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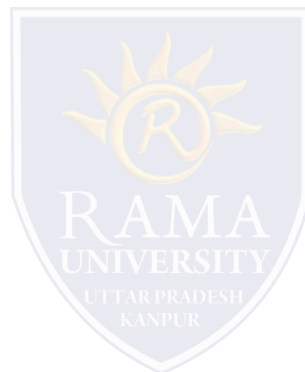
Soft Computing

LECTURE -18

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OUTLINE

- **The CART Algorithm**

- **The CART Algorithm Characteristics**

- **Example of CART Algorithm**

- **Decision tree**
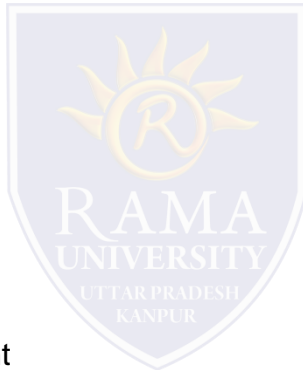
- **Groups of decision trees**

- **Reference**

CART Algorithm

Basic idea of CART:

❑First, a tree is constructed based on the training data.

❑Secondly, the tree is pruned to minimize cost and computations (minimum cost-complexity principle)

❑Impurity Functions

❑Node Partition

❑Tree Growth

❑Error Measure

❑Input/output Relations when Outputs are Constant
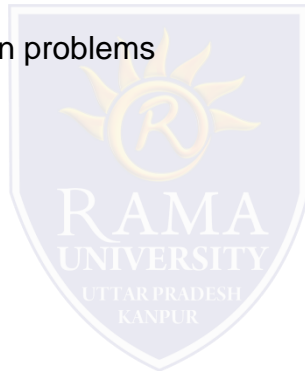
❑Input/output Relations when Outputs are Linear

CART Algorithm

The CART algorithm is a powerful algorithm which is nonparametric and has the following characteristics:

❑Based on a simple idea

❑Computationally powerful

❑Can both be used in classification and regression problems

❑Based on a solid statistical foundation

❑Suitable for high-dimensional data

❑Can identify important variables
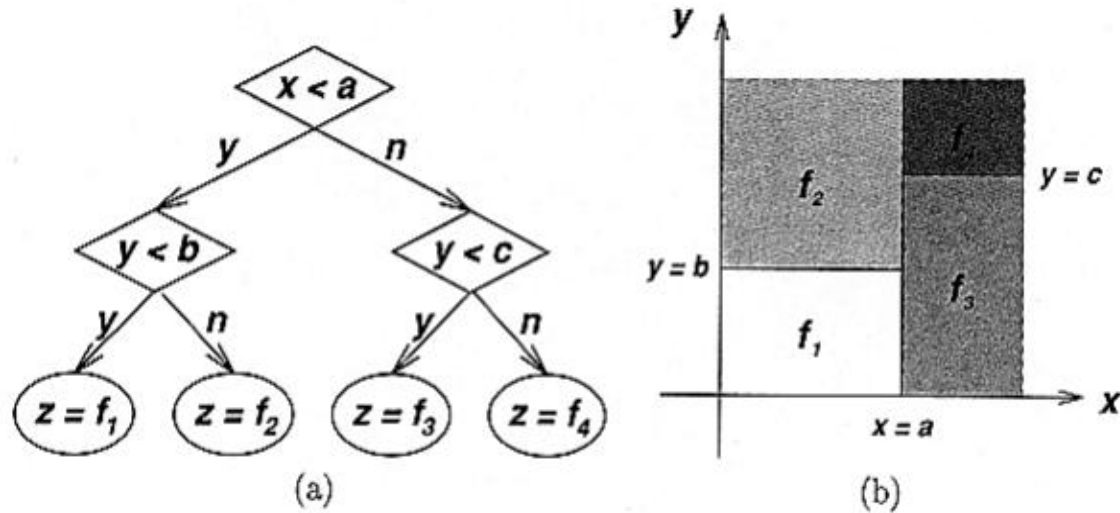
Example of CART Algorithm

Figure 14.1. *(a) A binary decision tree and (b) its input space partitioning.*

IF x < a AND y < b THEN z = f1

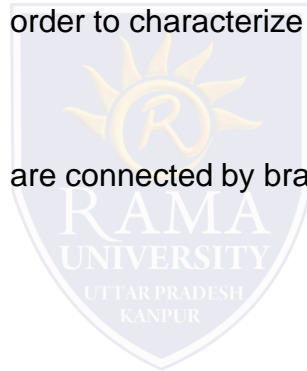IF x < a AND y > b THEN z = f2

IF x > a AND y < c THEN z = f3

IF x > a AND y > c THEN z = f4

Decision tree

Steps to construct decision tree:

❑ Splits the input space into exclusive regions

❑ Gives every area a label, value or an operation in order to characterize its data points.

❑ Is easy to use in classification

❑ Structured by inner nodes and outer nodes which are connected by branches

❑ Binary trees are the simplest

Groups of decision trees:

❑ Classification trees
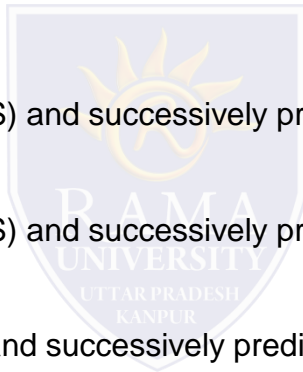
❑ Regression trees

11. Semantic grammars are _____

a) Encode semantic information into a syntactic grammar

b) Decode semantic information into a syntactic grammar

c) Encode syntactic information into a semantic grammar

d) Decode syntactic information into a semantic grammar

12. What is a top-down parser?

a) Begins by hypothesizing a sentence (the symbol S) and successively predicting lower level constituents until individual pre-terminal symbols are written

b) Begins by hypothesizing a sentence (the symbol S) and successively predicting upper level constituents until individual pre-terminal symbols are written

c) Begins by hypothesizing lower level constituents and successively predicting a sentence (the symbol S)

d) Begins by hypothesizing upper level constituents and successively predicting a sentence (the symbol S)

13. Perception involves _____

a) Sights, sounds, smell and touch

b) Hitting

c) Boxing

d) Dancing

REFERENCES

❑https://notendur.hi.is/benedikt/Courses/ch14_2005.pdf