A Survey of the Natural Language Processing using Artificial Intelligence

• **Priyanka R. Hipparkar**

Abstract: One of the essential and effortless artificial intelligence methods that can be considered, Natural Language Processing can communicate in simple languages like English. Natural Language Understanding (NLU) helps the machine understand and analyze human language by extracting metadata from content such as concepts, existence, keywords, emotions, relationships, and semantic roles. We have briefly explained how natural language processing works and what are the components of the natural language process, and why natural language process is essential. After experimenting with thousands of recurring neural network architectures, it is found that a recurring neural network architecture can surpass both long-term memory and gated recurrent units. Concurrent neural network-based methods take longer to train than recurrent neural networks Natural Language Processing (NLP). NLP is a sub-field of artificial intelligence and with a strong focus on research and development, the research focus in in the areas of communication systems, language processing, machine translation. Education develops many tools for creating industrial applications. The natural language process is a branch of artificial intelligence that analyzes, understands, and creates the languages that humans naturally use to communicate with computers in both written and spoken contexts, using natural human language instead of computer language. While the role of natural language processing techniques in education is being underlined, more experiments with different teaching techniques are expected. Natural language can improve the efficiency and accuracy of the process. Syntactic analysis process so that the model can capture and use more historical information.

Keywords: *Artificial Intelligence, Natural Language Processing, Deep Learning, Machine Learning, Pattern Recognition.*

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Introduction:

Artificial intelligence (AI) is the simulation of human intelligence in a machine programmed to think as persons and mimic their actions. The term can also be applied to any device related to the individual's mind such as learning and problem-solving. The ideal feature of artificial intelligence is the ability to reason and act with the best chance of achieving a specific goal. A subgroup of artificial intelligence is machine learning, which refers to the fact that computer programs can automatically learn and change new data without the help of human beings. Deep learning techniques enable automatic learning by exploiting large amounts of unstructured data like text, images, or videos.

Natural Language Processing

NLP is the natural language process, which is a part of computer science, human language, and artificial intelligence. It is a technology used by machines to understand, analyze, handle and interpret human language. It helps developers to organize knowledge to carry out tasks such as translation, automated summary, named entity recognition (NER), speech recognition, relationship extraction, and topic segmentation. Natural Language Processing (NLP) is an Artificial Intelligence method of communicating with intelligent systems using natural language, such as English. When we want an intelligent system like a robot according to our instructions, when we want to hear decisions from a clinical expert system based on communication, etc., we need to process natural language. The field of Natural Language Processing involves building computers to perform useful functions, including the natural language used by humans. Input and output of the Natural Language Processing system can be speech & written text.
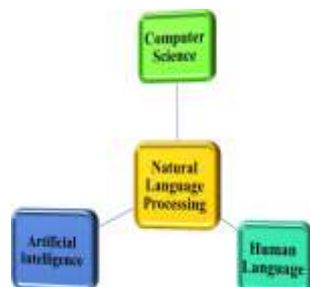

Fig. 1. Parts of Natural Language Processing

Artificial Intelligence is related to the Natural Language Process

Natural language processing and understanding of humans is the key to artificial intelligence and is able to support its claim on intelligence. New in-depth learning models are constantly improving the performance of artificial intelligence in Turing tests. Google's director of engineering, Ray Kurzweil, has predicted that by 2029, artificial intelligence will "reach the level of human intelligence."

Components of Natural Language Processing

The two components of NLP are given –

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

   Natural Language Understanding (NLU) helps the machine to understand and analyze human language by extracting metadata from content such as concepts, existence, keywords, emotions, relationships, and semantic roles. Natural Language Understanding is primarily used in business applications to understand customer issues in spoken and written language.

   The NLU includes the following functions:

   ➢ It is used to map a given input to a useful representation.

   ➢ It is used to analyze various aspects of language.

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

   Natural Language Generation (NLG) acts as a translator that converts computerized data into representations of natural language. It mainly involves text planning, sentence planning and text retrieval. It is the process of creating meaningful sentences and phrases in the form of natural language from some internal representation.

   This includes -

   1. **Text Planning: -** This includes retrieving relevant content from the Knowledge Base.

   2. **Sentence Planning: -** It involves selecting the required words, creating meaningful

sentences, and setting the tone of the sentence.

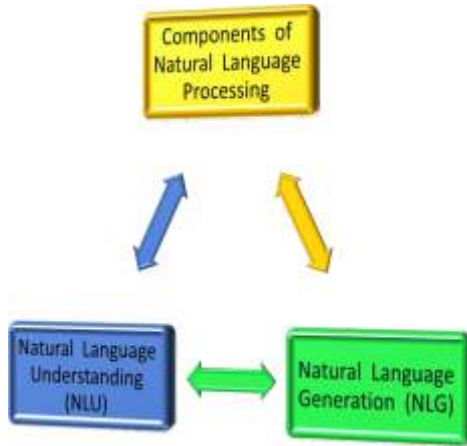3. **Text Realization: -** This is sentence mapping in sentence structure.

Fig.2. Components of Natural Language Processing

Phases of Natural Language Processing: -

Natural Language Processing has the following five stages:

1. **Lexical Analysis: -** The first stage of Natural Language Processing is lexical analysis. This phase scans the source code as a stream of characters and converts it into a meaningful lexim. It involves identifying and analyzing the structure of words. A language dictionary is a collection of words and phrases in a language. Lexical analysis is the process of dividing an entire section of text into paragraphs, sentences, and words.

2. **Syntactic Analysis (Parsing): -** It involves analyzing the words in a sentence for grammar and arranging the words in a way that shows the relationship between the words. The English syntax analyst has rejected the phrase "*school go to boy*".

3. **Semantic Analysis: -** It derives the exact meaning or dictionary meaning from the text. The text is checked for meaning. This task is performed by mapping the syntactic structures and objects in the domain. The semantic analyst ignores phrases like "*hot ice cream*".

4. **Discourse Analysis: -** The meaning of any sentence depends on the meaning of the previous sentence. Moreover, it also makes sense of the immediate aftermath.

5. **Pragmatic Analysis: -** In the meantime, what was said is re-interpreted as exactly what it meant. It involves generating those aspects of language that require real-world knowledge.
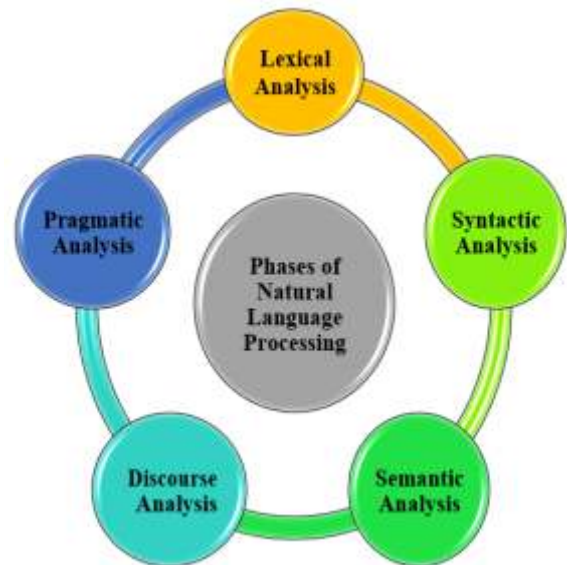

Fig. 3. Phases of Natural Language Processing

Paper	Pre processing	Feature Ex- traction	Performance Parameters
Natural Language Processing Techniques and Problems in Artificial Intelligence [1]	Natural Language Processing, Deep Learning, Natural Language Understanding,	Morphological Analysis, Syntax Analysis, Semantic Analysis, Discourse Integration, Pragmatic Analysis,	Part of Speech Tagging, Tokenization

Deep Learning in Natural Language Processing : A State of the Art Survey [2]	Natural Language Processing, Deep Learning, Machine Learning, Pattern Recognition, Recurrent Neural Network, Convolutional Neural Network, Deep Network, Multilayer Recurrent Neural Network Language Model, Named Entity Recognition, Recursive Neural Tensor Network, Dynamic Memory Network, Template based language model, Sequence learning models	Syntax Analysis, Semantic Analysis, Sentiment Analysis, Long-short term memory, Gated Recurrent Unit, Sentiment Classification, Sentiment Distribution, Syntactic Information, Sentiment Information, Sentiment Classification	Morphological Segmentation, Word Segmentation, Speed Tagging, Parsing, Entity Recognition, Machine Translation, Question Answering, Speech Recognition, Handwriting, Polyphonic Music Modelling, Hybrid method
Natural Language Processing and Its Applications in Machine Translation : A Diachronic Review [3]	Natural Language Processing, Artificial Intelligence, Natural Language Understanding, Natural Language Generation, Augmented Transition Network, Deep Learning	Phonetics, Lexix, Grammar, Semantics, Discourse, Pragmatics, Semantic Analysis, Discourse Analysis, Syntactic Analysis	Machine Translation, Human Translation, Sound Recognition, Sound Synthesis, Automatic Information Retrieval, Optical Character recognition, Man Machine Dialogue, Speech Translation
Advances in Natural Language Processing – A Survey of Current Research Trends, Development Tools and Industry Applications [4]	Natural Language Processing, Machine Learning, Computer Vision, Dynamic Neural Network	Lexical Analysis, Parsing, Semantic Analysis, Discourse Integration, Pragmatic Analysis, Sentiment Analysis, Extraction Algorithms, POS tags,	Optical Character Recognition, Machine Translation, Chatbots, Question Answering, Document Classification, Named Entity Recognition,
Natural Language Processing: State of The Art, Current Trends and Challenges [5]	Natural Language Processing, Artificial Intelligence, Natural Language Understanding, Natural Language Generation, Statistical Machine Learning, Artificial Neural Network, Deep Learning	Discourse Analysis, Phonology, Morphology, Lexical, Syntactic, Semantic, Discourse, Pragmatic, Multi- variate Bernoulli Model, Multi-nomial Model, Hidden Markov Model	Speech Recognition, Machine Translation, Morphological Segmentation, Named Entity Recognition, Optical Character Recognition, Part of Speech Tagging, Email Spam Detection, Information Extraction, Question Answering,

Literature and Review

In this paper we have briefly explained how the natural language process works and what are the elements of the natural language process. Some existing techniques for mastering the natural language process are also discussed. As the world moves towards digitalization, so does the need to introduce computers to communicate with humans through understanding human language. Thus, creating output based on language provided as input to these capabilities of systems have become hot areas of modern research. Natural Language Process is an area of artificial intelligence that is enabling to make world communication success for humans and computers but still lacking the techniques that can guarantee 100% communication between the two institutions, the system, and the human. In this paper we are currently discussing various tools to process linguistics and general problems which still exists in those measures. [1]

In-depth education increases the interest of the research community and their tremendous success in information processing specific functions such as video/speech recognition. We strive to provide a clear and serious summary for researchers and participants who are interested in incorporating in-depth learning techniques in their specific domain. They experimented with thousands of recurrent neural network architectures and found one recurrent neural network architecture that surpassed both long-short term memory and the gated recurrent unit. Compared to recurrent neural networks, concurrent neural network-based methods take longer to train. Compared with eight LSTM- based models on three functions: accent recognition, handwriting recognition, and polyphonic music modeling. Recurrent Neural Network architecture is optimized. They used two methods for word embedding, the window-based method, and the sentence-based method, and have proposed a method for learning emotion-specific word embedding using heavily labeled Twitter data. Experiments have shown that their methods give favorable results in the function of emotion classification compared to the methods of using hand-crafted features. They designed a simple convoluted neural network-based network to create language models from characters. The output of this network is given in the Multilayer Recurrent Neural Network Language Model (RNN-LM) to predict the next term. Tried to use it to solve Chinese partition and POS tagging problems. [2]

Natural language processing is rooted in multiple disciplines such as linguistics, computer science, and mathematics, and has now become a major research area for artificial intelligence. This paper introduces the history and development of natural language processing and machine translation and discusses the challenges facing natural language processing and future trends in machine translation. The paper first reviews and analyzes the main concepts and progress of the natural language process and summarizes the development stages of the machine translation and the research stage. The paper explores the relationship between machine translation and human translation and explores the future trends in natural language processing and machine translation. Natural language processing is widely used in many aspects of translation tools. Translated as a process of decoding, and attempted to convert word by word through intermediate language. Large scale means that the computer needs more for natural language processing. [3]

Natural Language Processing (NLP) means a Sub-field of artificial intelligence and a lot of focus on its research and development due to its emergence research focus in application focus is conversation systems, language processing, machine translation, and in-depth research in the field of learning leads to development many tools for creating industrial applications. Assembling the lamp, the technique is learning with natural language processing finding many applications in domains like Healthcare, Finance, manufacturing, education, retail, and consumer service. This paper provides a view of the progress areas of research, development, and the natural application language process. This Paper captures the research focus areas where 22 development tools and 6 domains where the natural language process is advancing rapidly. [4]

Natural Language Processing (NLP) has recently attracted a lot of attention for representation of Computer analysis of human language. It has spread applications in various fields such as machine translation, email spam detection, information retrieval, summarizing, medical, Q&A, etc. The paper separates the four stages by discussing different levels of NLP and natural language formation factors (NLG) followed by presenting the history and evolution of NLP, presenting the latest variety of applications of NLP, and current trends and challenges. [5]

We have explained the function of Natural Language Processing to achieve this Artificial Intelligence effect and how they extract emotion and information from the given input, and we have also developed an algorithm to support this which can predict the output after natural understanding English. We have also focused on Deep Learning and its models which are based on neural networks to make the most of our machines smartly refers to the intelligence of the machine. In this context, problem-solving and decision-making comparison and selection models were created that allow the machine to extremely accurate the decision making. So now together with the above two approaches machines can be taken to the next level called the Super Intelligent Machine. There is no reason why it would not work to secure its presence in the advanced world and it can also be used effectively in the military, medical, and other industrial matters work. So, we plan to focus more on our future work on the machine's super-intelligence to make the best use for mankind. Intelligent machines are playing an important role in implementing various initiatives in the industry which leads to a reduction increase in human effort, error rate, efficiency, and accuracy. Artificial intelligence is the backbone of the development of intelligent devices that use natural language processing and in-depth education as basic tools. Next, we summarize the overview of in-depth learning concurrent neural network and recurrent neural network models. Also, we review the importance of emotional analysis using the ability to process natural language and take machines' decisions and problem-solving. The natural language process is a branch of artificial intelligence that analyzes,

understands, and creates the languages that humans naturally use to communicate with computers in both written and spoken contexts, using natural human language instead of computer languages. Deep learning is defined as a subset of machine learning, the deep neural network is based on a system of completely hidden layers. [6]

There is a lot of machine learning and natural language processing subfields of artificial intelligence that gained importance in the last few decades. There are five important functions in the natural language process, that enables machine or computer equipment to understand human language. The paper shows that the researchers simply did not succeed to use various machine learning and deep learning techniques but in carrying out such tasks, these techniques worked much better than traditional task mechanisms. Underlined the important role played by education the technique in natural language processing is expected more experiments with different teaching techniques. Machine learning and natural language processing are an important subfield of artificial intelligence that has acquired wide popularity and adaptation in many areas machine learning has been a field of study in recent times enabling computers to solve problems they didn't have clearly programmed. [7]

These education schemes are still in their development stage but we expect local language process research based on in-depth education. We expect to see more natural language processing applications that use reinforcement learning methods, e.g., Communication systems. Finally, we expect to see more in-depth learning models whose internal memory (bottom knowledge learned from data) is enriched with external memory (inherited top-down knowledge from KB). In relying on machine learning, in fact, it is better to make a 'good guess' based on past experience, since the sub-symbolic methods encode the interrelationships and the decision-making process is possible. Understanding natural language, however, requires more than that. [8]

This is the model based on the neural network model and used as a feature extractor In particular, the model is based on the characteristics of long and short-

term memory neural networks and uses it to remember the analysis status and analysis history of transfer-based dependency syntactic analysis process so that the model can capture and use more historical information. By analyzing work experience and errors, we can do further studies based on the dependency syntax analysis model on long and short-term memory neural networks and it was noticed that the attention system could be the included model. [9]

Conclusion:

A subgroup of artificial intelligence is machine learning, which refers to the concept that computer programs can automatically learn and adapt to new data without the help of humans. One of the important and effortless artificial intelligence method can be considered as Natural Language Processing as it can be communicated in simple languages like English. The Natural Language Understanding (NLU) helps the machine to understand and analyse human language by extracting metadata from content such as concepts, existence, keywords, emotions, relationships and semantic roles. After experimenting with thousands of recurrent neural network architectures, we found one recurrent neural network architecture that surpassed both long-short term memory and the gated recurrent unit. We have also focused on Deep Learning and its models which are based on neural networks to make the most of our machines smartly refers to the intelligence of the machine. In this context, we created problem solving and decision-making comparison and selection models that allow the machine extremely accurate decision making. The natural language process is a branch of artificial intelligence that analyses, understands, and creates the languages that humans naturally use to communicate with computers in both written and spoken contexts, using natural human language instead of computer languages. This paper introduces the history and development of natural language processing and machine translation and discusses the challenges facing natural language processing and future trends in machine translation. There are five important functions in the natural language process, enables machine or computer equipment to understand human language. There are machine learning and natural language

processing an important subfield of artificial intelligence that has been acquired wide popularity and adaptation in many areas. Machine learning has been a field of study that enables computers to solve problems they didn't have clearly programmed. This is the model based on neural network model and used as a feature extractor in particular, the model is based on the characteristics of long and short-term memory neural networks and uses it to remember the analysis status and analysis history of transfer-based dependency syntactic analysis process so that the model can capture and use more historical information. In this paper we have briefly explained how the natural language process works and what are the elements of natural language process, natural language process is required.

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