

# Importance of Natural Language Processing, Its Features, Components and Applications

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**Abstract:** The paper context is about Natural language processing, why NLP is Important? It's the science that deals with human to machine communications, advanced and powerful algorithms. It has wide area of applications in different areas Education, Automotive, virtual assistant, Healthcare, customer support with speech to text conversions, Machine Translations, Grammar checking, Text classification and categorization, Question Answering etc. This works with its different components like Natural language Understanding and Natural Language Generation.

**Index Terms –** Natural Language Processing, Applications of NLP, NLU, NLG.

## 1. INTRODUCTION

Natural Language Processing (NLP) is branch of Artificial Intelligence which makes computers to understand, hear to human languages. With the help of NLP computer can read text, recognize human voice, understand and derive meaning from human languages. Natural Language Processing is responsible for human to machine conversations and vice versa. NLP is the automation area of Artificial Intelligence.

NLP = NLU + NLG

Examples of NLP: Spell checking, Siri, Alexa, or Google Assistant, Voice text messaging, Auto complete, related keywords on search engines, Bots etc.

## II. WHY NLP IS IMPORTANT?

NLP helps computers to read text, hear human voice, understand and interpret it which makes possible to communicate with machines with human languages e.g. English, German and Spanish etc. which humans can understand easily.

Machines can assist us continuously in a consistent way without break and fatigue to analyze more language based data efficiently from all fields like Medical, Educational, Agricultural, Social media to analyze text and speech.

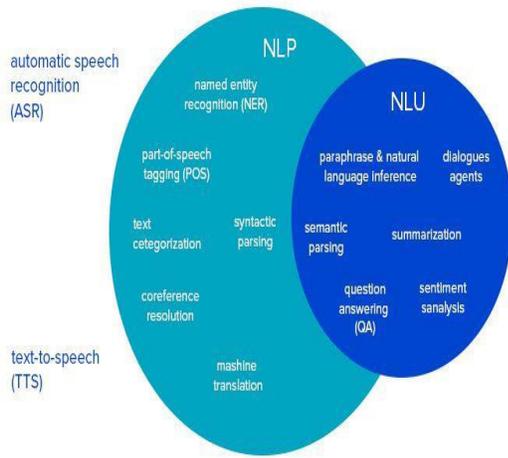


**Fig -1: Natural Language Processing [11]**

## III. COMPONENTS OF NATURAL LANGUAGE PROCESSING

A. NLU (Natural Language Understanding) is responsible for the understanding of the user input based on the grammar, the content is decided based on intent and entities in which it was said. It is responsible for the analysis of language from different aspects and mapping of the given input in Natural languages.

B. NLG (Natural Language Generation) deals with the generation of text from structured data. NLP processes the data through semantic parsing, Documentation summarization and sentiment analysis with meaningful phrases, entities, and intents. NLG just analyzes the data and narrates it into conversational language. Example Automated report writing, Data Analysis etc.



**Fig -2: the tasks of NLP and NLU [14]**

**IV. GOALS OF NATURAL LANGUAGE PROCESSING**

- Creation of Expert Machines The systems which are intelligent can think, learn, speak and behave like humans , also give explanation and advice to its users.
- Solving the real time and practical problems.

**V. APPLICATIONS OF NLP**

NLP has been dominant in various fields such as:

- Machine Translations. Machine translation is automatic translation of one type of data into another type or one language to another languages. The language model are used to convert data of one language (English) to another language (Spanish). It includes text to speech conversations and voice to text conversation. Computer can take two type of data as Input text and voice.
- Speech Recognition. Speech recognition is understanding the voice, which means understanding what was said. It takes audio or voice as Input and converts it into the text to understand what was it Examples: Siri, Alexa, or Google Assistant.



**Fig -3: Process of text to speech conversion [15]**

- Bots. Bots are basically robots that are communicated or run without the help of humans. There are several categories of bots are Chatbots, Gaming bots, web

crawlers, web scrapers, trading bots and text reading bots used in different areas like customer support, as a virtual assistant etc.

- Categorization & Classification of Text. Text categorization is to classifying the text with a theme or topic to increase the readability of the document, ease for web searching, sentiment analysis and easier identification of language and topic of data.
- Question Answering. Question Answering System is automatically answering questions that are asked. It means automatic answers to user queries by the system.
- Document Summarization. is automatic gibing small headings to large text bodies which means the creation of a short description of a text document.
- Grammar Checking. Grammar checking is the automatic checking the spelling mistakes and grammatical errors in the document. It can be checked by an automatic spell checker. Error-ridden messages are difficult to Interpret and results in miscommunication.
- Virtual Assistant. With the help of NLP, virtual assistants can be made in any field which assists us 24/7 without any fatigues. Example: Chabot’s in customer service, Virtual assistant in medical, Google assistant in web searching etc.
- Customer Support. Customer service automation is the answer provided automatically by chatbots.
- In Healthcare. In Healthcare, NLP helps in many ways like diagnostic assistance, discovery and retrieval of real-time information, as intelligent healthcare AI assistant, automatic report generation etc.
- In Automotive. In Automobiles, NLP helps as an autonomous robot with computational and transportational capabilities. For example Car assistant aware the driver about seat belt, door open and close etc.
- In Education. It helps in education in many ways advance studies, related web searches, Preparing document without mistakes by the automatic spell checker, shows numerous solutions to one problem etc.

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