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MCS–224

MASTER OF COMPUTER APPLICATIONS (MCA-NEW)

Term-End Examination

December, 2023

MCS-224 : ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Time : 3 Hours *Maximum Marks : 100*

Note : *Question No. 1 is compulsory. Attempt any* ***three*** *questions from the rest.*

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1. (a) Differentiate between clustering and classification technique. List any *two* algorithms for each. 6

   (b) Explain Turing test with suitable example. 5

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(c) What is skolomization ? What is the utility of skolomization ? Skolomize the following expression : 6

$$\exists_{x_1}\exists_{x_2}\forall_{y_1}\forall_{y_2}\exists x_3\forall_{y_3}\mathrm{P}(x_1, x_2, x_3, y_1, y_2, y_3)$$

(d) Explain backward chaining system with a suitable example. 6

(e) Differentiate between Lazy learners and Eager learners in classification problem. Also, list the algorithms used for each type of learners, respectively. 6

(f) Explain the term 'Dimensionality Reduction'. Name the general techniques used to perform it. Also give merits and limitation of dimensionality reduction. 6

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(g) Explain the working of partition based clustering. Mention any *two* methods used for partition based clustering. 5

2. (a) Compare artificial intelligence, machine learning and deep learning. 6

(b) What do you understand by state space in AI ? What is its utility ? Write production rules for state space representation of water jug problem. 7

(c) Write and explain Breadth First Search (BFS) algorithm. Discuss its space and time complexity. Also, give advantage and disadvantage of BFS algorithm. 7

3. (a) Differentiate between predicate and propositional logic. If $P(x) \rightarrow$ "x is a rational number" and $Q(x) \rightarrow$ "x is a real

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number" then symbolize the following sentences : 5

(i) Every rational number is a real number

(ii) Some real numbers are rational

(iii) Not every real number is a rational number

(b) Explain the concept of resolution and unification in AI, with suitable example for each. 7

(c) Explain rule based systems in AI. Give advantages and disadvantages of rule based systems. Also, give the *two* important sources of uncertainty in rule based systems. 8

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4. (a) Explain reinforcement learning with the help of a block diagram. Explain the role of each component of block diagram. 6

   (b) Compare classification and regression techniques of supervised learning. Explain the various metrics used for evaluating the classification model. 7

   (c) Differentiate between the following (give example for each) : 7

      (i) Logistic regression and Linear regression

      (ii) K-NN algorithm and K-means algorithm

5. Explain any ***four*** of the following with suitable example for each : 4×5=20

   (a) Linear Discriminant Analysis

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(b) FP tree growth

(c) Density based clustering

(d) Restricted Boltzmann Machines

(e) Convolutional Neural Networks

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