Past few year Questions from MBR course

1. What specific kind of knowledge do the programs SAM and PAM use for
   understanding?   [Marks 8]

2. Describe the Candidate-Elimination algorithm. How does it compare with
   decision tree learning with ID3?   [Marks 12]

3. What is inductive bias? Why does a learning algorithm have to some inductive
   bias?   [Marks 10]

4. The ID3 algorithm extends the decision tree by selecting an attribute that gives
   maximum information gain on being used as a test. The attribute may take some
   discrete set of values. Given that some attribute may have many possible
   values, while others may have only a few values, how does the number of values
   that the attribute can take influence this process? Explain with an example.
                                                                    [Marks 10]

5. What roles do the notions of utility and similarity play in CBR?   [Marks 8]

6. Where and how are the BWB and BOB tests used?   [Marks 10]

7. When is the Fish&Shrink algorithm appropriate to use?   [Marks 6]

8. What is diversity conscious retrieval? Where is it used? Define diversity.
                                                                    [Marks 10]

9. Discuss the semantics of the similarity measures used in taxonomies.
                                                                    [Marks 5]

10. Define the triangle inequality for a similarity measure. Name a retrieval algorithm
    that requires the triangle inequality to hold? Why?   [Marks 8]

11. Define TF and IDF measures and describe vector space model for document
    retrieval   [Marks 10]

12. What is latent semantic indexing? Where is it used?   [Marks 6]

-----******------

1. For each of the following give your estimate of the size of the vocabulary held -
          A. A four year old child.
          B. An IIT graduate.
          C. Salman Rushdie.
          D. An IIT graduate about to write GRE.   [Marks 2]

2. What roles do the notions of utility and similarity play in CBR?   [Marks 8]

3. Where and when are the BWB and BOB tests used? [Marks 10]

4. When is the Fish&Shrink algorithm appropriate to use? [Marks 6]

5. What is diversity conscious retrieval? Where is it used? Define diversity.
[Marks 10]

6. Define the triangle inequality for a similarity measure. Name a retrieval algorithm that requires the triangle inequality to hold? Why? [Marks 10]

7. What is latent semantic indexing? Where is it used? [Marks 6]

8. What is inductive bias? Why does a learning algorithm have to some inductive bias? [Marks 10]

9. What are version spaces? Where and how are they used? [Marks 10]

10. Use the information gain measure to build a decision tree for the following data. Show clearly the calculations that go into deciding the tree structure.
The following log (base 2) data might be useful. $\lg(1/8) = -3$, $\lg(2/8) = -2$, $\lg(3/8)= -1.415$, $\lg(4/8) = -1$, $\lg(5/8) = -0.678$, $\lg(6/8) = -0.415$, $\lg(7/8)$ -0.193

Paper reading	Progr assign	Endsem	Result
No	Yes	Yes	Fail
Yes	Yes	No	Pass
No	Yes	No	Fail
Yes	No	No	Fail
Yes	Yes	Yes	Pass
No	No	No	Fail
No	No	Yes	Fail
Yes	No	Yes	Fail

[Marks 12]

11. The ID3 algorithm extends the decision tree by selecting an attribute that gives maximum information gain on being used as a test. The attribute may take some discrete set of values. Given that some attribute may have many possible values, while others may have only a few values, how does the number of values that the attribute can take influence this process? Explain with an example.
[Marks 10]

12. Represent the following sentences using Schank's Conceptual Dependency theory
   a. Ramesh sold the book to Rakesh.
   b. Rashmi ate the rice with sambhar.
   c. Suresh ate the rice with Anjali.
   d. Jivika angered her friend by shouting at her.

     e. Rashmi thought she would like the sambhar but she didn't.

                                                                                       [Marks 10]

13. What specific kind of knowledge do the programs SAM and PAM use for understanding? [Marks 8]

14. Sketch the design of a "music appreciation" system. (A system that applauds at the right time). How would the design differ for Indian Classical and Western Classical music? [Marks 8]

----*******----

I don't need time. What I need is a deadline.
—Duke Ellington, jazz pianist, composer, and conductor (1899-1974)

1. For each of the following give your estimate of the size of the vocabulary held -
   A. A four year old child.
   B. An IIT graduate.
   C. Salman Rushdie.
       A) D. An IIT graduate about to write GRE. [Marks 2]

2. "The King of England gave Harry to the Church"
       A) How would ELI process the above sentence? Describe,
       B) The state of the requests
       C) The C-List
       D) after each word is read in. [Marks 10]

3. Represent the following sentences using Schank's Conceptual Dependency theory
       A) Ramesh sold the book to Rakesh.
       B) Rashmi ate the rice with sambhar.
       C) Suresh ate the rice with Anjali.
       D) Jivika angered her friend by shouting at her.
       E) Rashmi thought she would like the sambhar but she didn't.
       [Marks 10]

4. Convert the following story into CD like FOL representation.
5. "Drona put down his weapons because he came to believe that
   A. his son was dead. This was because Yudhistra told him that
   B. Aswathama was killed by Bhima." [Marks 10]

6. What are the four types of causal connections between conceptualizations? Give an example for each. [Marks 8]

7. Describe the architecture of SAM. What are the processes which act upon each sentence which is input to the system? Where are Rolefit and Rolemerge used?
[Marks 12]

8. What are the different components of PAM? Describe how PAM processes a story.   [Marks 12]

9. Sketch the design of a "music appreciation" system. How would the design differ for Indian Classical and Western Classical music?   [Marks 12]

10. What is inductive bias? When does a learning algorithm have to have inductive bias?   [Marks 10]

11. What are version spaces? Where and how are they used?   [Marks 10]

12. Describe the Candidate-Elimination algorithm. How does it compare with decision tree learning with ID3?   [Marks 15]

13. Use the information gain measure to build a decision tree for the following data. Show clearly the calculations that go into deciding the tree structure.
The following log (base 2) data might be useful.   lg(1/8) = -3, lg(2/8) = -2, lg(3/8)= -1.415, lg(4/8) = -1, lg(5/8) = -0.678, lg(6/8) = -0.415, lg(7/8) -0.193

Paper reading	Progr assign	Endsem	Result
No	Yes	Yes	Fail
Yes	Yes	No	Pass
No	Yes	No	Fail
Yes	No	No	Fail
Yes	Yes	Yes	Pass
No	No	No	Fail
No	No	Yes	Fail
Yes	No	Yes	Fail

i. [Marks 15]

14. The ID3 algorithm extends the decision tree by selecting an attribute based on information gain. The attribute may take some discrete set of values. Given that some attribute may have many possible values, while others may have only a few, how does the number of values that the attribute can take likely to influence ID3? Explain with an example.
[Marks 10]

15. Do any 15: Describe in brief what the following terms refer to,
   *   Qualitative belief propagation
   *   Extgain, and engain
   *   Buckingham Pi theorem
   *   Latent semantic indexing
   *   No function in structure principle

- Matching knowledge and indexing knowledge
- MBR Transform
- Diversity conscious retrieval
- Boosted Rise
- Conversational CBR
- Bubble world
- Case dispatching
- Unexpected success, and false expectation
- Locality and fragmentation (measures of efficiency)
- The curse of dimensionality
- Context based similarity
- Geometric Near Access Tree
- Searching by slicing

[Marks 30]

----End----

---

1. Imagine the OS of your machine with a memory of its interaction with you. It might, for example, complain that you did not shut down properly the day before. Also imagine that it proactively helps you in maintaining your information – files, memos, emails, calendar etc – apart from routinely beating you at chess and scrabble. Would you consider such a machine intelligent? Give reasons for your answer. *[Marks 2]*

2. What is the problem solving strategy used by CBR? Define similarity and utility. What is the relation between similarity and utility in facilitating CBR?
[Marks 5]

3. What is the Triangle Inequality? How does it figure in CBR? *[Marks 5]*

4. Discuss the semantics of the similarity measures used in taxonomies.
[Marks 5]

5. What is diversity in the context of CBR? Outline an algorithm to exploit diversity in CBR. *[Marks 5]*

6. Write the algorithm used fore retrieval in KDTrees. Where are KDtrees used?
[Marks 5]

7. Describe the Fish&Shrink algorithm. When does one use the algorithm?
[Marks 5]

8. The ID3 algorithm extends the decision tree by selecting an attribute based on information gain. The attribute may take some discrete set of values. Given that some attribute may have many possible values, for example the attribute Roll Number, while others may have only a few, for example age, how does the number of values that the attribute can take likely to influence ID3? Explain with an example. *[Marks 5]*

9. What is inductive bias? When does a learning algorithm have to have inductive bias? *[Marks 5]*

10. What are version spaces? Where and how are they used? *[Marks 4]*

11. Use the information gain measure to build a decision tree for the following data. Show clearly the calculations that go into deciding the tree structure.
The following log (base 2) data might be useful. $\lg(1/8) = -3$, $\lg(2/8) = -2$, $\lg(3/8) = -1.415$, $\lg(4/8) = -1$, $\lg(5/8) = -0.678$, $\lg(6/8) = -0.415$, $\lg(7/8)$ -0.193

12. Paper 13. reading	14. Prog 15. assign	16. Endsem	17. Result
18. No	19. Yes	20. Yes	21. Fail
22. Yes	23. Yes	24. No	25. Pass
26. No	27. Yes	28. No	29. Fail
30. Yes	31. No	32. No	33. Fail
34. Yes	35. Yes	36. Yes	37. Pass
38. No	39. No	40. No	41. Fail
42. No	43. No	44. Yes	45. Fail
46. Yes	47. No	48. Yes	49. Fail

i. [Marks 8]

12. Build a CRNet for the above set of eight cases. *[Marks 6]*

13. What is Latent Semantic Indexing? Where is it used? *[Marks 7]*

14. Represent the following sentences using Schank's Conceptual Dependency theory
15. Ramesh sold the book to Rakesh.
16. Rashmi ate the rice with sambhar.
17. Suresh ate the rice with Anjali.
18. Jivika angered her friend by shouting at her.
19. Rashmi thought she would like the sambhar but she didn't.
i. [Marks 8]

20. Describe the architecture of SAM. What are the processes which act upon each sentence which is input to the system? Where are Rolefit and Rolemerge used?

[Marks 6]

21. What are the different components of PAM? Describe how PAM processes a story.

[Marks 6]

22. What is the objective of a stochastic sequential decision problem?

[Marks 3]

----End----