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Natural Language Processing- AI

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Abstract: Natural Language Processing is a branch of artificial intelligence that deals with interpreting and manipulating human language. NLP technologies are used in various applications, such as machine translation, speech recognition, and text mining

In AI support Natural language processing involves machine or robots to understand and process the languages that human speak, and infer knowledge form the speech input.

The main motto of NLP is that the verbal output from the system. So the input and output of an NLP system can be speech and written text are respectively.

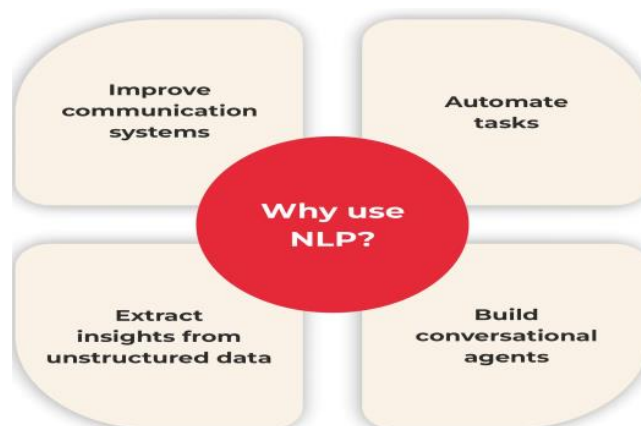*Keywords: NLP, Human Language, Process, NLU, NLG.*

I. INTRODUCTION

NLP is defined as the application of computational techniques to the analysis and synthesis of natural language and the use of different techniques from computer science (algorithms) to understand and manipulate human language and speech.

A set of computer programs which contains the knowledge and some inference capability of an system, As expert system is supposed to contain the capability to lead to some Conclusion based on the inputs provided, information it already contains and its Processing capability, an expert system belongs to the branch of Computer Science Called Artificial Intelligence

One of the challenges in NLP is dealing with the vast variation in human language. This includes different dialects, accents, and idioms. Another challenge is the ambiguity of language, which can often lead to multiple interpretations of the same text.
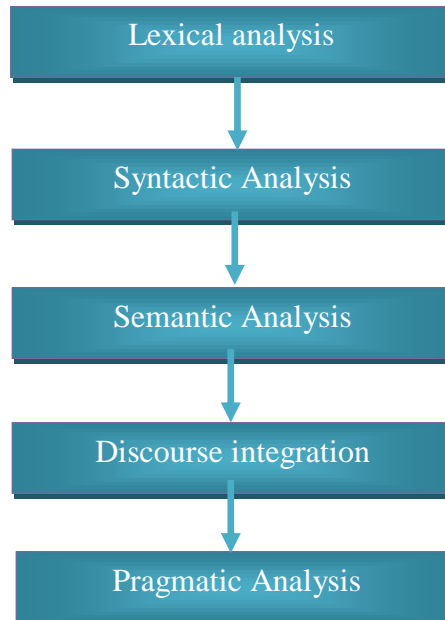
II. USE OF NLP

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III. WHAT IS THE PROCESS OF NLP

The Natural language processing is very complicated processing following ways:

- **Lexical Analysis**: It involves identifying and analyzing the structure of words dictionary of a language means the collection of words and phrases in a language. Lexical analysis is dividing the whole chunk of txt into paragraphs, sentences, and words.

- **Syntactic Analysis:** It involves analysis of words in the sentence for grammar and arranging words in a manner that shows the relationship among the words. The sentence such as "**Mango eats me**" is rejected by English syntactic analyzer.

- **Semantic Analysis:** It draws the exact meaning or the dictionary meaning from the text. The text is checked for meaningfulness. It is done by mapping syntactic structures and objects in the task domain. The semantic analyzer disregards sentence such as "**Bitter sugar**".

- **Discourse Integration**: the meaning of any sentence depends upon the meaning of the sentence just before it. In addition, it also brings about the meaning of immediately succeeding sentence.

- **Pragmatic Analysis**: Pragmatic deals with meaning of the sentence in various situations, In pragmatic analysis, the sentences are re-interpreted to verify the correctness of the meaning in the given context. It requires having real world knowledge of the language.
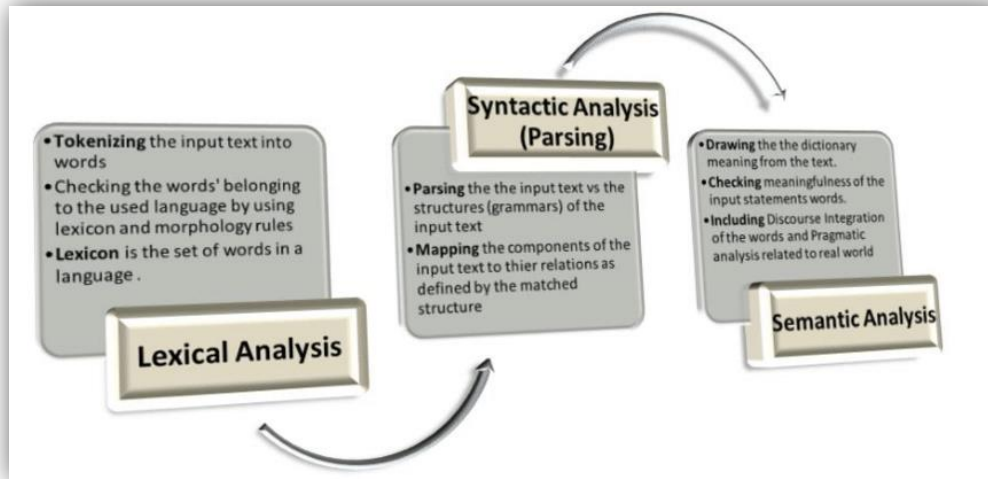
IV. WHICH ARE THE TECHNIQUES USED FOR NLP

There are several main techniques used in analyzing natural language processing

- **Pattern matching:**

  Pattern matching focuses on interpreting input 'utterances, It doesn't work with meaning of sentence structures and individual words other lower level For a deep level of analysis in pattern matching a large number of patterns are required even for a restricted domain. This problem can be controlled by hierarchical pattern matching in the input is gradually cannibalized through pattern matching against sub phrases. Another way to reduce the number of patterns is by matching with semantic primitives.

- **Syntactically driven Parsing:**

  Syntax is the way words can fit together in order to form higher level units like phrases, clauses and sentences. Hence in syntactically driven parsing interpretations ^{o} of ^{b} larger groups of words 'built of the interpretations of their syntactic constituent words or phrases: In a way this is the opposite of pattern matching as here the interpretation of the input is done as a whole. Syntactic analyses are obtained by application of a grammar that determines what sentences are legal in the language that is being parsed.

- **Semantic Grammars:**

  Natural Language analysis based on semantic grammars is similar syntactically-driven parsing except that in semantic grammars the categories used are defined semantically as well as or syntactically.

- **Case Frame Instantiation:**

  Case frame instantiation is one of the most effective parsing techniques and it is under active research today. It has very use computational properties such as its recursive nature and its ability to combine bottom-up recognition of key constituents with top-down instantiation of less structure [constituents]

- **Spell Checking:**

  The purpose of spell checking is the detection and correction of typographic and orthographic errors in an earth level occurrence considered out Out of the Context.

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<center>V. COMPONENTS OF NLP</center>

- **Natural Language Understanding (NLU)** :

   The speech input gets transformed into the useful representations in order to analyze various aspects of the language as the natural language is very reach in forms and structures, it is also very confusing. There can be different forms of ambiguities like ambiguity, which is a very basic i.e. word level ambiguity. For example the "document" can be a noun or verb. It's a complicated process. Secondly, there can be syntactical ambiguity, which is about parsing the sentence. For example, a sentence like "Madam said on Monday she would give an exam* .thirdly, there can be referential ambiguity.

- **Natural Language Generation (NLG) :**

   In order to generate the output text, the intermediate representation requires to be converted back to the natural language format. Hence, in this process there are multiple sub processes involves. They are as follow:

   ➢ Text Planning: It includes extracting relevant contents from knowledge base.

   ➢ Sentence planning: This process involves selecting correct words, forming meaningful sentence following language grammar and setting tone for the same.

   ➢ Text Realization: This is the process of mapping the planned sentence into a structure.

<center>VI. NLP IMPLEMENTATION</center>

These are some successful implementations of natural language processing:

- Search engines like Google, Yahoo, etc. Google's search engine understands that you are a tech guy, so it shows you results related to that.

- Social website feeds like your Facebook news feed. Speech engines like **Apple Siri.**

- Spam filters like Google spam filters. It's not just about your usual spam filtering; now, spam filters understand what's inside the email content and see if it's spam or not.

<center>VII. CONCLUSION</center>

NLP process helps computers communicate with humans in their language and scales other language-related tasks NLP system provides answers to the questions in natural language the accuracy of the answers increases with the amount of relevant information provided in the question NLP process helps computers communicate with humans in their language and scales other language-related tasks.

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