Analysis of Application of Natural Language Processing in Artificial Intelligence

Shivam Jogandar Dubey	**Omja Shukla**	**Shikha Tiwari**
Department of Computer Science	Department of Computer Science	Assistant Professor
Kalinga University, Raipur, India	Kalinga University, Raipur, India	Department of Computer Science
		Kalinga University, Raipur, India

Abstract— Natural language processing is a branch of artificial intelligence which focuses on giving machines the ability to understand text and recognize words the same way humans can. Natural language processing uses computational linguistics with machine learning and deep learning modules. Together these technologies enable machines to use and process human language. In this paper we have analyzed and explained the understanding and processing of natural language done by computers. The challenges faced while processing the language and how they are solved. The role of statistical NLP, machine learning and deep learning when natural language processing is used in applications such as chat bots.

Keywords—natural language processing, artificial intelligence, style, styling, insert (key words)
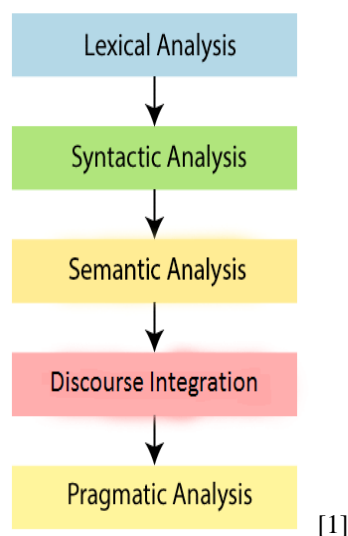
I.   INTRODUCTION

The idea had come from the need for machine translation in the 40s. Then the era came when MT/NLP almost died because the research in this area did not have much requirement at that time. The condition became better when the product related to machine translation came and provided results and the need of artificial intelligence emerged. Natural Language Processing (NLP) helps machines to break down and interpret human language. It's at the center of tools we use every day – from translation software, chatbots, spam filters, and search engines, to grammar correction software, voice assistants, and social media monitoring tools. This field focuses on communication between computers and humans in natural language and NLP is all about making computers understand and generate human language. NLP uses the power of linguistics and computers to study the rules and structure of language, and create intelligent systems (run on machine learning and NLP algorithms) capable of understanding, identification, and extracting meaning from text and speech.

Natural Language Processing is subdivided into categories:

 1.Natural Language Understanding (NLU) makes the machine able to understand and analyze human language by extracting the text from large data such as keywords, emotions, relations, and semantics, etc.

2.Natural Language Generation (NLG) is the extraction of important and meaningful phrases or sentences in the form of natural language.

II.   PHASES OF NATURAL LANGUAGE PROCESSING

There are five phases in NLP:

[1]

. Lexical Analysis - Lexical analysis is the first step of a compiler. It is the process of understanding the meaning of the given words and their relations to one other. There could be more than one defination of a word, in that case computer has to decide which defination suits the given sentence.

A. Syntactic Analysis - Syntactic analysis is the process of checking whether the sentence grammatically makes sense or not. NLP uses these syntax techniques: Lemmatization (which reduces a word to a simpler form), Parsing (process of analyzing the given sentence grammatically), Word Segmentation (separates words in spaceless texts).

B. Semantic Analysis - Semantic analysis is one of the most difficult tasks. It requires algorithms to understand the meaning of the input text. It includes techniques like : Entity Extraction, Machine Translation, Natural Language Generation, Natural Language Understanding.

C. Discourse Integration - Discourse integration is the process of analyzing the meaning of any single sentence which depends upon the prior context.

D. Pragmatic Analysis - Pragmatic analysis is the portion that focuses on figuring out what a text actually means. It is a set of linguistic tools where the context is considered from the text.

III. LITERATURE SURVEY

Natural language processing(NLP) requires a variety of knowledge. Linguistic knowledge such as grammar and dictionaries has been developed and shared among the researchers in NLP for a decade or so. But general knowledge for use in NLP is not. When we consider about man-machine dialogue we have to prepare lots of knowledge, and also strong inference functions such as logical inference and common sense reasoning [2]

There is a huge amount of data on the Internet, at least 20 billion pages. Applications for processing large amounts of texts require NLP expertise. Some requirements are: • Classify text into categories • Index and search large texts • Automatic translation • Speech understanding: Understand phone conversations • Information extraction: Extract useful information from resumes • Automatic summarization: Condense 1 book into 1 page • Question answering • Knowledge acquisition • Text generations / dialogues.[3]

IV. Main concept of NlP

Based on the viewpoint of linguists, language comprises the following levels: phonetics, lexis, grammar, semantics, discourse, and pragmatics. The applications of natural language processing on the above levels can be further subdivided into these sections: machine translation, sound recognition, sound synthesis, automatic information retrieval, term database, optical character recognition, man-machine dialogue, etc.

At present, natural language processing has gained abundant accumulation in terms of theoretical basis, language resources, and key technologies. The above-mentioned applications have also been greatly progressed. For instance, sound recognition is used in speech translation and interrogation systems at unmanned service centers at railway stations or airports. Optical character recognition technology, which can be applied to scanning software, is adopted to recognize printed fonts and even handwritten scripts, and ultimately generate electronic documents. Furthermore, natural language processing is extensively utilized in many aspects of translation tools. [4]

V. USE OF NLP IN CHATBOT

An NLP based chatbot is usually used in messaging applications like telegram or facebook messenger. These are computer programs designed to communicate with customers via sound methods or textual methods. Synonyms, misspellings, abbreviations, omitting punctuation rules, different accents are few of the elements in our speech that affects the understanding of a NLP chatbot. It provides chat or phone support by answering questions.An NLP chatbot can provide a company's information to a client, it can help in booking an appointment with a doctor or in booking hotels, tickets etc. NLP chatbot works off the following keys: utterances (user's preference to a specific intent), intent (meaning of user's typed word), entity (important details like dates and locations), context (to save and share parameters across a session), session (a complete conversation even if interrupted). Chatbots without NLP are majorly based on pre-fed static information and are not so equipped to handle human languages as it has variations in emotions, intent, sentiments. Through NLP a connection between incoming text from human and system generated response is possible.

In a chatbot system, usually a chatbot analyzes a query asked by a person and retrieves a particular answer from the fixed database. Usually, an answer is retrieved based on the basic keyword matching and a fixed response is given as the output. This paper basically focuses on improving this response generation by making it generate variations for a response rather than a one fixed response for a question asked. The methodology considers a response by a chatbot which will be a sentence as a sequence of words to be input for the model. Fig.1 describes a flow chart of the entire model. A sentence cannot be processed directly to the model so it is needed to perform some Natural Language Processing(NLP) to make further operations. Some operations were performed like Tokenization and Parts-of-Speech Tagging. [6]

VI. Major Challenges while using Natural Language Processing

. **Development time**. It takes a lot of time to create a NLP system and AI needs to evaluate a lot of data and it will take a high powered pc with a lot of GPUs because with an underpowered pc it will take a lifetime to build

A. Phrasing ambiguities. Sometimes even humans have a hard time understanding what other humans mean. Therefore NLP needs context to find meaning behind statements.

B. Difference in language. The majority of people in India use hindi as their language . But people outside India use other languages too which do not only have different vocabulary but also have different forms of phrasing, inflections, and cultural norms.

C. Uncertainty and false positives. When an NLP detects a term that should be understandable and/or addressable but can't be replied to, it's called a false positive. The idea is to create a NLP which knows its own limit.

VII. NLP and Deep Learning in machines

One of the major characteristics of Machine intelligence, An optimal classification of input text based on emotions is called sentimental analysis, The input signal(audio or text) which will be provided to the machine that needs to be classified, is given as input to the NLP algorithm and processed to create emotional ontology for a better understanding of the semantics and relationships among input data. When we give an input for example: " Men " system will check some parameters like length of string and accordingly it will take the words (say her, fan, num etc) then it will take some set of words (say n=5) at a time and it will provide a weight to each set (called distributed law), at the end the set having highest weight will remain, rest all will be discarded now, out of last 5 words it will take 4 words and again follow the distributed law then 3 words and continue.. at last, it will remain with a single word. Similarly, if we provide a set of words, it will follow same method and my prediction, it will find the accurate meaning and by getting the accurate meaning it will follow the sentimental analysis.[5]

Conclusion

Natural language processing has become a major field for research purposes in Artificial Intelligence. The major advancement in natural language processing has become a strong support for machine translation. Natural language processing has been widely used in machine translation and new breakthroughs have been achieved recently. This not only opens scope for more research related to machine translation but also adds space for different new inventions.

REFERENCES

[1] Https://www.javatpoint.com/nlp#Phases

[2] Nagao, M. (2005). [IEEE 2005 International Conference on Natural Language Processing and Knowledge Engineering - Wuhan, China (30-01 Oct. 2005)] 2005 International Conference on Natural Language Processing and Knowledge Engineering - Natural Language Processing and Knowledge. , (), 1–1. doi:10.1109/nlpke.2005.1598694

[3] Surabhi, M. Chandhana (2013). [IEEE 2013 International Conference on Optical Imaging Sensor and Security (ICOSS) - Coimbatore, India (2013.07.2-2013.07.3)] 2013 International Conference on Optical Imaging Sensor and Security (ICOSS) - Natural language processing future. , (), 1–3. doi:10.1109/icoiss.2013.6678407

[4] Kai Jiang;Xi Lu; (2020). Natural Language Processing and Its Applications in Machine Translation: A Diachronic Review . 2020 IEEE 3rd International Conference of Safe Production and Informatization (IICSPI), (), –. doi:10.1109/iicspi51290.2020.9332458

[5] Chaki, Prosanta Kumar, et al. "An Aspect of Sentiment Analysis: Sentimental Noun with Dual Sentimental Words Analysis." 2017 International Conference on Current Trends in Computer, Electrical, Electronics and Communication (CTCEEC). IEEE, 2017.

[6] Kai Jiang;Xi Lu; (2020). *Natural Language Processing and Its Applications in Machine Translation: A Diachronic Review . 2020 IEEE 3rd International Conference of Safe Production and Informatization (IICSPI), (), –.* doi:10.1109/iicspi51290.2020.9332458