

End Semester Examination

Course Name: Artificial Intelligence
Marks: 15

Code: CS 571/561
Time: 50 minutes

Answer ALL the questions

Make reasonable assumptions as and whenever necessary. You can answer the questions in any sequence. However, the answers to all the components of any particular question should appear together. Carefully read the instructions circulated in the group on Nov 23, 2021.

Q1. "Information Gain is always a better splitting criteria than Gini Index for building the Decision Tree".

Justify this statement with proper intuition and example(s). Come up with a counterexample to disprove this statement. **3 + 3**

Q2. If A* knows the ACTUAL cost of the optimal path of any node to the goal, then no useless node is expanded. Prove or disprove this statement with proper explanation. **5**

Q3. Suppose a knowledge base contains just the following first-order Horn clauses:

$\text{Ancestor}(\text{Mother}(x), x)$

$\text{Ancestor}(x, y) \wedge \text{Ancestor}(y, z) \implies \text{Ancestor}(x, z)$

Consider a forward chaining algorithm, that on the j th iteration, terminates if the KB contains a sentence that unifies with the query, else adds to the KB every atomic sentence that can be inferred from the sentences already in the KB after iteration $j-1$.

Can a resolution algorithm prove the sentence $\sim \text{Ancestor}(\text{John}, \text{John})$ from the original knowledge base? Explain how, or why not? **4**

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Best of Luck