Speech Recognition in an E-Health Report

Dr. M. Senthamil Selvi1, Mrs. S. Jansi Rani 2 ,Mr. C. Ranjeeth Kumar
1Professor, Department of Information Technology,
Sri Ramakrishna Engineering College, Coimbatore, Tamil Nadu, India
2,3Assistant Professor, Department of Information Technology,
Sri Ramakrishna Engineering College, Coimbatore, Tamil Nadu, India
Email-ID: 1senthamilselvi@srec.ac.in

Article Info

Page Number: 1461 - 1467

Publication Issue:

Vol 71 No. 3 (2022)

Article History

Article Received*: 12 January 2022*

Revised*: 25 February 2022*

Accepted*: 20 April 2022*

Publication*: 09 June 2022*

Abstract

The one task doctors complain about most is filling out the electronic health record because on average a doctor see 20.2 patients a day. Every time a doctor sees a patient, they must take notes for medical records. So our project is to design user interface that will capture the voice based summary report from the doctor and convert it into text using Natural Language Processing and send the summary report to the respective patient. There has been a significant amount of study into the use of machine learning for speech processing applications, particularly voice recognition, over the last few decades. In recent years, however, research has centred on using deep learning for speech-related applications. This new branch of artificial intelligence has outperformed others in a range of applications, including voice, and has thus become a particularly appealing study topic. This study examines the various studies that have been undertaken for voice applications since natural language processing was initially introduced as a new area of artificial intelligence.

Keywords: Video surveillance, anomaly detection

I. INTRODUCTION

Natural language processing (NLP) is a branch of artificial intelligence in which computers evaluate, comprehend, and infer meaning from human language. Natural language processing (NLP) can be used by developers to organise and organise knowledge for activities including automatic summarization, translation, named entity recognition, relationship extraction, sentiment analysis, speech recognition, and topic segmentation. NLP (natural language processing) is a text analysis technology that allows computers to understand human speech. This human-computer interaction allows for automatic text summarization, sentiment analysis, topic extraction, named entity recognition, parts-of-speech tagging, connection extraction, stemming, and other real-world applications. NLP is used in a variety of ways, such as text mining, machine translation, and automated question answering. Language is a form of communication that enables us to speak, read, and write. One branch of computer science is Natural Language Processing (NLP) concerned with artificial intelligence (AI), which allows computers to comprehend and process human language. Natural Language Processing is the process of teaching computers to interpret natural language. However, this is not a simple task. Computers can interpret structured data such as spreadsheets and database tables, but unstructured data such as human languages, words, and voices is difficult for computers to comprehend, necessitating the usage of (NLP) Natural Language technologies have the potential to improve knowledge accessibility and comprehension. Speech recognition, in particular, has a variety of exciting uses. Speech recognition

(SR) systems are made up of microphones (which turn sound into electrical signals), sound cards (which digitalize the electrical signals), and speech engine software (that convert the data into text words). It was described as early as 1975, "in which individual words, delivered by a programmed talker, are detected through calculation of a minimal prediction residual reporting a 97.3 percent identification rate for a male speaker.".Radiology applications have been exhibited, with the authors reporting a decrease in report response times from 15.7 to 4.7 hours, despite some system integration problems. Document handling in endocrinology and psychiatry, which involved doctors and their assistants, also improved efficiency. Similar processes have recently been implemented in surgical pathology reporting, with "response times from 4 to 3 days" and "cases signed off in 1 day improved from 22% to 37%."

The following is how the paper is structured:
The literature review on Surveillance System is described in Section 2. The suggested anomaly detection system is described in Section 3. Sections 4 and 5 discuss implementation and conclusion, respectively.

2. LITERATURE REVIEW

The application of natural language processing (NLP) approaches to constructing conversational systems for health diagnosis improves patients' access to medical information. A chatbot service based on fuzzy logic rules and fuzzy inference was built for the Covenant University Doctor (CUDoctor) telemedicine system in this study[1]. In Nigeria, the service assesses the symptoms of tropical diseases. The chatbot and the system were connected using the Telegram Bot Application Programming Interface (API), while the system and a short message service (SMS) subscriber were connected using the Twilio API. The service makes use of a knowledge base derived from medical ontologies that contains known facts about diseases and symptoms. The disease is efficiently predicted using a fuzzy support vector machine (SVM) based on the symptoms supplied. NLP recognises the users' inputs and forwards them to the CUDoctor for decision support. Finally, the user receives a message indicating the completion of the diagnosis process. As a result, a medical diagnosis system has been developed that gives a personalised diagnosis based on user input to successfully diagnose disorders. The system usability scale (SUS) was used to assess the usability of the developed system, obtaining an average SUS score of 80.4, indicating a positive overall evaluation.

This study describes[2] a new healthcare system that would revolutionise the way health records are stored and processed. The entire healthcare procedure will be digitised. There will be no need to bring paper prescriptions with you when you visit the doctor. Using speech recognition and natural language processing, the system will generate an electronic prescription. The digital prescription record maintained on a blockchain network is retrieved using a QR code on a patient's smartphone. A patient's previous prescription records will be transferable to a new doctor. The patient can control the privacy of their own health record using the system. Only the QR code from the patient's smartphone can be used to access the patient's health record. The solution presented in this study is aimed at doctors and clinics that still use paper-based handwritten prescriptions and can't afford to upgrade to one of the available electronic health record systems. Even a single smartphone can operate this system completely. It is made up of a collection of five components that work together. Hyperledger Composer Blockchain Network, Node.js server REST APIs for communicating with the blockchain network,

Python Django REST API server for Natural Language Processing or text processing, a React JS-based admin panel, and a React-Native-based mobile app for doctors and patients are among the modules.

In the last decade, the digitalization of healthcare data has become a necessity for managing the massive amounts of information created by health care institutions. Health-care institutions generate vast volumes of data. This process successfully offers an enabling resource that will improve healthcare service provision, as well as on-the-edge associated applications including medical text mining, forecasting, patient matching, genetic data processing, and several others.The application discussed in this paper[3] relates to the digitalization of medical prescriptions, this can be used to authorize medical services or get reimbursement for medical expenses. The proposed system extracts text from scanned medical prescriptions, then classifies the data using embedded terms and categories about the patient's/personal doctor's information, symptoms, pathology, diagnosis, and suggested treatments using Natural Language Processing and machine learning techniques. A REST full Web Service is used to deliver the results of prescription classification over a set of 800K+ diagnostic statements.

Almost every industry uses Information and communication technology (ICT). The use of information and communication technology (ICT) has changed the way healthcare data is managed. The increasing usage of electronic gadgets such as computers, tablets, and smartphones, alsointernet with high speed, has made the transition from paper to electronic patient records possible. Electronic health records (EHRs) are real-time updated computerised representations of patient records. A complete report on a person's general health is an EHR (Electronic Health Record). Electronic health records (EHRs) make it easier to track a patient's clinical progress, make better health-care decisions, and provide evidence-based care. This is a concept paper based on secondary data collected from national and international publications, government documents, and public and commercial webpages.A review of Electronic Health Records (EHRs) and their application in India is presented in this paper[4]. The publication outlines the Indian government's efforts in the area of electronic health records. The report also explores the advantages of electronic health records (EHRs). Lessons from other countries, such as China,Malaysia and Bangladesh, are also highlighted. The Electronic Medical Record Adoption Model (EMRAM) and private initiatives are also briefly described. The deployment of electronic health records (EHRs) in India is investigated in detail. In addition, this report lays forth a road plan for India's adoption of electronic health records (EHRs).

3. Proposed System for E-Health Record

Methodology:

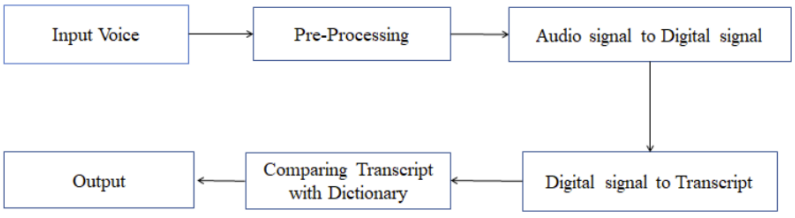

Fig1: Methodology

Flow of E-Health Record:

1. SPEECH TO TEXT CONVERSION:

The term "speech recognition" refers to a process in which a provider speaks into a microphone or any other audio input device attached to a device (laptop, pc, tablet, smartphone). High-quality handheld microphones, headsets with connected boom, and collection microphones for hands-free or headset-free dictation provide the best audio input for front-end speech recognition. Unless all devices have noise-canceling, the recognition accuracy will suffer. The audio signals are recognized and the preprocessing of audio signals are done by sampling and the audio signal are less than 2 second will be eliminated. Then the prepressed audio signal will be converted into digital signal and it will be further converted into text. The benefit is that the practitioner has complete control over the process—the patient health report is dictated, revised, and authenticated all at once. "Once and done" is a term used to describe this situation. The digital transcript is ready to be distributed once it has been completed. The digital transcript is ready for text prepressing and clinical text comparison[15- 25].

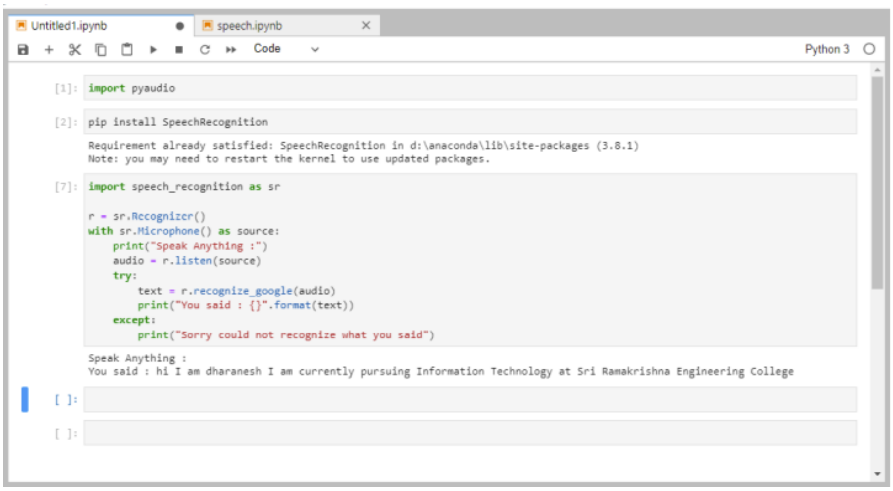

Fig 2: Speech to text conversion

2. TEXT PRE-PROCESSING:

Words misread by the program might be a difficulty when using voice recognition, especially if time-consuming modifications are required of the user. Allowing a misunderstood word to go unchecked can lead to ambiguous documentation, humiliating mistakes, and patient safety concerns. Dissatisfaction with Speech 9 Recognition technology stems from the responsibility placed on providers to correct misread words. Because computers are limited in their ability to format and correct grammar, providers that use computer transcription spend more time correcting errors than those who utilize human transcription. Computer transcription made 16 times more errors than human transcription in a 2003 research, including misidentified words, unsaid words inadvertently included in the text, words recognized as commands, and commands recognized as words.Because it takes nearly twice as long to edit text as it does to dictate, the time necessary to fix errors was the primary reason for 70% of users abandoning SR. Hybrid approach of voice recognition can overwhelmed the limitation followed by the text pre-processing and the clinical text comparison. the pre-processing of the text will be done by tokenization, stop words removal, stemming, lemmatization. Then the pre-processed text will be compared with medical database dictionary using SciPy, Python Library. The data set is then divided into train data and test data. The ratio between train and test data is 8:2. The data set is labelled into which category of disease the given transcript falls. The transcript is labelled according to their disease.

3. MODEL DEVELOPMENT

This work uses a Natural Language Processing model (SciPy) for the clinical text comparison. The model is trained with the dataset which is reshaped for 30 epochs with each given a batch size of 64. The model istrained and tested with the given labelled data and through the microphone it lively detectsthe doctors voice and converts it into text using speech reorganization and the text gets pre-processed and compered with medical database. And the final report is given in the form of document.

Fig 3: Clinical data comparison

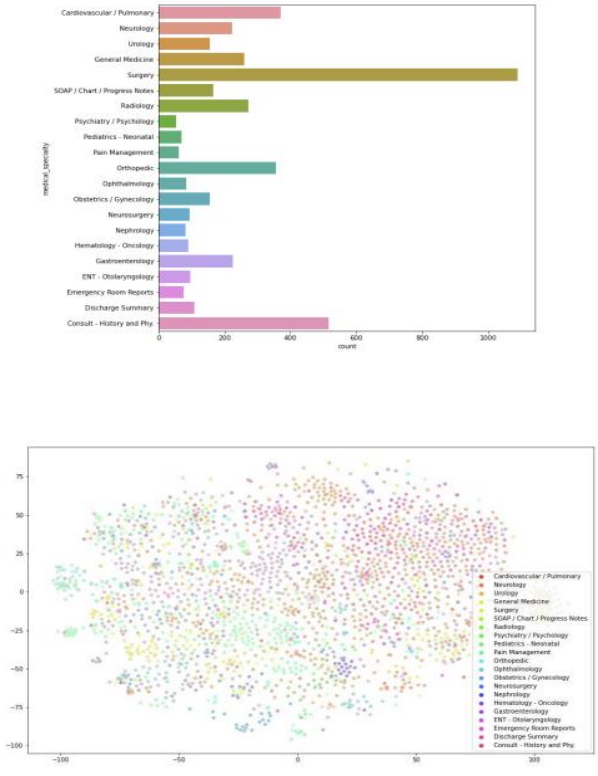

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Fig:4 Results of E- Record

CONCLUSION:

In this project, we help the doctors or a clinician to reduce time taken in writing or typing a report of a patient after the patient visit. The doctor has access to all of a person's health and medical records over the internet. incorporating both clinic management & patient management.

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