

A Survey (NLP) Natural Language Processing and Transactions on (NNL) Neural Networks and learning Systems

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Abstract. Natural Language Processing NLP, or Natural Language Processing, is an area of artificial intelligence (AI) that concentrates on the interaction between computers and human language. Its goal is to develop algorithms and models that enable computers to understand, interpret, and generate human language in a meaningful manner. NLP aims to bridge the gap between human language and computer language, enabling computers to process and comprehend natural language data effectively. This field encompasses a range of tasks, including speech recognition, language translation, sentiment analysis, text summarization, question answering, and many others. These tasks rely on machine learning models that are trained using large amounts of annotated data. media monitoring, information retrieval, customer support chatbots, and many other areas where understanding human language is crucial. As research and development in NLP progress, we can anticipate the emergence of more advanced and sophisticated models that will further enhance the capabilities of language processing and understanding by computers. This advancement holds exciting possibilities for human-computer interaction. NLP research has seamless communication and empowering us to extract valuable knowledge from textual data on a large scale. technique employed in the process of multi-criteria decision-making and prioritizing alternatives. Its purpose is to provide a structured method for assessing and ranking different options in the presence of multiple criteria that may conflict with one another. MOORA is widely utilized across various domains, including operations research, engineering, and management. Alternative: Programming language, Linguistic theory, Hardware platform, Knowledge Representation
Keywords: Linguistic theory, Hardware platform, Knowledge Representation, MOORA, Natural Language Processing.

1 Introduction

Currently, natural language processing (NLP) methodology is extensively utilized in various tasks and applications. These include automated identification of records, such as the removal of personal information from documents using tools like the MITRE Identification Scrubber Toolkit. NLP is also employed in phenotype identification, where it accurately identifies specific characteristics like smokers, patients with hypertension, obesity, etc., to provide precise phenotype data for genomic studies, surpassing the limitations of ICD-9 codes. Furthermore, NLP is employed in surveillance activities, specifically in screening clinical narratives to detect unexpected adverse reactions following post-marketing of drugs. These applications are just a few examples of how NLP is employed in different domains. The roots of NLP can be traced back to the 1940s, and the field has evolved significantly since then. A comprehensive history of the field and up-to-date methods can be found in the work of Jurassic and Martin. Some of the key theoretical questions in the NLP field encompass areas like computational phonology (converting text to speech), speech recognition, computational morphology machine translation, and question answering (QA). [2] However, due to the rapid advancements in this field, there is still a lack of a comprehensive overview of attention. This article aims to fill that gap by introducing The authors of this article present a comprehensive framework for attention architectures in natural language processing, with a specific emphasis on models designed for vector representations of textual data. They introduce a taxonomy of attention models that categorizes them based on four important dimensions: input representation, compatibility function, distribution function, and the presence of multiple inputs and/or outputs. The article also delves into the incorporation of prior information into attention models and examines current research endeavors in this field. It highlights the challenges that researchers face and discusses the future prospects for advancements in attention architectures.

In summary, this article provides a thorough categorization of the extensive body of literature on attention models in natural language processing, offering valuable insights into this exciting domain. [3] In this book, my objective is to provide a comprehensive resource for individuals involved in natural language processing (NLP) and computational linguistics (CL) who are interested in working with the Arabic language. This includes computer scientists, linguists, researchers, and developers. I aim to cover various linguistic aspects specific to Arabic and present an overview of the latest advancements in Arabic processing. The content of this book originated from a highly popular tutorial, which is why it maintains a tutorial style and addresses common questions frequently raised by students, researchers, and developers. While writing this book, my primary focus was on my current doctoral students, as I wanted to create a valuable reference that would help them become familiar with the concepts and terminology in the field. Additionally, I aimed to address potential confusing issues that could hinder their progress. [5] NLP practitioners can focus more on the design and optimization of the model architecture itself rather than spending excessive effort on handcrafting features. Traditional non-neural NLP approaches often rely heavily on manually crafted features that are discrete in nature. On the other hand, neural approaches utilize compact and dense vectors, referred to as distributed representations, to implicitly capture both the syntactic and semantic aspects of language. These representations are acquired through specific tasks and training processes within neural models.

Consequently, neural approaches streamline the development process of various NLP systems, providing greater ease and flexibility for researchers and developers. [7] There is a limited number of natural language processing (NLP) projects that specifically aim to achieve ontological outcomes. Most researchers in this field have primarily concentrated on identifying instances of cancer recurrence. These studies primarily concentrate on identifying instances where cancer is mentioned positively and determining the timing of such mentions

to classify a case as a recurrence. In contrast, other research endeavors have aimed to predict cancer progression by analyzing whether there are any documented alterations mentioned in radiology reports. For instance, they may look for phrases such as "mass has increased slightly since the previous scan." [8] NLP specifically focuses on linguistic analysis to teach machines how to interpret large amounts of text. NLP involves various methods such as automatic labeling, tagging, disambiguation, extracting entities and relationships, recognizing patterns, and analyzing frequencies. Its purpose is to decode the meaning and nuances present in human language that can be understood and processed by machines. [9] Analyzing social media posts can offer valuable insights into the well-being of individuals, groups, and communities, including information on access to healthy food options in neighborhoods. Moreover, it has the potential to improve the data resources available to mental health professionals and researchers, leading to a more informed and well-equipped mental health field. Copper smith introduced a system that examined mental health-related patterns in publicly accessible Twitter data. The study showcased how basic natural language processing techniques can provide valuable understanding of particular disorders and mental health as a whole. The research also indicated the existence of linguistic cues on social media that could be relevant to mental health but have not yet been discovered. [10] While the existing natural language processing (NLP) technology is valuable, it is important to note that there is still room for improvement. While information retrieval has primarily focused on retrieving documents, users would greatly appreciate systems that allow for more intuitive and meaning-based interactions.

Fortunately, current NLP technology shows promise in making these applications possible, and ongoing research is being conducted to address relevant tasks. For instance, one approach to assist users in information-intensive tasks is to provide document summaries instead of presenting the entire documents. Recent evaluations of summarization technology have found that statistical methods are quite effective when generating simple extracts from document texts. However, producing more cohesive abstracts will likely necessitate further advancements in linguistic processing. Another means of supporting users is by generating actual answers to their queries. [11] Tools that aid users in finding relevant documents have become crucial due to the explosive growth in the availability of electronically accessible full-text documents in natural language. Information retrieval systems tackle this issue by comparing query language statements, which represent the user's information requirement, with document surrogates. It seems logical that natural language processing techniques could enhance the quality of these document surrogates, thereby improving retrieval performance. However, thus far, explicitly employing linguistic processing of document or query text has yielded little benefit for general-purpose retrieval systems (i.e., those not specific to a particular domain) when compared to more cost-effective statistical techniques. [12] Computers face significant challenges when it comes to processing natural language. Putting aside philosophical discussions, notable change in methodology, shifting from rule-based techniques to statistical approaches that have held prominence since the 1990s.

Building upon this foundation, deep learning has taken the statistical path to a greater extent and has gradually emerged as the standard technique in the statistical landscape. This book explores two captivating subjects: neural networks. [13] It has been noticed that there are five main tasks in natural language processing (NLP): classification, matching, translation, structured prediction, and sequential decision processes. Deep learning methods have shown remarkable performance in the first four tasks, surpassing traditional approaches in many cases and often achieving significantly better results. [14] Their method involves assuming that it is easier to develop natural language processing (NLP) systems for dialects by initially identifying and classifying the consistent grammatical features of a dialect,

thereby making it more similar to Modern Standard Arabic (MSA). Subsequently, they utilize MSA-based NLP tools to process the text. Another approach, based on the same assumption, is to construct Dialect Treebanks that resemble MSA Treebanks by capitalizing on the systematic patterns within a particular dialect and across various dialects. For instance, a conducted study focused on transferring Egyptian Arabic texts to MSA.

To accomplish this, they employed a lexical transfer technique and adjusted the word order from Egyptian Arabic's subject-verb-object (SVO) to MSA's verb-subject-object (VSO) structure. Additionally, they enhanced the tables of Backwater's morphological analyzer to convert Egyptian Arabic words into their corresponding MSA equivalents. [16] Despite the varied nature of research in this field, there is a shared foundation and objective utilizing the connections between genes, sequences, and texts to develop advanced analysis tools and methodologies that synergistically merge bioinformatics and NLP technologies. These approaches are commonly referred to as "biological natural language processing" or bio-NLP for conciseness. [17] Despite the variety of research conducted in this field, there is a shared foundation and objective: leveraging the connections between genes, sequences, and texts to develop advanced complementary manner. To keep it concise, these approaches are commonly referred to as "biological natural language processing" or bio-NLP. [18]

2 Materials & Methods

2.1 Alternative

Programming language, Linguistic theory, Hardware platform, Knowledge Representation

2.2 Evaluation preference

LSP-MLP, Specialist, Recit, Menelas, Aristote, Rime, Meditas, SymText

2.3 Programming language

A programming language is a formal means of communication between humans and computers, allowing individuals to convey instructions to computer systems. It consists of a defined set of rules and syntax that programmers utilize to write code aimed at solving specific problems or accomplishing desired tasks. These languages enable the expression of algorithms and computations in a format understandable and executable by computers. Consequently, programmers select the most suitable language based on various factors such as project requirements, performance demands, available libraries, community support, and personal familiarity

2.4 Linguistic theory

Linguistic theory involves the examination and analysis of language and its fundamental structures. It is a specialized field within the broader study of linguistics that seeks to comprehend the organization, functionality, acquisition, and usage of languages by individuals and communities. Within linguistic theory, there are various perspectives and approaches that offer unique insights and methodologies. Several essential aspects and theories are commonly explored in this field. Linguistic theory relies on empirical evidence, which includes linguistic corpora, experiments, and observations, to formulate and test hypotheses regarding language structure and usage. Its primary objective is to provide

explanations and theories that account for the diverse range of phenomena observed in natural languages. By doing so, it contributes to our comprehension of human language as a universal cognitive capacity.

2.5 Hardware platform

A hardware platform refers to the physical foundation or system on which software applications and programs operate. It encompasses the combination of hardware components like processors, memory, storage, and networking devices, which collaborate to support and execute software instructions. A hardware platform can take the form of a general-purpose computing system, such as a personal computer (PC), or a specialized system tailored for specific tasks, such as a server, gaming console, mobile device, or embedded system. Each hardware platform possesses its own distinct architecture, specifications, and capabilities. Additionally, each hardware platform is associated with an operating system and software development tools that enable developers to create applications tailored to that particular platform. It is crucial to comprehend the hardware platform when developing and optimizing software to ensure compatibility and achieve optimal performance

2.6 Knowledge Representation

Knowledge representation is the process of structuring and organizing information in a manner that allows for effective utilization and processing by computer systems or intelligent agents. It involves capturing real-world knowledge and presenting it in a format that machines can readily comprehend and manipulate. The objective of knowledge representation is to enable computers to engage in reasoning, comprehension, and decision-making based on the available information. It establishes a framework for storing and manipulating data, enabling intelligent systems to utilize that knowledge to tackle intricate problems. as it serves as the foundation for constructing intelligent systems capable of comprehending and processing information. By representing knowledge in a structured and formalized manner, machines can engage in reasoning, learning, and problem-solving across diverse domains, encompassing natural language processing, expert systems, robotics, and more.

2.7 MOORA (Multi-objective Optimization on the basis of Ratio Analysis)

There are three main reasons why MOORA is preferred over other multiple standards decision-making (MCDM) techniques. First Moore refers to a brand-new MCTM technique that was created with knowledge of the weak points of more traditional techniques. We therefore believed it should be entirely practical. The second reason is the processing time needed by MOORA to resolve the issue, as shown by the MCDM literature. Finally, MOORA requires little to no setup because the literature implies that it takes time and has a constant personality [14]. The MOORA device is a decision-support tool for picking college students who get scholarships in order to boost academic success. The institution has a tool meant to help with decision-making called MOORA that may be used to tackle a variety of issues. Utilizing a machine selection process, scholarship candidates can be chosen swiftly to increase educational performance while benefiting needy students [15]. Amazing is MOORA. A green multi-criteria selection method for a thorough analysis of options that deals with significant heterogeneity and a variety of helpful components. For the purpose of effectively resolving complicated decision-making issues, the MOORA approach is presented. This method typically produces grades that are rigidly contradicting. Thinks about and tries to choose the optimal solution while taking into account both favorable and

unfavorable standards. Some of MOORA's decisions are rewarded for their technique [16]. A MOORA is a technique for multi-objective optimization. There are several types of traits and techniques that are used for some people to go through and progress at the same time. MOORA is all about trying different things, a useful approach strategy. Constraints [17]. The MOORA method is able to remember all characteristics and their respective weights, leading to a higher evaluation of alternatives. The MOORA approach may be simple to understand and apply. The suggested method is generic and is applicable to any size and quality Combining the features leads to more precise targeting and a more straightforward decision-making process. Additionally, this strategy can be applied to any type of decision problem [18]. MOORA, or multiple criteria or multiple features, stands for multi-goal optimization based mostly on ratio analysis. Optimization is an upgrading mechanism that simultaneously considers two or more attributes that are in dispute (notes). This timed offers a wide range of programmers for decision-making in the contentious and a difficult aspect of the environment of the supply chain Choosing the location of the warehouse, the supplier, the product, and the method design are only a few examples. MOORA can be employed when the best options are needed [19]. According to the failure prioritizing achieved by the use of the extension in MOORA, it is evident that every single failure that has been identified is listed in excellent priorities. In other words, the suggested strategy seeks to mitigate a number of significant drawbacks of RPN score and also for selection method in regular MOORA Provides reliability by connecting the use of range idea. Ultimately, deliver logical results to the decision-maker. of this method The comparison of the outcomes with the two various conventional procedures reveals that complete prioritization of catastrophes is carried out and that disasters are discovered [20]. THE ANALYSIS BY MOORA Again, the study of earlier scholars is more recent, and as a result, MOORA and MOOSRA techniques are thought to utilize the most recent statistics available. for the first method of selection Basically. As a result of the explanation above, MOORA and MOOSRA method is used for the choice problem. complementary, resulting in variety and non-conventional in a production setting, this approach is quite reliable. If this ratio is expressed, it is advantageous at the expense of the denominator. It is a favored performance for measuring economic welfare because the value becomes the same for the ratio. As a result, this MOORA and The MOOSRA methodology is compatible from an ideological standpoint with other mounting performance evaluation approaches [21]. both the ratio device and the benchmark MOORA technique with component. We choose the kind and significance of goals and options because our simulation of port planning is all that is important to us. The relevant parties include local, state, and federal governments as well as cooperating organizations. Only implicitly is consumer sovereignty related to the industrial process.

3 Materials & Methods

Table 1. Natural Language Processing

	Programming language	Linguistic theory	Hardware platform	Knowledge Representation
LSP-MLP	0.37	0.69	0.57	0.76
Specialist	0.66	0.35	0.37	0.61
Recit	0.96	0.79	0.63	0.69
Menelas	0.43	0.79	0.63	0.77
Aristote	0.69	0.89	0.32	0.43
Rime	0.76	0.89	0.27	0.36
Meditas	0.89	0.74	0.52	0.96

SymText	0.25	0.25	0.75	0.37
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Table 1 shows the Natural Language Processing and Alternative: Programming language, Linguistic theory, Hardware platform, Knowledge Representation

Evaluation preference: LSP-MLP, Specialist, Recit, Menelas, Aristote, Rime, Meditas, SymText. use this table.

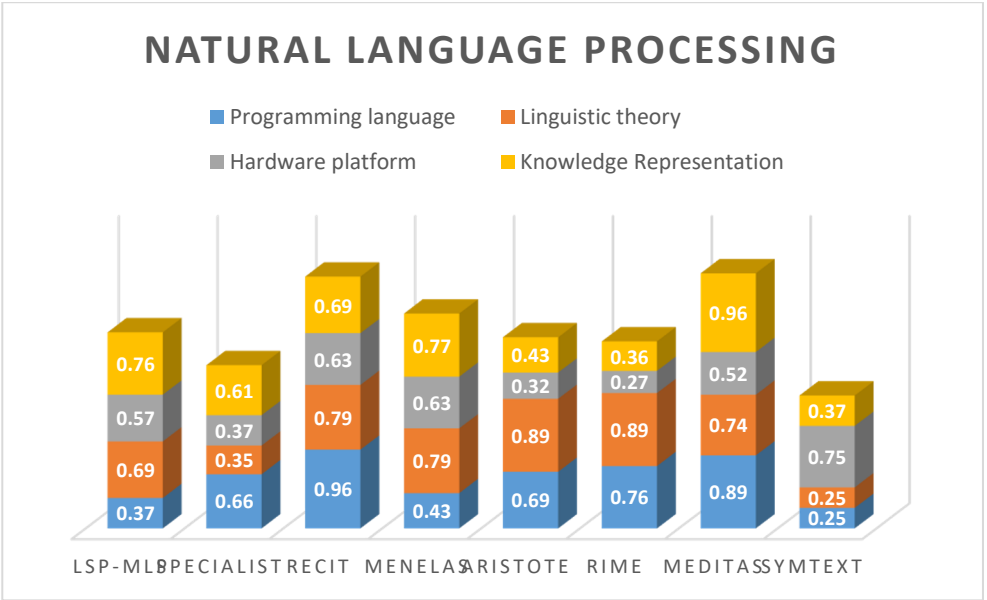


Figure 1. Natural Language Processing

Figure 1 Shows the Natural Language Processing and Alternative: Programming language, Linguistic theory, Hardware platform, Knowledge Representation Evaluation preference: LSP-MLP, Specialist, Recit, Menelas, Aristote, Rime, Meditas, SymText.

Table 2. Divide & Sum

0.1369	0.4761	0.3249	0.5776
0.4356	0.1225	0.1369	0.3721
0.9216	0.6241	0.3969	0.4761
0.1849	0.6241	0.3969	0.5929
0.4761	0.7921	0.1024	0.1849
0.5776	0.7921	0.0729	0.1296
0.7921	0.5476	0.2704	0.9216
0.0625	0.0625	0.5625	0.1369
3.5873	4.0411	2.2638	3.3917

Table 2 shows the Divide & Sum matrix formula used this table.

Table 3. Normalized Data

Normalized Data			
Programming language	Linguistic theory	Hardware platform	Knowledge Representation
0.195352006	0.343241105	0.37884	0.41267188

0.348465741	0.174107807	0.245913684	0.331223483
0.506859259	0.392986193	0.418717895	0.374662628
0.22703071	0.392986193	0.418717895	0.418101773
0.364305092	0.442731281	0.212682105	0.233485406
0.40126358	0.442731281	0.179450526	0.195476154
0.469900771	0.368113649	0.345608421	0.521269743
0.131994599	0.124362719	0.498473684	0.200906047

$$X_{n1} = \frac{X1}{\sqrt{((X1)^2 + (X2)^2 + (X3)^2 \dots)}}$$

Table 3 shows the various Normalized Data Canada, Alternative: Alternative: Programming language, Linguistic theory, Hardware platform, Knowledge Representation Evaluation preference: LSP-MLP, Specialist, Recit, Menelas, Aristote, Rime, Meditas, SymText. Normalized value is obtained by using the formula (1).

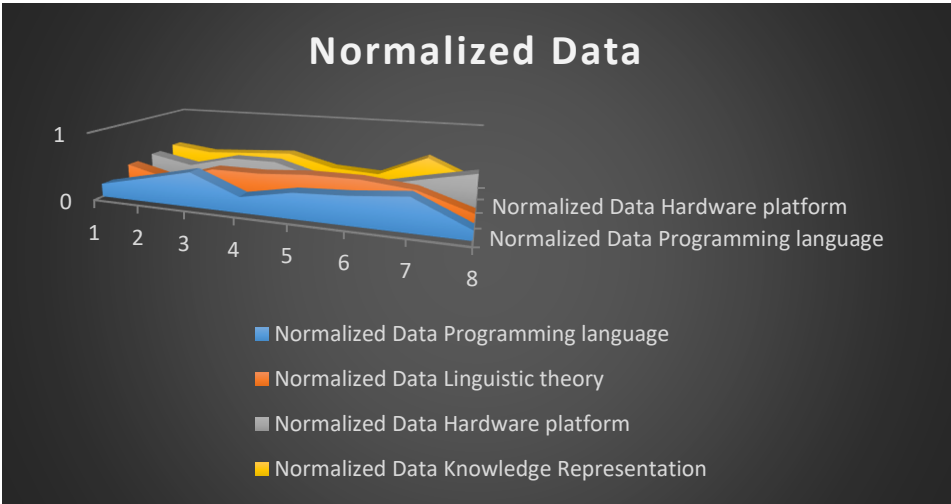


Figure 2. Normalized Data

Figure 2 shows the various Normalized Data Alternative: Programming language, Linguistic theory, Hardware platform, Knowledge Representation Evaluation preference: LSP-MLP, Specialist, Recit, Menelas, Aristote, Rime, Meditas, SymText. Normalized value.

Table 4. Weight

Weight			
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25

Table 4 shows the Weight All same value.

$$X_{wnormal1} = X_{n1} \times w_1$$

Table 5. Weighted normalized decision matrix

Weighted normalized decision matrix			
0.048838002	0.085810276	0.09471	0.103168
0.087116435	0.043526952	0.061478421	0.082806
0.126714815	0.098246548	0.104679474	0.093666
0.056757677	0.098246548	0.104679474	0.104525
0.091076273	0.11068282	0.053170526	0.058371
0.100315895	0.11068282	0.044862632	0.048869
0.117475193	0.092028412	0.086402105	0.130317
0.03299865	0.03109068	0.124618421	0.050227

Table 5 shows the Weighted normalized decision matrix Alternative: Programming language, Linguistic theory, Hardware platform, Knowledge Representation Evaluation preference: LSP-MLP, Specialist, Recit, Menelas, Aristote, Rime, Meditas, SymText. the weighted default result is calculated using the matrix formula (2).

Table 6. Assessment value& Rank

	Assesment value	Rank
LSP-MLP	-0.063	7
Specialist	-0.014	5
Recit	0.027	3
Menelas	-0.054	6
Aristote	0.09	2
Rime	0.117	1
Meditas	-0.007	4
SymText	-0.111	8

$$\text{Assesment value} = \sum X_{wn1} + X_{wn2} - X_{wn3} (3).$$

Table 6 shows the Assessment value& Rank value used. LSP-MLP 0.063, Specialist 0.014, Recit 0.027, Menelas 0.054, Aristote 0.09, Rime 0.117, the final rank of this paper the Menelas is in 6th rank, the Recit is in 3rd rank, the Aristote is in 2nd rank, the Meditas is in 4th rank, the Specialist is in 5th rank, and the Rime is in 1st rank. LSP-MLP is in 7rd rank, Sym Text is in 8rd rank. The final result is done by using the moora method.

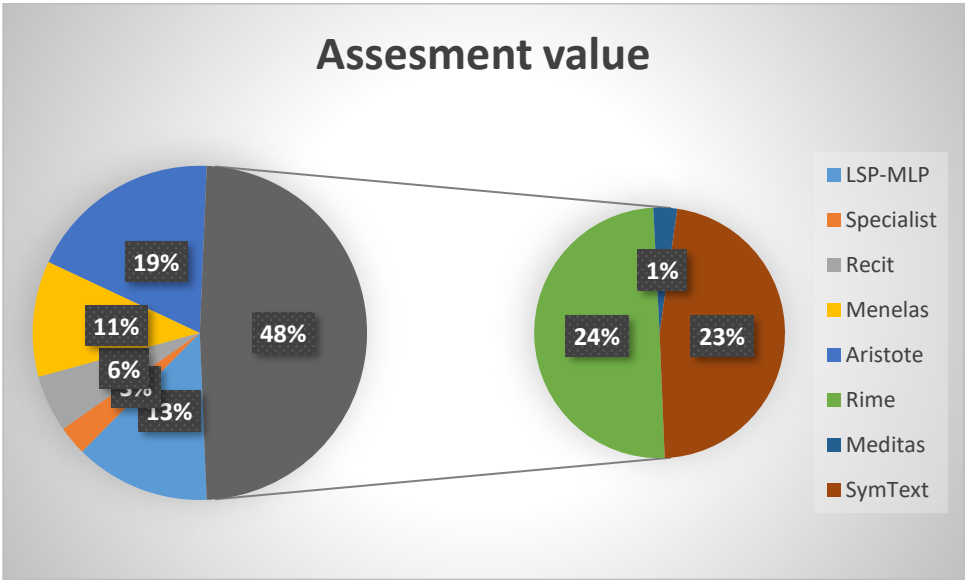


Figure 3. Assesment value

Figure 3 shows the Assesment value for LSP-MLP 0.063, Specialist 0.014, Recit 0.027, Menelas 0.054, Aristote 0.09, Rime 0.117.

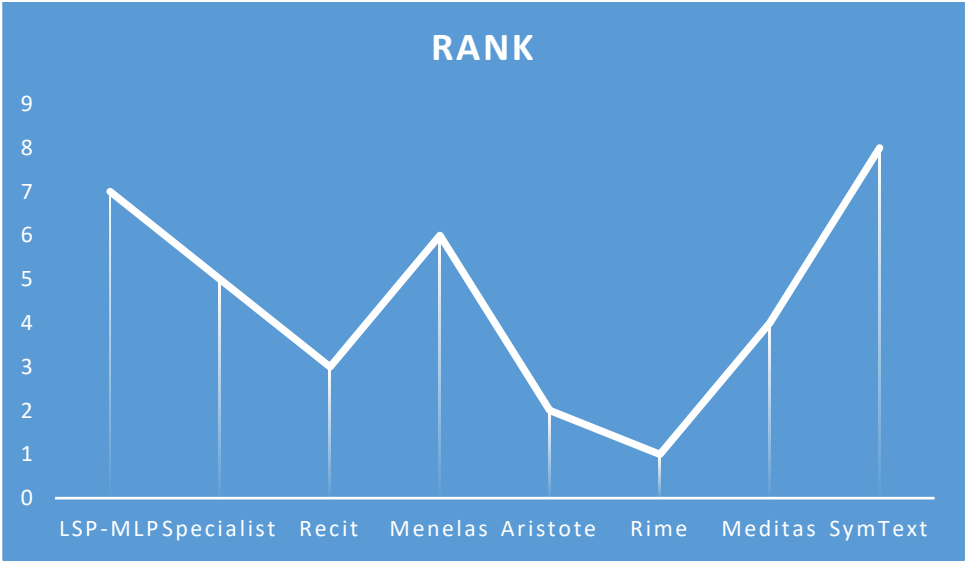


Figure 4. Rank

Figure 4 shows the graphical view of the the final rank of this paper the Menelas is in 6th rank, the Recit is in 3rd rank, the Aristote is in 2nd rank, the Meditas is in 4th rank, the Specialist is in 5th rank, and the Rime is in 1st rank. LSP-MLP is in 7rd rank, SymText is in 8rd rank. The final result is done by using the moora method.

4 Conclusion

NLP practitioners can focus more on the design and optimization of the model architecture itself rather than spending excessive effort on handcrafting features. Traditional non-neural NLP approaches often rely heavily on manually crafted features that are discrete in nature. On the other hand, neural approaches utilize compact and dense vectors, referred to as distributed representations, to implicitly capture both the syntactic and semantic aspects of language. These representations are acquired through specific tasks and training processes within neural models. Consequently, neural approaches streamline the development process of various NLP systems, providing greater ease and flexibility for researchers and developers. There is a limited number of natural language processing (NLP) projects that specifically aim to achieve ontological outcomes. Most researchers in this field have primarily concentrated on identifying instances of cancer recurrence. These studies primarily concentrate on identifying instances where cancer is mentioned positively and determining the timing of such mentions to classify a case as a recurrence. In contrast, other research endeavors have aimed to predict cancer progression by analyzing whether there are any documented alterations mentioned in radiology reports. For instance, they may look for phrases such as "mass has increased slightly since the previous scan." NLP specifically focuses on linguistic analysis to teach machines how to interpret large amounts of text. NLP involves various methods such as automatic labeling, tagging, disambiguation, extracting entities and relationships, recognizing patterns, and analyzing frequencies. Its purpose is to decode the meaning and nuances present in human language that can be understood and processed by machines. Analyzing social media posts can offer valuable insights into the well-being of individuals, groups, and communities, including information on access to healthy food options in neighborhoods. Moreover, it has the potential to improve the data resources available to mental health professionals and researchers, leading to a more informed and well-equipped mental health field. Copper smith introduced a system that examined mental health-related patterns in publicly accessible Twitter data. The study showcased how basic natural language processing techniques can provide valuable understanding of particular disorders and mental health as a whole. The research also indicated the existence of linguistic cues on social media that could be relevant to mental health but have not yet been discovered.

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