VII | CMPN | C-2019 | Dec-2023

(Time: 3 Hours) **(Total Marks: 80)**

N.B.:
1. Question No. 1 is compulsory.
2. Answer any three out of the remaining questions.
3. Assume suitable data if necessary.
4. Figures to the right indicate full marks.

Q1. Attempt the following (Any 4): **(20)**

a. Explain the concept of UTXO model of Bitcoin.
b. Differentiate between hot and cold wallets
c. Explain mining pool and its difficulty.
d. Compare and contrast private and public blockchain.
e. List and explain various types of nodes used in ethereum.

Q2. Attempt the following:

a. Explain the function of state machine replication. Explain with respect to crowd funding application. **(10)**
b. Compare BFT and PBFT Consensus in detail. **(10)**

Q3. Attempt the following:

a. Compare the role of MSP and Fabric CA. Explain their role in Hyperledger blockchain. **(10)**
b. Explain ethereum architecture and workflow in detail. **(10)**

Q4. Attempt the following:

a. List and explain the types of test networks used in ethereum. **(10)**
b. Explain different visibility specifier of functions in solidity with example. **(10)**

Q5. Attempt the following:

a. What is transaction structure? Explain transaction life cycle in detail. **(10)**
b. Explain the role of address and address payable in solidity with example. **(10)**

Q6. Write short notes on (Any 2): **(20)**

a. Consensus in Bitcoin
b. Hyperledger Fabric
c. Cryptography in Blockchain
d. Defi Architecture

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