

TEXT MINING WITH ARTIFICIAL INTELLIGENCE (AI) USING NATURAL LANGUAGE PROCESSING (NLP)

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Abstract

Natural language processing (NLP) has drawn a lot of attention recently as a way to analyze and evaluate human dialogue computer. We explore the breakdown of the sustainable and nutritious ingredients in recipes and cuisine using natural language processing and artificial intelligence. In addition to machine interpretation, email spam detection, data extraction, outline generation, therapeutic use, and question answering, its applications have spread to a variety of diverse industries. We discuss challenges after outlining the cutting edge and a few usage examples. A legal AI recovery framework is developed using natural language processing (NLP) technology and then implemented in the context of artificial intelligence (AI) legislation. After considering the case's theme, the accuracy, review rate, blunder rate, and other relevant markers are next assessed to examine how the lawful recovery framework was given. The framework passed the dependability test with flying colors and experienced no problems during the continuous seven-day recovery test, according to additional assessments of its unwavering quality. The employment of NLP technology in the legal AI recovery framework has a high degree of precision, which is consistent with the paper's premise; it can be inferred from this analysis.

Keywords: Artificial Intelligence, Natural Language Processing, Technology

I. INTRODUCTION

Simply described, natural language processing is the area of artificial intelligence that enables computers to comprehend, manipulate, and interpret human language. Artificial intelligence message analysis is essentially the process of extracting information from a larger body of text-based data. To bridge the gap between human communication and machine comprehension, natural language processing combines a variety of disciplines, such as software engineering and computational semantics. The two fundamental categories that NLP approaches fall under are syntactic analysis and semantic analysis. Syntactic analysis, sometimes referred to as parsing, evaluates messages using significant language norms to identify sentence structure, organize words, and determines how they interact. For semantic research, text capture is essential. It starts by looking at what each term means (lexical semantics). Natural language processing has the potential to be especially helpful in automating the complete cycle pertaining to the interpretation of comments made by customers on a larger scale, if we're talking about businesses. It will help them make informed decisions about how to handle the business.

Because it enables computers to speak with individuals in their own languages and scale different tasks in line with the languages, natural language processing is significant. Using a model, we may say that natural language processing enables all PCs to read messages, hear conversations, comprehend them, gauge opinions, and further select the portions that need to be dealt with. Human languages are immensely sophisticated and stylistically varied. We have been disclosing information about ourselves in a variety of ways, both vocally and in writing as physical copies. Natural language processing is crucial to artificial intelligence since it assists in resolving linguistic uncertainty and adds a mathematically much more advantageous design to words for many various types of downstream applications, such as dialogue acknowledgment or text inspection. The quality of people's lives is improving as a result of the rapid growth of civilization, intelligent products, and intelligent technology. Technology related to artificial intelligence (AI) is developing in a manner that can no longer be distinguished from information. When they analyze and think about the data, the data recipient needs and obtains information. It consists of perspectives on development, cultural norms, and knowledge of and control over the natural

environment. The human brain reassembles and systemsatizes the facts through cognition. The information base primarily determines how data is used by artificial intelligence technologies. In the realms of big data and artificial intelligence, the knowledge base (KB), which attempts to organize human information, is playing an undeniably crucial role.

One of the key fields of AI study right now is natural language processing (NLP), sometimes known as "the valuable stone in the crown of artificial intelligence." A fundamental application focus in the area of natural language processing is the creation of a phonetic information base. Worldwide efforts are being made to create extremely thorough semantic word references and semantic data banks. The English Word Association from Princeton School, for instance, is a comprehensive, data-coordinating, computer-clear word reference. Nowadays, a lot of people have put a lot of effort into learning about and using Word Net, and they also receive a lot of financial support. It continues to advance in standing. Word Net and other knowledge bases have been developed and used in the most recent pattern of international academic conferences in the fields of AI and NLP. The academic and corporate worlds are both greatly motivated by it. The fact that Chinese NLP research has not gotten as much attention as English NLP research has had an impact on the development of the Chinese data bank. The Chinese knowledge base needs to be taken into account, supported by, and evaluated by academic and contemporary circles in order for AI and NLP technology to advance swiftly in the field of the Chinese language in this particular situation.

II. LITERATURE REVIEW

Shridhar Marri (2018) The author demonstrated how emotional intelligence and artificial super intelligence might coexist in his blog post for Forbes India. Despite the fact that machines can do a task far more quickly than people, he argues that people should still direct robots by assigning them a mission to perform. This combination will work as a potent catalyst for human advancement. He adds that the more natural interactions between people and artificial superintelligence, the more emotional intelligence is required for superintelligence. It will be a remarkable accomplishment for people if artificial superintelligence possesses emotional intelligence. If machines do indeed nurture a significant degree of emotional development similar to that of humans, then the way things are done in the modern world needs to alter. Compared to

how people used to walk, computers now move more efficiently. In a very short amount of time, current facial recognition software will choose one person out of thousands, and current estimates only account for a small percentage of that time. But, that does not imply that mankind has nothing to contribute in a real society populated by humanistic super intelligences. Despite the computer's seeming intelligence, it actually needs instructions on what to try. The idea for machine learning originates from individuals, without a customer to ask, "Follow down this person," the best face recognition programming framework is pointless. In other words, if super intelligence is to become more prominent, emotional intelligence may end up being the most crucial skill. In the here and now, where Super Intelligence (SI) and Emotional Intelligence (EI) can serve as the two main engines propelling our evolution, mankind can be shaped by being a blend of those two glaringly separate intelligences. With vocations like delivery drivers, scheduled operations, tellers, radiologists, and many other occupations and businesses primed for automation, AI breakthroughs pose serious concerns to workers today and tomorrow. Even high-paying positions could disappear in the near future, well before the current school-age population can start to replenish the labor market. This would affect both low-paying and high-paying jobs. The meaning of labor and how people engage with technology will benefit society when super intelligences replace some of the routine chores that make up a typical workweek.

Katja Grace et. al. (2018) The unexpected article "When will AI execution surpass that of humans? Evidence from AI experts" discussed how changes in daily life and transportation could be brought about by advances in artificial intelligence, which in the near future could result in the displacement of a significant number of jobs. Furthermore, the designers offered thorough machine intelligence audits (HLMI). The military, financial, scientific, and transportation industries could all be entirely reconstructed because to advances in artificial intelligence (AI). [4] To alter public accommodations, we could want to spread the word about these developments. We will summarize the results of a thorough analysis of information on machines and experts' viewpoints on the development of AI in this post. These conclusions can help experts and decision-makers plan and drive AI designs. Artificial intelligence (AI) advancement may have a big impact on civilization. Over the next ten years, self-driving cars will aim to replace a range of driving tasks. The relocation may result in unexpected experiences, such as association recreation, car network protection, and

the variation of laws and standards, in addition to potential job failures. Applications in technology, development, and law enforcement would also provide new difficulties for those in charge of developing AI. In order to prepare for these difficulties, innovative AI with precise foresight would be helpful.

Florian Berlinger (2017) Daniel Dennett claimed that the use of computer computations in human decision-making and execution should be viewed as an exploration of artificial intelligence in his paper "The Hole between Intelligence and Artificial Intelligence." In fact, even local decision-making has a big impact on how often artificial intelligence repeats collective behaviors. The primary goal is to assemble more thorough, objective evidence; before the automated framework can wisely assess, the crucial data needs to be more dependably recovered. [5] Unfortunately, it becomes challenging to incorporate such a vast body of information into a tiny independent robot. Educating oneself in reality rather than the knowledge that is widely available is another big undertaking. Animal swarms allow us the opportunity to study the evolution of group behavior. In order to use artificial intelligences to emulate aggregate methods of functioning, each unit must understand local decision-production. Decisions are made based on how the current environment is perceived. We must learn to develop more accurate perceptions, to consistently separate pregnant data, and to make wiser choices on mechanical frameworks. One factor is using a massive mainframe computer to search through a very little amount of data. It is a very different sensation to travel through a chaotic world with a golem that has its own autonomous intelligence. Much more resilient than learning from a pre-selected data set is the ability to make decisions in a world that is fairly unpredictable.

EgorDezhic (2017) Natural and artificial intelligence are separated. "Natural intelligence" in this context refers to brain-driven intelligence. He imagined that because of the incredible speed, many tasks could be finished in the same amount of time as a single human effort. Comparable to human intelligence, artificial intelligence is unaffected by bias and is able to function with the same level of accuracy at each time, regardless of how many times the task is performed. [6] Yet, human intellect consumes less energy than artificial intelligence, which can only perform a limited number of jobs despite using gigawatts of power. It is not necessary to develop people, but it can

take years for AI to become multi-entrusting. The brain and artificial intelligence will dominate most of our future. For instance, OpenAI recently created numerous techniques that let administrators set objectives for AI frameworks. Moreover, brain-machine interfaces are the subject of a lot of research. Overall, human and machine interdependence appears to be dreadfully accommodating, providing we can address issues with jobs.

III. THE PROPOSED METHOD

A. NLP Technology

NLP technology refers to a process of parsing human language using a computer in order to comprehend how natural language is used for correspondence between people and PCs. To achieve a complete correspondence between people and PCs, NLP technology needs to be combined with a variety of disciplines, including semantics, basic programming, data crunching, estimations, and human brain science. In the current study of information science and technology, NLP is a crucial technology. It also covers the following topics: information extraction, word sense disambiguation, component naming confirmation, syntactic analysis, and updated synopsis. NLP technology is frequently associated with text classification, responsive structure, machine translation, and information recovery. [7] The message classification shows the process of later selecting the message classification as indicated by the message content under the preset classification framework, even though it has issues with phrase similarity. The assessment of sentence similarity is the essential technology of the adaptive framework, which was created in response to the necessity to swiftly and reliably extract specific information from massive amounts of data. Machine interpretation, which often involves the interpretation of whole words or messages, is the act of turning one natural language into another using a computer system. Data recovery is the mode used for data recovery in language processing technology. Understanding the importance of the customer inquiry articulation is essential to assuring the accuracy of the question data during the question.

B. Information Retrieval Technology

Software engineering goes into great detail on data recovery. Its goal is to increase the operation's contribution to customer satisfaction. The three primary categories are the boolean model, the vector space model, and the likelihood recovery model. The simplest model is the Boolean one. The component values must be carefully selected while retrieving data. The message depiction model affects how element words are weighted. The message presentation model frequently includes both the vector space model and the Boolean model. The fundamental estimate methodologies for highlight weight are simple word recurrence approach, Boolean capability strategy, root capability strategy, and Tf-idf capability strategy. [8] The straightforward word recurrence technique makes the assumption that the frequency—that is, the number of times the highlighted item appears in the archive—can transmit the weight or significance of the constituent word in the record. The following describes the situation as:

$$W_{ij} = t_{if},$$

It demonstrates the regularity of the highlighted event and the significance of the report's item. The basic word recurrence approach is more complex than the Boolean capacity method. The capability simply considers the individual objects in the archive; the total number of occurrences is unimportant. The estimated weight values for the highlighted items might then vary between 0 and 1. The following describes the situation as:

$$w_{ij} = \begin{cases} 0, & t_{if} > 0, \\ 1, & t_{if} \leq 0. \end{cases}$$

Additionally, the root capability technique enhances the simple word recurrence strategy. The weight of the highlighted item is expressed as the square root of the quantity of occurrences for the included object.

C. The Combination of AI and Law

The AI framework has been increasingly incorporated into legal practice, including courts, throughout the ongoing development of the law. In any case, it is still important to investigate the relationship between AI and law as well as the implementation of the core technological elements of the court office design. [9] The interdisciplinary field of artificial intelligence includes machine learning, NLP, image recognition, and human-PC communication (AI). It enables computers or frameworks to reason independently at levels that are on par with or even higher than those of humans, ultimately leading to the production of judgments that are more effective and sophisticated than those reached by humans. It represents a substantial improvement in the coordination of profound learning in the field of Computer vision. The three main stages of AI development are weak AI, strong AI, and super AI. Most AI experts agree that the technology is only currently at the stage of weak AI.

The development of supercomputing, enormous data, and data training mostly impacts genuine industry, legitimate activities, and the law. The advantages of AI are consistent with the requirements of the law. The following scientists have summarized the key points of the law for the classes that go along with it: The law contains numerous actual clauses, instances, conjectures, and norms. Several classification and reasoning techniques can be used to demonstrate the meticulous legitimization of a guideline. The law also encompasses a wide range of tasks and abilities, including direction, evaluation, assumption, guiding, and stress. Conflicts are also used to highlight the case's present real-world components.

D. The Design of the NLP-Based Legal Retrieval System

It is being handled concurrently by family members, legal counsel, honorable professionals, and dishonorable professionals. Throughout the earliest phases of the case, all parties must be aware of and keep an eye on the case interaction. A legal recovery system is therefore absolutely important. [10] For example, the traditional eyewitnesses, who are unlicensed professionals, may address their concerns about how the suspects are being treated as well as find analogous cases to analyze in order to have a thorough understanding of the scenario. Figure 1 demonstrates how the framework for legal recovery in this evaluation is integrated with NLP technology to further recognize AI in legal recovery.

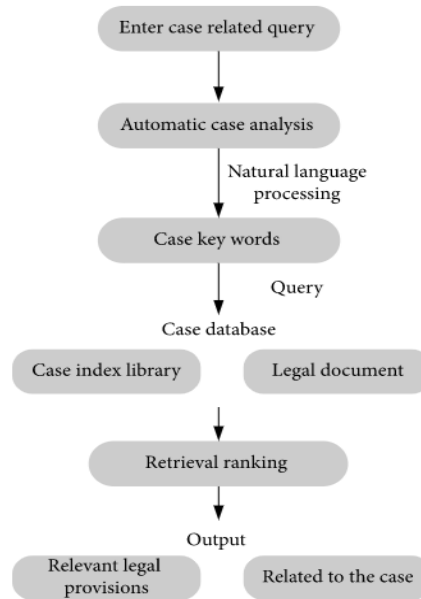


Figure: 1. the NLP-based legal retrieval system's flowchart

The basic activity cycle of the framework appears as follows. When a client supplies a question, the framework automatically breaks it down, processing it for word division, substance recognized proof, catchphrase data extraction, and connected word meaning expansion. After processing, the case record library of the framework sends the words to be questioned to the inquiry module, which then conducts the inquiry. The separate watchword positioning system, last but not least, gives the search result.

The four practical modules that make up the framework's main hub in the operating system are the word division module, watchword extraction module, catchphrase expansion module, and recuperation module. The word division module fragments the information case using the proper word division device, conducts word division on it, and then adds a distinct real word reference to the cycle to operate on the word division's conclusion. The catchphrase extraction module filters out superfluous jargon, isolates the case's pertinent jargon from the case, and concentrates watchwords that can be cross-examined for the important details. The expression extension module mostly expands the watchwords deleted for the case need and adds nearly identical terms. After contributing the extension, the investigation is strengthened and the semantics of the case are

advanced. Typically, legal phrasing is searched for using the recovery module, and enlarged expressions are found and synced with the document library under the control of legal provisions. After getting the examination, the instances are assessed by comparing acceptable expressions and significance.

E. Simulation and Performance Evaluation

The advanced language for this framework's keyword extraction and extension phase is Java, and the testing environment is Windows. The recovery module is executed on the My Eclipse stage. The unique framework advancement environment is displayed in Table 1. According to Apache, LUCENE 5.0 full-text search improvement library is the 2015 release.

Table: 1. the system's environment for development.

Development platform	Windows7+JDK8
Development language	JAVA+JAVA WEB
Development tool	Eclipse4.9+Myeclipse2017+Tomcat7
Development kit of retrival	LIJCENE5.0

In this study, the framework recovery execution is recovered using the Text Recovery Gathering (TREC). The Text Recovery Meeting gauges the effectiveness of the built-in recovery framework using quantitative standards like precision, review, and F-measure. The circumstances are as follows:

$$\text{Accuracy rate } P = \frac{\text{number of correctly retrieved law provisions}}{\text{number of retrieved law provision}}$$

$$\text{Recall rate } R = \frac{\text{number of correctly retrieved law provisions}}{\text{number of law provisions related to the case}}$$

$$\text{Metric } F = \frac{2 * P * R}{P + R}$$

The exhibition test's simulation component is still going on. The lawful hunt power supply of this framework is contrasted with the complete data recovery framework. The record library is now only mentioned in a small number of legal terms. As a result, the framework assessment introduces a second error rate and a zero-discovery rate in order to take the appropriate rate into account. The circumstances are as follows:

$$\text{Accuracy rate } P = \frac{\text{number of correctly retrieved cases}}{\text{total case number}}$$

$$\text{Error Rate } E = \frac{\text{number of incorrectly retrieved cases}}{\text{total cases number}}$$

$$\text{Zero retrieval rate } Z = \frac{\text{number of nonretrieved cases}}{\text{total case number}}$$

The trials used as the test set for a hunt test on the framework in this study are randomly selected from the case list data set. The valid recovery framework offered in this evaluation is assessed using the three files of the right rate, error rate, and zero recovery rate. [11] The unbreakable nature of the framework, network scenarios, actual instances involving a single subject, genuine situations involving a variety of subject matters, and real cases involving a single subject are also studied.

IV. RESULTS AND DISCUSSION

A. Real Single-Subject Case Retrieval Performance Analysis

Every situation should have a proper, similar constraint, according to one subject. For this evaluation, seven instances were used, including an attack, a break-in, and a police obstruction. The measurements are shown in Table 2. Table 2 demonstrates the ability of this study's inquiry methodology to understand legal definitions and the specific number of cases relevant to each topic. Further information on its accuracy rate, error rate, and right rate is shown in Figure 4.

Table: 2. Results of actual single-subject searches.

Number	Cases	Legal provision	Total number of cases
a	Assault	Article 43	453
b	Theft	Article 49	526
c	Interference of law enforcement	Article 50	45
d	Illegal business operations	Article 54	47
e	Hotel administration	Article 56	233
f	Prostitution	Article 66	436
g	Gambling	Article 70	3738
h	Drug taking or making others take drugs	Article 72	435

B. Real Multiple-Subject Case Retrieval Performance Analysis

Several themes show limits in each situation with many, opposing legal standards. [12] For this review, three cases involving assault and burglary, robbery and gambling, and assault and drug possession were chosen. The measurements are displayed in Table 3 and Figure 2.

Table: 3. Results of actual multiple-subject searches.

No	Cases	Total number of cases	Accuracy rate	Error rate	Zero retrieval rate
1	Assault and theft	57	0.561	0.237	0
2	Theft and gambling	52	0.645	0.334	0.042
3	Drug taking and assault	115	0.637	0.307	0.053

C. Test and Analysis of Online Cases

Web-based situations have more unclear characteristics, and the record might contain comments made based on the design requirements utilizing manual and spoken procedures. During the test cycle, a total of are obtained from the organization. The test results for the query items are displayed in Figure 3.

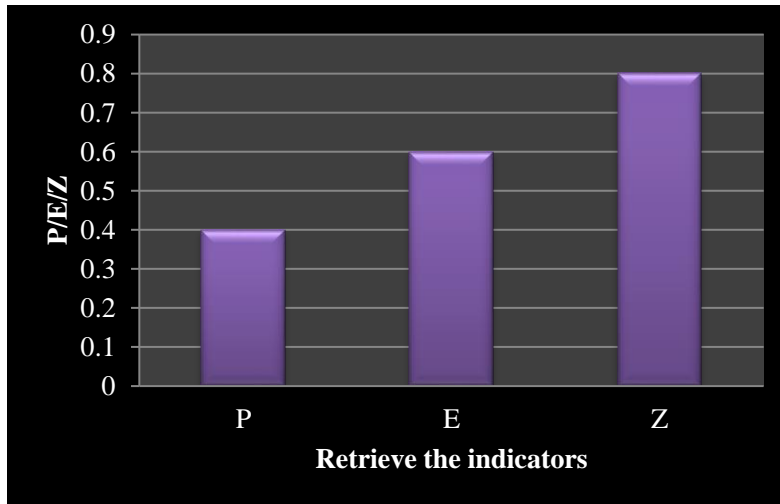


Figure: 3. Detection effect histogram for online cases.

D. System Reliability Analysis

A quest that is played out continuously for more than a week enables the impact of the framework's unbreakable quality to be seen. [13] Ultimately, it is found that the framework can operate reliably during the experiment. Also, there haven't been any repeated quality failures, and the structure is really sturdy. The recovery strategy for this exam therefore readily passed the strict quality inspection.

V. CONCLUSION

Over the whole history of NLP and computational science, the objective and utility of natural language formal analysis have not been realized due to increases in processing power and the application of significant learning. Semantic appropriate analysis theories and methods still have room for development and improvement. [14] For the advancement of NLP and mental science, a complete, accurate, and important grasp of the many common natural language analysis suppositions is still necessary. NLP experts are able to divide concepts into parts with fictitious value while producing different numerical advancements. Natural language processing (NLP) technology has been found to be used in the legal system for AI recovery with a consistent precision rate and steadfastness, which is consistent with the survey's assumptions and further supports the use of natural language processing (NLP) technology in the legal AI settings by providing a preliminary basis. The assessment cycle has a few problems as well. [15] For instance, the preliminary is still in the stage of simulation and improvement. Whatever the situation, more people will face problems in their daily lives. This will provide a more solid foundation for the intellectualization of the legal AI issues. It should also be used in the excursions that follow for actual, legal situations.

VI. FUTURE SCOPE

Extension of the system is essentially as completely open as a doorway. More research may be completed to create a model or robot that has a similar level of mental capacity to humans. As a scientist, I would advise constructing it so that it wouldn't overwhelm people while still taking into account the overall benefit. The well-known Sophia bot from Hanson Advanced mechanics has its modifications made because it can produce output that could be harmful to people's health. By adding intelligence, such as intrapersonal intelligence, existential intelligence, organic intelligence, coherent numerical intelligence, and to provide some instances, the system may be transformed into "The One - Supercomputer." Robots can perform most tedious tasks and some savvy errands, so this will undoubtedly relieve part of the pressure and load on people. Furthermore, there should be restrictions on robot advancement that prevent them from developing consciousness, from thinking, or from acting in ways that could lead to conflict between humans and robots. Later on, implementing solar-powered battery charging will enable the system to

function continuously by supplying power to the battery. This name denotes the initial phase of brain-PC communication. In addition, one of the components that might be attained with this focus as the foundation is awareness, consideration chasing, and confidence in the leadership.

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