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Analysis of Artificial Intelligence and Natural Language Processing Significance as Expert Systems Support for E-Health Using Pre-Train Deep Learning Models

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Abstract: Artificial intelligence (AI) and natural language processing (NLP) are relentless technologies for healthcare that can support a strong and secure digital system with embedded applications of internet of things (IoTs). The study tried to build an artificial intelligence-natural language processing cluster system. In the system, rich content is extracted using parts of speech and then classified into an understandable dataset. The unavailable uniqueness systems with standardize process and procedures for artificial intelligence and natural language processing across different systems to support E-healthcare sector is a big challenge for nations and the world at large. Aim to train a cluster system that extract rich content and fit into a deep learning model frame to enable interpretation of the dataset for healthcare needs through a fast and secure digital system. The study uses (behavior-oriented driven and influential functions) to determine the significance of AI and NLP on E-health. Based on a selective scorings method, a rate of 1 out of 5 grading was developed called the Key Benefits score. The behavior-oriented drive and influential function allows an in-depth evaluation of E-health based on the selection of text content applied to the sample proposed study. Results show a score of 3.947 scale significance of NLP and AI on E-health. The study concluded that well-defined artificial intelligence and natural language processing applications are perfect areas that advance positive results in healthcare electronic services.

Keywords: Artificial intelligence; Natural language processing; Deep learning models; Clinical decision support; E-health

1. Introduction

One of the most recent and relentless technologies for healthcare increasingly prevalent for effectiveness and efficiency are AI and NLP [1, 2]. The advantages of artificial intelligence and Natural language as sister systems in society are being using in the healthcare as the youngest technological developments [3]. Human communications with the help of ICT tools like mobile phones, and computers via digital systems interact with chatbots, audios, video conferences, emailing and related applications which has shape the health sector thanks to AI and NLP. Users of AI and NLP software systems and application are able to access the numerous healthcare facilities without living their comfort zones. Artificial intelligence help automate systems to understand human languages with the help of natural language processing applications. The AI and NLP, whom most of the Mobile applications are built upon, function as sister technological systems. AI and NLP have the necessary systems, application and services to transform many areas of the modern world. Modern service providers now use email, text, phone calls, smart records, and virtual assistants as first contact points for almost all of their dealings, customer inquiries, and most preferred trading channels [4]. The art of digital communication is a combination of artificial intelligence and natural language processing which they act as sister technological applications and system software to provide services to its users. Due to the population growth rate and the need to secure faster clinical results many aspects of healthcare users beginning with the employees, and practitioners through administrative processes within healthcare. The modern tele-pharmacies have shown that the modern health sector will depend strongly on artificial intelligence and natural language processing to provide care monitoring, ease payment and analyze and interpret pharmaceutical results.

Deep learning is helping system devices and software applications to computer what comes naturally from human thoughts. With the coming of modern machine learning algorithms, many proms have been developed to analyses situations, and train system with the help of AI to function side by sight humans. Person-to-machine relationship via cyber-physical Systems is really a living science via the Internet of Everything thanks to artificial intelligence, robots, and industry 4.0 rewriting the interaction miracles between humans and computer-based applications. Modern technologies built on frequent use interfaces like Natural Language Processing (NLP), Gestures Recognition Interfaces, voice analysis, and handwritten and Facial Expressions Recognition is being used in sophisticated automation systems like clinical trial centers, research centers and service robotic systems environments but with little attention.

There are millions of multidisciplinary approaches and research studies emphasizing that artificial intelligence and natural language be built as a performer to assist humans in handling healthcare services [5, 6]. Artificial intelligence in healthcare for clinical services requires natural language processing applications to understand and classify clinical documentation [7]. Natural language processing are the modern systems using a variety of automated application systems that can analyze and interpret clinical comments about healthcare users by providing an in-depth insight and detailed oriented issues of customers with the main purpose of breaking down the identified issue into understandable approach with high quality either by advancing necessary means, strategic methods, and better outcomes for healthcare users or by replacing services and systematic approaches [8]. Expert systems for healthcare required human abilities to reinforce, strengthen and modify when necessary, the applicable system software, and smart engineers to construct a large and accommodating intensive and extensive number of rules, and regulations that contain a certain level of knowledge with specify focus area to analyze and interpret clinical outcomes. When a healthcare a system is built such as an expert system software, they function well with constant follow-up until the point when they become easy to follow and managed or automated all their processes. But as the volume of data increases, the rules grow too large exceeding several thousand of the rules it can handle. This usually begins to conflict with each other and fall apart. The excess data volume stresses system software. The knowledge area usually changes in a significant way due to increased capacity oriented in previous rule requirements. The process of updating to meet the standard by changing the rules can be burdensome and laborious.

Artificial intelligence and natural language processing are slowly replacing human resource-based-rules systems with new approaches based on system-defined software interpreting data using proprietary medical algorithms. A lot of findings have indicated that artificial intelligence and natural language processing are better than humans at key healthcare tasks, such as diagnosing disease, analyzing, interpreting, and performing tasks. Nowadays, modern algorithms have already outperformed researchers in analyzing and interpreting patterns and guiding researchers in how to build cost-efficient clinical trials [9, 10].

However, several reasons make us believe and think that in many years to come artificial intelligence will replace humans in many vast areas in medical process domains. In this article, we present a prototype system process, artificial intelligence, and natural language processing cluster of the dataset on deep learning models, a flow chart for artificial intelligence and Natural language processing for E-health, provide types of artificial intelligence and describe the potential of artificial intelligence offers to automate aspects of care and some challenges of implementation of AI in healthcare [11, 12]. Few decades ago, almost everything was done manually especial communication between healthcare practitioners and patients. Today, almost everything is in the digital form with some countries already applying robot surgeries. Some countries like USA, UK, Germany, Japan and China already have e-healthcare services that are fully virtual that can be independently run by robots. These already made-available system has made us to understand that digital healthcare services with the help of AI and related system applications in the future will be more advance than human capacity. Besides, the skepticism amongst users in today's world to fully accept robot surgeries already signal the advancement of AI to human imagination and engagement.

2. Related Literature

This section content is made up of definition of terms, definition of key terms, type of artificial intelligence for healthcare services, important of artificial intelligence and natural language processing for healthcare services, and challenges of artificial intelligence and natural language processing.

2.1 Definition of Key Terms

Natural language processing (NLP): Natural language processing is part of AI which involves with the designing and implementing of various systems and algorithms that an able to interact with human language [13]. Natural language processing is one of the umbrella systems that has unite other innovative technologies behind financial technology [14]. NLP is a tract of AI and Linguistics that is devoted to make computers understand the statements and words written in human languages [15]. NLP is the study of mathematical and computational modeling of various aspects of language and the development in a wide range of systems [14]. NLP is the designing programs to function and operate in some useful ways using some natural language tasks [16]. NLP is a subfield of AI that focuses on training computers with seemingly intelligent to understanding and generate languages just like humans [17]. NLP is a subdivision of computer science which concentrate on learning, understanding and production of everyday human languages [18].

Artificial Intelligence (AI): AI is a branch of machine learning that rely on model of mathematics to achieve machine intelligence [19]. Artificial intelligence is a combination of several sub-disciplines based on the fundamentals of different approaches that is often used interchangeably to encompass a broad range of technologies and applications [20]. Artificial intelligence is a system that learn from the surroundings and uses the knowledge to make intelligent decisions [21]. Artificial intelligence is a leading computer component that advances industrial transformation by enabling an intelligent machine to execute tasks autonomously such as self-monitoring, interpretation, diagnosis, and analysis [22]. Artificial intelligence is a computer system that deals with the simulation of intelligent behavior in computers in cognizing the state of making intelligent decisions [23].

Deep learning models (DLMs): Deep learning is a field of study that moves across various applications. It has a structure that connects different applications like knowledge graph which is going to be discussed in this article in detail. In this section, we are going to discuss different types of deep learning models. Deep learning models have succeeded in predicting disease and covid-19 is an example [24]. Deep learning is a computer system that is using mathematical and conceptual backgrounds and techniques used in industry, and research [25]. The learning of representation of data in multiple levels [26]. The selection of elements to solve real-life data science problems using layers of selected models is deep learning [27].

E-health: The process of capturing knowledge through informal networks [28]. It is information and health services delivered via the Internet or related technologies [29].

2.2 Type of Artificial Intelligence for Healthcare Services

Artificial intelligence as a collection of systems and applicable techniques such as NLP, ML and DL which are the most of technologies that have immediate importance to healthcare sector. The various processes, rules and tasks deep learning, machine learning and natural language processing support via artificial intelligence are very large. The following paragraphs represent some particular artificial intelligence technologies highly significant to healthcare.

Natural Language Processing. Natural language processing is one of the widely use application that understand and makes meaningful sense of human language [30]. Thousands of artificial intelligence researchers indicate that Natural language processing quickly finds relevant information within a document using various systems incorporated such as semantic, tokenization, text tagging and textual categorization. The discipline of NLP includes text translation, speech recognition, and text analysis. Statistical and semantics are the most widely used approaches in natural language processing. Semantics analysis contributes and increase the accuracy of recognition.

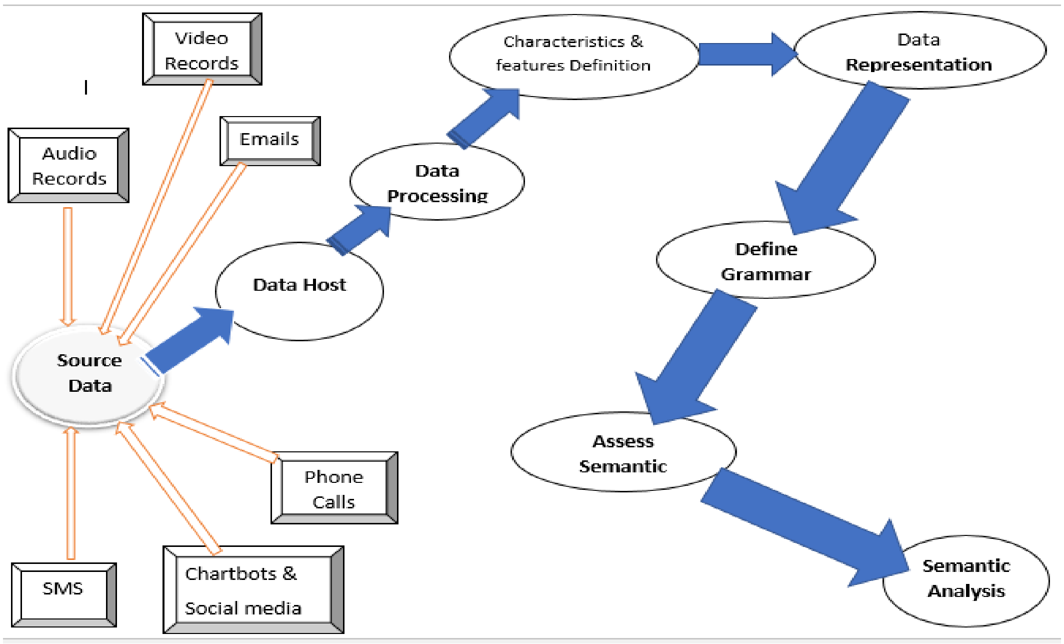

Figure 1. Semantics approach to data analysis

Figure 1 above represents semantic explanation of information on NLP. Because of the large quantity of generated data involved in healthcare, NLP is becoming the dominant application used. The process of applying natural language processing in healthcare involved the creation, understanding, storing and classification of clinical documents and results. The Figure 1 represent a systems semantics analysis of natural language processing step by step clustering unstructured clinical data.

Expert system software based. Expert systems software based. This is a system software that collects and analyzes information based on 'if-then' rules [31, 32]. In healthcare, the expert system software base is used for 'clinical decision support' purposes. The modern applications using the programming language of python have employed this system into its algorithm. Modern programmers have applied expert systems with the help of expert human resource and knowledge engineers to construct a series of rules in a particular knowledge domain with python programming language. In the past, when the number of rules increase, it was difficult to make decisions as rules conflict with different datasets. Nowadays programming languages have handled the capacity of load and with the help of system update the evolution of that datasets balances with system updates.

Healthcare physical robots. Healthcare physical robots are well-known as healthcare oriented industrial robots. Healthcare physical robots perform predefined tasks like scanning for X-rays, measuring weight, alarming for emergencies, and automatic bed adjustable in healthcare [33]. However, healthcare physical robots have become more collaborative with humans as seen through training enabling humans to go through desired tasks [34]. In 2002 healthcare physical robots surgeons were approved and they have improved to be able to see, create precise and minimally invasive incisions, and stitch wounds. However, even though healthcare physical robots perform this functions, important decisions within healthcare are still made by human surgeons.

Healthcare diagnosis and treatment application. In recent years, companies like IBM's Watson have become very popular because of the rules and focus on precision medicine such as cancer diagnosis and treatment. Watson applied machine learning and NLP applications to train datasets and understand human psychology [35]. IBM Watson is a set of 'cognitive services' providers using machine learning and natural language processing application programming interfaces [36]. IBM Watson application is made up of speech and language, vision, and machine learning-based data-analysis programs. IBM Watson applications interfaces are technically capable of taking treatment programs provided by some vendors of open source, such as Google's TensorFlow.

Machine learning and deep learning models of neural networks. In healthcare, the most recent and still growing yet to be fully applied applications is machine learning. Machine learning precision help predefining what healing protocols are able to be successful on an individual basis [37]. Majority of this application of machine learning and precision medicine applications require training of dataset for which are outcome variables known as supervised learning. Machine learning is a technological model of a neural network that has been existing since the 60s and has been highly and well established in healthcare trials. Deep learning is expanding with a wide variety of its used for speech recognition and it is seen as a form of NLP. Deep learning unlike other forms of statistical analysis, characteristics of deep learning typically has little meaning to a human. There are many hidden features in deep learning models, which are being revealed by processing graphics and cloud architectures.

2.3 Important of Artificial Intelligence and Natural Language Processing for Healthcare Services

The following paragraphs explain how importance is the application of artificial intelligence and natural language processing to the healthcare and how they are applied and in which level.

AI-assistive mobile applications. The number growing technology that provides and enhances services like real-time patient data collection and monitoring for emergency care is artificial intelligence [38]. Artificial intelligence applications offer preventive healthcare recommendations for healthcare providers [39]. Better still, mobile applications is one of system used in monitoring movements and activities of patients especially in psychiatric hospital and elderly persons suffering from memory lost. Artificial intelligence applications are enabling the efficient implementation of in-home health monitoring, health information access, personalized health management, and the use of treatment devices such as visual assistive devices.

NLP-assistive communication aids. Advances in supercomputing and natural language processing have enabled the delivery of more precise and personalized healthcare services to patients thanks to faster digital communications devices [40]. Natural language processing is an example of evidence base application supporting the adoption of virtual healthcare there by reducing healthcare costs while maintaining and improving the quality of care. Therefore, the use of NLP-based tools of electronic devices can result in potential savings for several end users in the healthcare industry. Examples include remote consultations, billing for healthcare payers and claims verifications.

Diagnosis. Diagnostic procedures and treatment process of disease have been the heart of healthcare for using artificial intelligence [41]. Previous expert system software in the past has demonstrated some potential to accurately enable human diagnose and treat disease. These expert systems were based on laydown rules on procedure and process for humans but were not totally accepted for clinical practice. As improvement has been broadly involved, artificial intelligence and natural language processing integrated remote control system software

are able to outperform humans. The integration of artificial intelligence and natural language processing has shown expert system software capacity to handle both based-rule procedure and process at the same time.

Healthcare administrative applications. The application of artificial intelligence in healthcare settings is somewhat less game changing as built self-drive human control software compared to self-drive system control patient care [42]. Natural language processing and artificial intelligence for healthcare administrative assistants has substantially let efficiency and effectiveness. System embedded alerts, regulatory mechanisms, self-adjusted procedures have changed the power of doing something and waiting for something to be done.

Healthcare data verification. Natural language processing and artificial intelligence in healthcare has helped tremendously in verifying appropriate and justified claims and payment using administrative machine learning expert systems [43]. A well-structured expert system built on proper algorithms can be used for pairing data across different databases. Insurers and providers now can rely on verified data from expert systems. It is easier now to determine whether the trillions of claims submitted daily are accurate or not. Identifying and correcting coding issues and incorrect claims has saved millions of dollars for healthcare providers.

2.4 Challenges of Artificial Intelligence and Natural Language Processing

- One challenge of the limitations of artificial intelligence and natural language processing for healthcare services is that these applications require access to huge volumes of data training in order to be effective.
- Another challenge is that there will be a risk of bias if the data used to train the algorithms is not representative of the population as a whole. The system expert software required specifications in terms of population cultural heritage, behavior, history and global educational background. The system artificial intelligence and natural language processing guard data for a particular set of people and will require new datasets to apply to another group.
- The uniqueness and unavailable standardization of artificial intelligence and natural language processing across different systems which would have been easy to share data acquisition regarding human cultural heritage, education, health issues and eating habits across the globe. The unavailable standardized rules make it difficult to compare and combine data from multiple sources and make conclusions.
- Ethical implications of AI is one of the challenges face by healthcare providers and practitioners. Health decisions such as clinical results within healthcare are exclusively by humans in previous years. There are many rules and regulations to issue clinical results for certain diseases but artificial intelligence doesn't qualify yet for such [34].
- The use of smart system machines to provide and assist with raises problem of accountability, transparency, permission and privacy has reduced but increase a lot of questions within healthcare sectors.

3. Results

In this section we applied an NLP cluster system where we extract rich content in text or speech then classified into an understandable dataset. This yet to be cluster system can be used to build some deep learning models frames. A sample text content is used here to demonstrate the influence of AI and NLP on E-health using parts of speech. The results explained that the way we think, act and run our day-to-day activities based on data obtained via NLP means predetermined our health Patten. The (**behavior-oriented driven and influential functions**) and key benefits scores are used. The Key Benefits consist of Metrics and metrics range substitutes. There are push factors which represents the products and services institutions, establishments and organizations. The push factors depend on a selective item called dependent parameters.

The metrics range are a range of numbers from one to five (1, 2, 3, 4, 5). To calculate the require benefit and determine health content based on text, we divide the summation of metrics range substitute by metrics range and multiply by behavior score.

Formulae

The influence is symbolized as BIF = F(D) which is said "f of d" equal to $Eq=\int(D)\sum_{MR}^{MR^S} X\ BS$. *MR are related such that for every MR, there is a unique part of the speech of MR. That is, F(D) cannot have more than one value for the same d in MR. MR is up of (nouns, adjectives, verbs, adverbs, interjections, prepositions, conjunctions, pronouns, determiners, and numerals).* MR^S *is made up of (nouns, adjectives, verbs, adverbs, interjections, numerals, and prepositions) The said theory used function related in an element d as defined by MR to an influence F(D) to determine the influence behavior score.*

BIF=Behavior oriented drive and influential function
F=Push factors
D=Dependent parameters
MR=Metrics range

MR^S= *Metrics range substitute*
BS=Behavior Score
KBS=key benefits score
$q\ Eq{=}\int(D)\sum_{MR}^{MR^S} X\ BS.$

Table 1. Metric range and metrics range substitute

Metrics range	Nouns	Adjectives	Adverbs	Verbs	Prepositions	Pronouns	Conjunctions	Interjections	Determiners	Numerals
Metrics range substitute	Nouns	Adjectives	Adverbs	Verbs	Prepositions	Interjections	Numerals			

Table 1 above represents elements of the part of speech classified into metrics range and metrics range substitute that the study uses to evaluate the influence of natural language processing and artificial intelligence technology application using a deep learning model on E-health.

Table 2. Behavior score

Behavior score	1	2	3	4	5
Key benefits score rate	Poor	Fair	Good	Very good	Excellent

Table 2 represent arrange of five benefits score (BS) that we used to measure the influence of natural language processing and artificial intelligence on E-health applied deep learning model. The score grade is determined after each summation and data clustering. The five behavior score represents human five senses.

3.1 The Evaluation of NLP/AI on E-Health Based on the Behavior Oriented Drive and Influential Function

This section presents a simple text with detail analysis on a real world example on natural language processing. The text is classified into different parts of speech, summarize and evaluated. The sample text content explain how artificial intelligence expert system can be constructed based on natural langue that will automate digital content of users convert into meaning dialogue that healthcare practitioners can used to evaluate a case by cased bases of its patient. The used of text sample brings us to real life simulation of system application for healthcare need based on E-health system with ability to consult, secure healthcare data and communicated freely online.

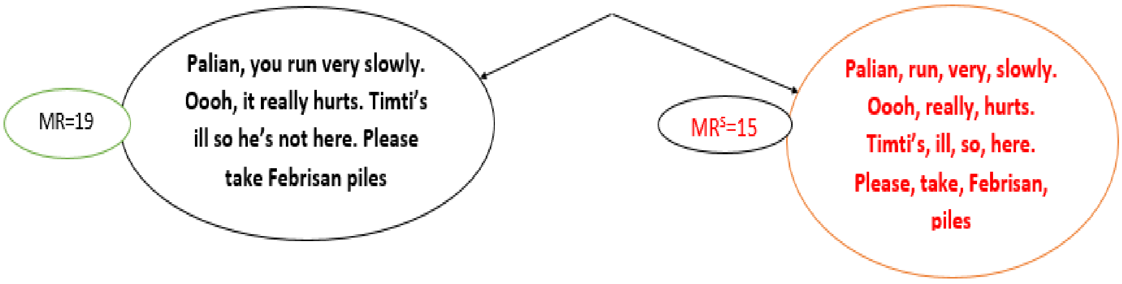

Figure 2. Evaluation of NLP/AI on E-health based on the Behavior oriented drive and influential function

Above Figure 2, provide text content that we used to classified into two groups. The two groups are metrics range substitutes and metrics range mark red and black respectively. The red color stands for metrics range substitute while the black stand for metrics range. $MR=19$ *and* MR^S=15

BIF=Behavior oriented drive and influential function of NLP/AI on E-health

F=push factors of NLP/AI

D=Dependent parameters

MR=Metrics Range

MR^S= *Metrics Range Substitute*

BS=Behavior Score

KBS=key benefits score

$$Eq=\int(D)\sum_{MR}^{MR^S} X\ BS.$$

$$====)))) \int(D) = \sum_{19}^{15} \times 5$$

$$====))) \int(D) = 3.947$$

The statistics above detailed how relevant natural language processing and artificial intelligence applied on deep learning model technology is to the E-health. From the summation and evaluation, the study obtains a score grade "Good". The grade score of 3.944 provide the severity of the health situation based on simple text classification. Text data can help with advance insight into the health situation of patients based on E-health system which helps practitioners know beforehand the influential function determining the rate at which NLP and AI is needed in E-health.

4. Applied Method

This section helps to clarify the nature of activities and give details of the less complex processes used in the classification using parts of speech. The section also identifies steps that do add value to the internal or external use such as needless storage and sourcing necessary work, duplication, and added detail breakdowns in communication. The detailed flowchart is a close-up view of the process, typically showing step by steps data classification using different parts of speech identified in this study. These flowcharts represent a self-explanatory flow of dataset within an E-health system that make it easy to identify rework loops and complexity.

Figure 4 is a representation of 19 words. These 19 words in Figure 4 above, represents parts of speech. Based on standard English language classification of parts of speech, the study uses the approach and subdivide the parts of speech into metrics range and metrics range substitutes. The study however understands that the English language is broad and also different languages have their standard structures. Figure 4 represents the classification into metric range and metric range substitutes. The metric range according to the study is made up of all the parts of speech. Both the words Mark with red and white are of metric range. Metric range substitutes are selected parts of speech. The author observed that the parts of speech recognize in the study as metric range substitutes are closely related to human aspects of life that can help others easily feel the pain or happiness other people go through Just by observing their text.

Figure 3 represent a system break down on how data is classified to extract meaningful information. The Figure 3 show how information moves from data source to natural language application. System software sends the information into classification section. Once information reaches the classification service center, it subs classified into two sub sections following predefine needs. At this stage two section received the information which are metric range and metric range substitute. From this stage information is send to the healthcare base on the need. If the information is urgently needed, prompt option is automatically activated.

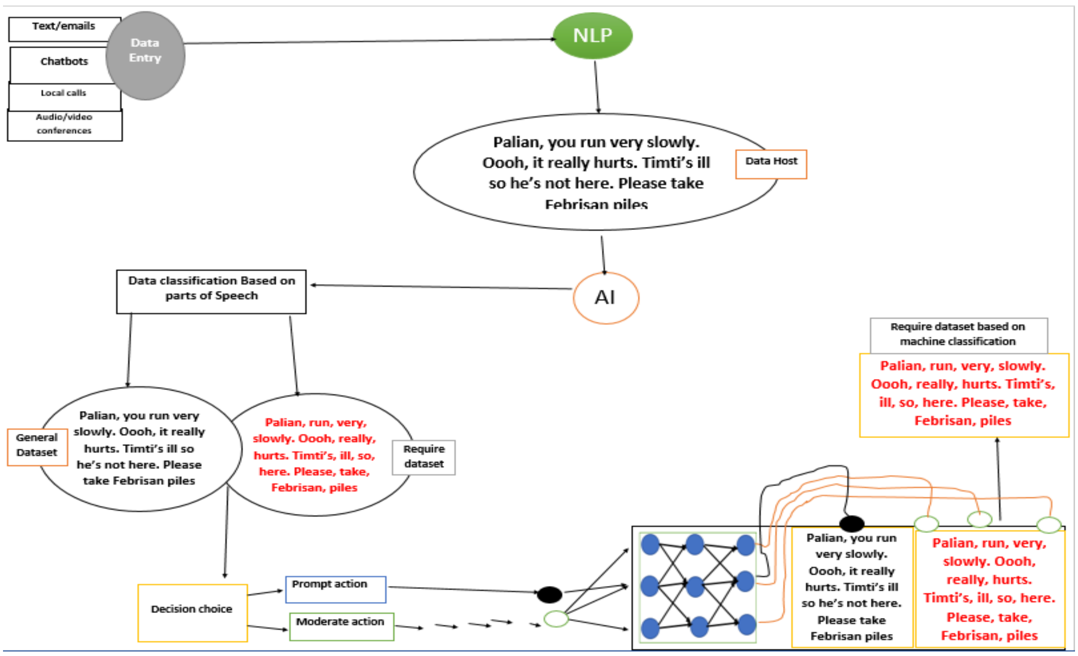

Figure 3. Data classification flow chart

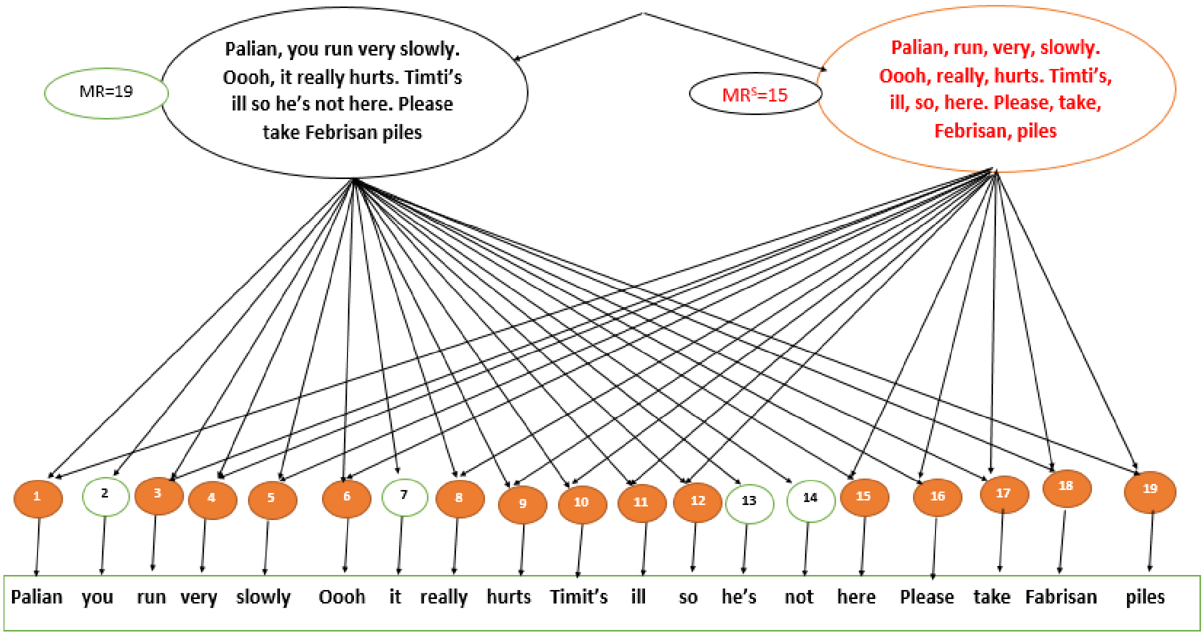

Figure 4. Metric range and metric range substitutes identified

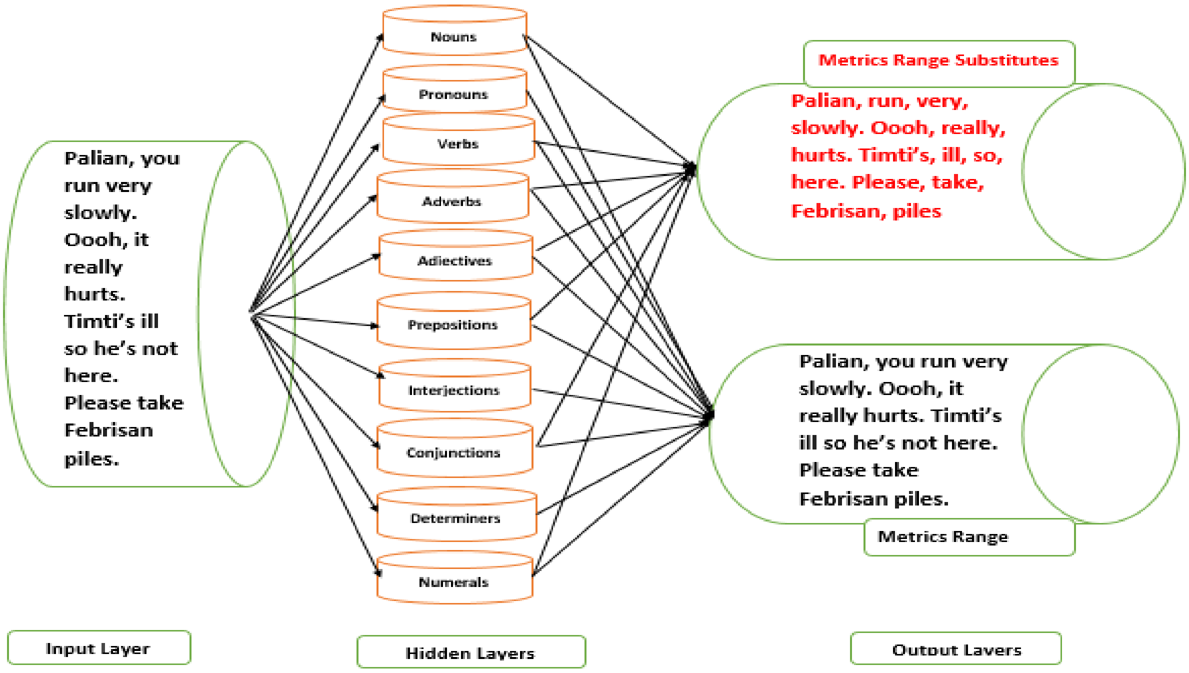

Figure 5. Deep learning data cluster for decision making

Figure 5 presents NLP/AI technological system with a set of rules and regulated approach based on parts of speech. This proposed classification can enable health practitioners to predetermine the health condition of its patients based on text content as classified above. Deep learning model of recurrent neural networks and data classification can connect and allow digital automation of consultation of patients based pure understanding of language and its standard regulations and rules applicable. The input layer, hidden layers, and output layer skeleton of a deep learning model can classify information in any language based on 10 parts of speech as defined by this study. Figure 5 indicates that the transactions recorded on the DLM layer are stored in to different hidden layers. The information contained in each hidden layer represent parts of speech. Unlike spoken words, they depend on various parts of speech. There's no way a text can be out of the scope of language structure. If such a situation occurred then a new dictionary of the English language is required. Base on the above classification, it is pretty easier for healthcare practitioners to extract meaningful information. This can therefore help in decision making.

5. Expert System for E-Health

This is an expert system that can be built to represents E-healthcare system. The proposed E-healthcare system can enhance a fast evaluation of healthcare situation based on classification of simple text. The expert system can also securely encode text details of patients. This expert system can format text content, extract and evaluate it with a simple automated system as introduce in this study. This is a state-of-the-art natural language processing that can be built on language by language bases with a strict adhesion on parts of speech.

Figure 6 represents a selected model of a text content made up of a natural language processing, deep learning that represented an artificial system which can understand human language. The proposed system can classify a text into a number of words. In the proposed system, each word is coded with a number.

5.1 Analysis of Proposed Expert System for E-Healthcare

This section asses the selected text content that was generated to explain and examine E-health based on artificial intelligence and natural language processing. The section presents a simple text with detail analysis on a real world example on how natural language communication that explain human feelings can be automated with the help of AI, DL and ML to health advance E-healthcare services. The aim is to provide health services, advices and secure communication between health practitioners and patients based on simple conversation. The text is classified into different parts of speech, summarize and evaluated. The sample text content explain how artificial intelligence expert system can be constructed based on natural langue that will automate digital content of users convert into meaning dialogue that healthcare practitioners can used to evaluate a case by cased bases of its patient. The used of text sample brings us to real life simulation of system application for healthcare need based on E-health system with ability to consult, secure healthcare data and communicated freely online.

Figure 7 represents the interconnected words to form a graph that convey an individual situation (health issue) of a patient depending communication as the means of interactive relationship between words, system and humans. The standard rule to build this graph using numbers allows the study to measure and evaluate content. Each text allows the extraction to evaluate the richest word in a sentence. Figure 7 indicates (pre-content extraction) which according to the study is the total of the input dataset called metrics range while (content extracted) according to the study represents the metrics range substitute. A metrics range substitute is the rich content extracted from the same given text called metrics range. The total number of words according to hidden codes represented by numbers is added to give us fifteen (15) while the whole content added all together as per hidden codes gives us nineteen (19). This system of data extraction can evaluate and extract data from all types of the dataset without bias.

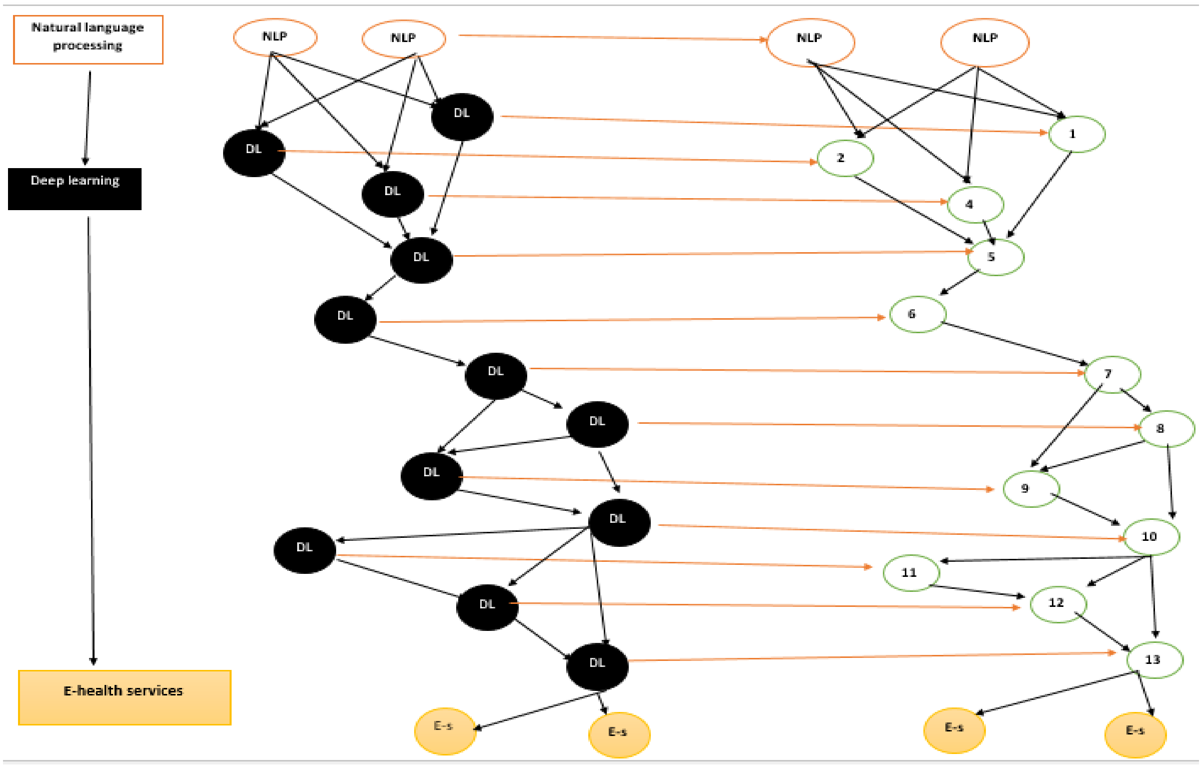

Figure 6. Expert system for E-health

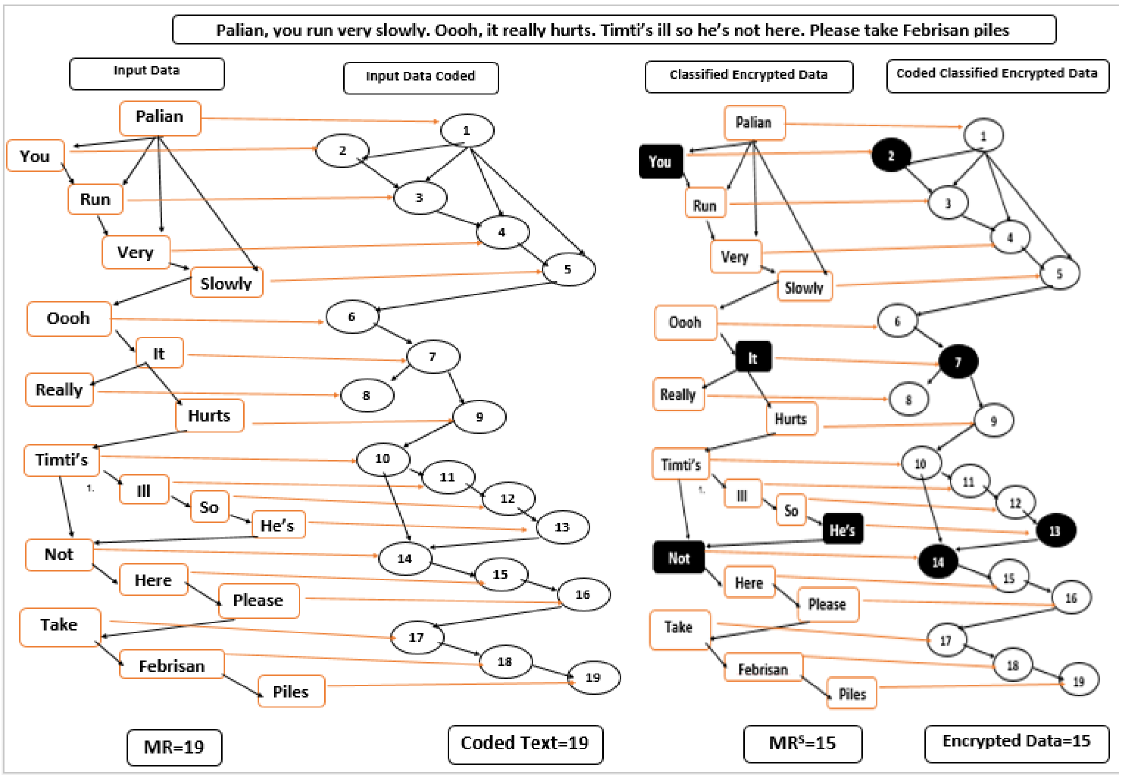

Figure 7. Analysis of proposed expert system for E-healthcare

5.2 Artificial Intelligence and Natural Language Processing Interrelation with Deep Learning

This section briefly shows how intelligence flow between humans to system and computer software and how computer use this data collected to train systems that can predict our health issues.

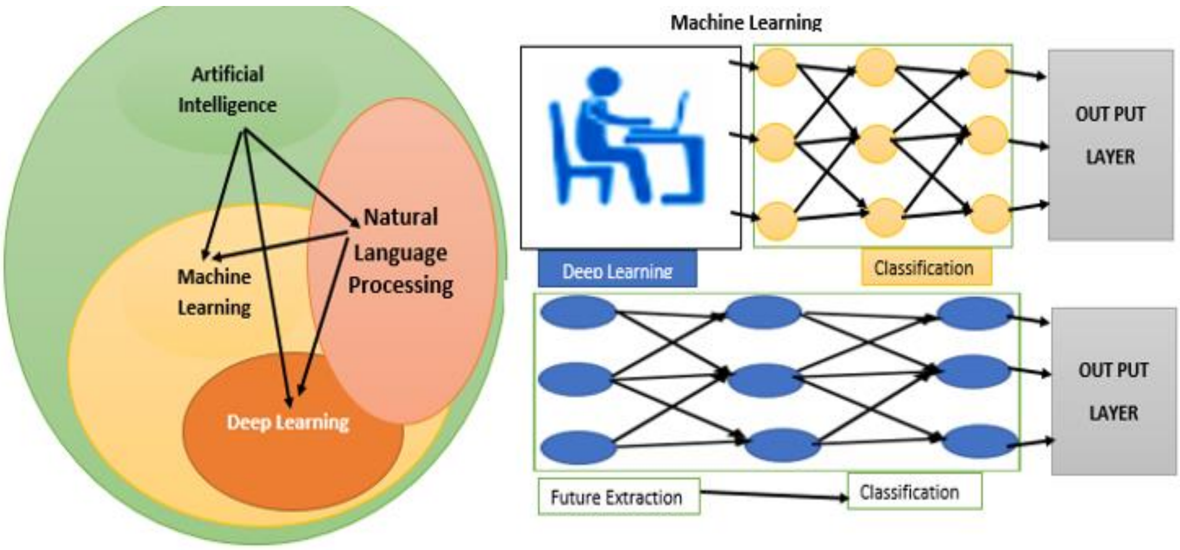

Figure 8. Artificial Intelligence and natural language processing

Figure 8 is an interrelation between artificial intelligence, natural language processing, deep learning and machine learning. From Figure 8, natural language processing, machine learning and deep learning are subfields of artificial intelligence. Deep learning is a subfield of machine learning that help train computers what naturally come out of human thoughts. Natural language processing uses deep learning to convey human thought with the help of machine learning algorithms [44, 45].

6. Conclusion

The study concluded that natural language processing is the best system that summarizes textual content into much easier form very important for healthcare providers. Artificial intelligence and natural language processing ensure a lot of trust and confidence in healthcare when it comes to the need for trusted and tamper proof usable insights. The ability for E-health systems to leverage the most needed energy depends on how willing healthcare providers are willing to integrate natural language processing and artificial intelligence to simplify decision making for their users and subscribers to better and advance healthcare services. Deep learning model systems incorporated with natural language processing and artificial intelligence will provide on time and prompt friendly ecosystem environment which go a long way to enacting a healthy environment.

Data Availability

The data used to support the research findings are available from the corresponding author upon request.

Conflicts of Interest

We certify that we have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript. We have no financial or proprietary interests in any material discussed in this article. All data underlying the results are available as part of the article and no additional source data are required or reserved somewhere.

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