Pattern Recognition:

Pattern recognition is the process of recognizing patterns by using a machine learning algorithm. Pattern recognition can be defined as the classification of data based on knowledge already gained or on statistical information extracted from patterns and/or their representation.

Examples: Speech recognition, speaker identification, multimedia document recognition (MDR), automatic medical diagnosis.

Pattern recognition possesses the following features:

- Pattern recognition system should recognize familiar patterns quickly and accurate

- Recognize and classify unfamiliar objects

- Accurately recognize shapes and objects from different angles

- Identify patterns and objects even when partly hidden

- Recognize patterns quickly with ease, and with automaticity.

❖Process-Decision Theoretic Classification

- Decision theory is a study of an agent's rational choices that supports all kinds of progress in technology such as work on machine learning and artificial intelligence.
- In AI, decision theoretic classification involves using machine learning algorithms to analyze data and make predictions based on probabilities and costs.

- The classification process involves assigning data points to one of several categories or classes based on their characteristics or features.

- The process begins with a set of training data that is used to train a machine learning

algorithm to classify new data. The algorithm is typically based on a probabilistic model

that calculates the likelihood of each data point belonging to each class.

- Once the algorithm has been trained, it can be used to classify new data by calculating the likelihood of each data point belonging to each class and selecting the class with the

  highest likelihood.

- To determine the best classification approach, it is important to evaluate the performance

  of different algorithms using metrics such as accuracy, precision, and recall.

- The effectiveness of decision theoretic classification in AI depends on the quality and

  quantity of the training data, as well as the accuracy of the algorithms used.

❖ Syntactic Classification; Learning Classification Patterns

In artificial intelligence, both syntactic classification and learning classification patterns are

important approaches to classification. Here are some easy notes on each approach specifically in

the context of AI:

Syntactic Classification in AI:

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1. In AI, syntactic classification is often used in natural language processing (NLP) to analyze and classify text data based on its syntactic structure.

2. The approach involves using grammatical rules to break down sentences into their constituent parts, such as subjects, verbs, and objects, and then using these parts to identify the meaning and intent of the text.

3. Syntactic classification can be used for a variety of NLP tasks, such as sentiment analysis, named entity recognition, and text summarization.

4. However, the effectiveness of syntactic classification depends on the accuracy of the grammatical rules used and the complexity of the text being analyzed.

Learning Classification Patterns in AI:

1. In AI, learning classification patterns is a fundamental approach to machine learning that involves training a model to recognize patterns in data and make predictions based on those patterns.

2. The approach involves providing the model with a set of labeled training data, which it uses to identify patterns that are characteristic of different classes or categories.

3. Once the model has been trained, it can be used to classify new data based on the patterns it has learned.

4. Learning classification patterns can be used for a wide range of applications in AI, such as image recognition, speech recognition, and natural language processing.

5. However, the effectiveness of learning classification patterns depends on the quality and quantity of the training data, as well as the complexity of the patterns being learned.

❖ <u>What is speech recognition?</u>

Speech recognition, or speech-to-text, is the ability of a machine or <u>program</u> to identify words spoken aloud and convert them into readable text.

- **speech recognition** is used to identify words in spoken language.
- **Voice recognition** is a biometric technology for identifying an individual's voice.

Speech processing system has mainly three tasks −

**First,** speech recognition that allows the machine to catch the words, phrases and sentences we speak

Second, natural language processing to allow the machine to understand what we speak, and

Third, speech synthesis to allow the machine to speak.

How does speech recognition work?

Speech recognition systems use computer algorithms to process and interpret spoken words and convert them into text. A software program turns the sound a microphone records into written language that computers and humans can understand, following these four steps:

1. analyze the audio;
2. break it into parts;
3. digitize it into a computer-readable format; and
4. use an algorithm to match it to the most suitable text representation.
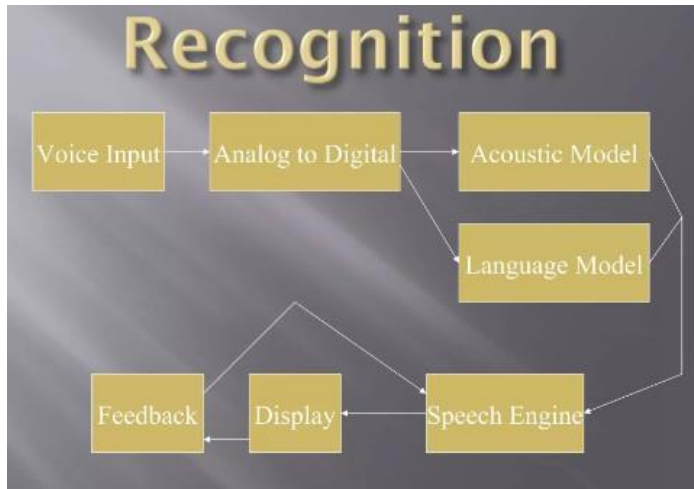
Uses:-

- Mobile Devices
- Education
- Customer service
- Healthcare Applications