Available online at http://www.advancedscientificjournal.com
http://www.krishmapublication.com
IJMASRI, Vol. 1, issue 10, pp. 283 -287, Dec. -2021
https://doi.org/10.53633/ijmasri.2021.1.10.007

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY ADVANCED SCIENTIFIC RESEARCH AND INNOVATION (IJMASRI)

ISSN: 2582-9130 **IBI IMPACT FACTOR 1.5** **DOI: 10.53633/IJMASRI**

RESEARCH ARTICLE

VOICE BASED PRESCRIPTION USING MACHINE LEARNING

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Abstract

Medicine side effects are the major problem in the world, due to wrong prescriptions thousands of people die every year. Most of these mistakes are due to illegible handwriting which leads to taking the wrong medicine or dosage. To solve this issue, a voice-based prescription came into the picture where the prescription is taken as voice input, and a pdf file is generated which is then emailed to the patient. This method can save wealth and life throughout the world, particularly in developing countries where the prescriptions are generally paper-based. The system proposed in this paper is for those doctors and hospitals that are still using a paper-based handwritten prescription.

Keywords: Healthcare, Voice-based, Python, Natural Language Processing (NLP), Electronic Prescription, Text Processing, Electronic Health Record (EHR).

Introduction

A major problem today in India is that most prescriptions are handwritten. Several cases are highlighted, where an error in understanding the prescription by a chemist has led to wrong medication which led to serious health issues (Sokol and Hettige, 2006) If a doctor has prescribed some medicine, for example, “Tocilizumab Injection” such medicine is only readable by chemists. Due to the illegible handwriting of doctors, the non-medical background people are not able to interpret prescriptions correctly.5

Electronic health record (EHR) systems have been widely used across healthcare organizations. While there are many advantages of using EHR such as secure sharing of patient data and easy

accessibility, a shortcoming is that its manual data input is time-consuming and error-prone. Physicians spend as much as 49.2% of their office time on EHR (Bhatt *et al.,* 2021). The requirement to enhance health care improved the use of technology solutions in the health sector. The Internet has received significant attention in recent years but the voice is still a common, convenient and direct way to communicate person-to-person or person-to-computer. Google's API is a new standard for developing voice control applications. This technique reduces the cost and develops writing efficiency. Voice assist systems are incorporated in various fields, including data providers such as warehouses, air travel, financial institutions (Azeta *et al.,* 2008), customer service (Atayero *et al.,* 2009), e-learning (Jitendra Mahatpure *et al.,* 2019) and various areas.

Now, it is the time of the computer era where everything is computerized, boosting the pace of human life. A solution to the above problems is to create an application that can be used to reduce the work of doctors. By using this system Doctors will be able to dictate prescriptions to the patient and at the same time, this dictation gets recorded in the system. This recorded prescription gets converted into text and gets saved in pdf format. Additionally using this app, the Doctor can edit the prescription and also send it directly to the patient's email ID.

Due to this remarkable solution, doctors will be able to handle more patients in a small amount of time. Now chemists will also be able to read prescriptions correctly and patients will also be able to verify the medicines given by the chemist are the same as written in the prescription. In addition, as the prescription is sent to the patient's email id the patient can show all his previous prescriptions to the doctor in a secure way even if he goes to a different hospital. This will also prevent the illegal use of patient's prescriptions and provide security.

The objective of this project is to design a system that will generate voice-based prescriptions in pdf format which will be sent to patients through email. So, there is no chance of loss of prescription. If this solution is implemented in real-time then it will lead to saving a lot of time for doctors to write a prescription as well as for patients to search previous prescriptions.

Literature Review

The Electronic prescription system (Kory Kreimeyer *et al.,* 2017) generates prescription using natural language processing (NLP). They proposed a method to fasten up the process of prescription generation as the Speech Recognition technique takes less time. Google's speech recognition API is used for speech-to-text conversion and NLP is used to extract prescription information from transcript.

(Kory Kreimeyer et al., 2017a) "Natural language processing systems for capturing and standardizing unstructured clinical information: A systematic review". A Systematic approach focused on the Preferred Reporting Items for Systematic Reviews and Meta-Analysis is used to find clinical natural language processing (NLP) frameworks which produces structured information from unstructured free text. A query containing principles of NLP and structured data used to scan seven literature databases. The data gathered and analyzed in this study will be useful in creating new NLP approaches. (Gladson Maria Britto and Suresh Kumar, 2014)

(Gladson Maria Britto and S. Suresh Kumar. 2014a) "Speaker diarization using Support Vector Machines and Auto Associative Neural Network". The process of partitioning a speech signal containing speech segments of multiple speakers and then grouping the voice segments which belong to a same speaker is known as speaker diarization. The initial phase is identifying when a speaker starts speaking, followed by speaker clustering. Without having knowledge of a number of speakers or names, speaker turn point identification should work properly. (Azeta *et al.,* 2009)

The idea of electronic prescription is not new, there are few systems in India that offer a way to

digitally generate and store prescriptions. Some of them are described below.

IRX Clinics is a complete management kit for doctors. It provides a smartpen and a smart prescription pad. The system allows doctors to write the prescriptions which are then digitally saved in the background. A tablet is also provided which is already loaded with a management system to manage patient data.

E Prescription by i-Grandee Software Technologies Pvt. Ltd is a system that allows doctors to directly share E-Prescription with medical stores. Doctors create prescriptions and transfer them to pharmacies. All authorized health care providers can access the E-Prescription using this system.

Prescription pad is one of the software used for writing prescriptions. It is a safe prescription writing facility which provides comparative analysis of a patient's medical history.

SlashDr is a virtual assistant for doctors. It is an EHR for doctors to keep track of their patients. Doctors need to select the symptoms and it automatically generates prescriptions.

3. Block Architecture and System Flow

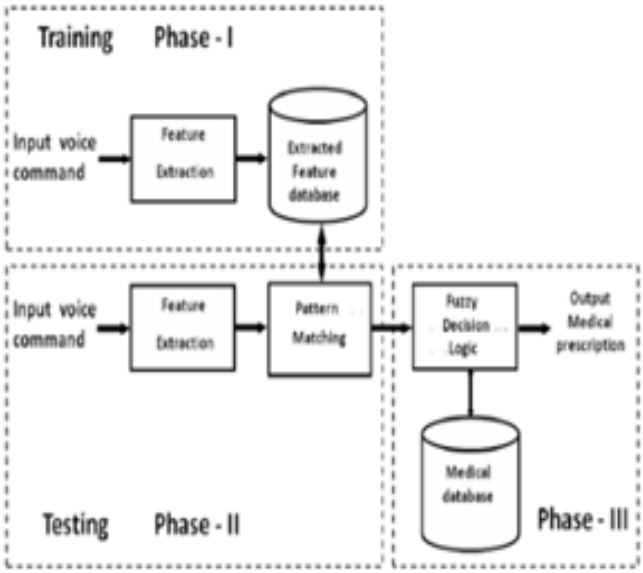
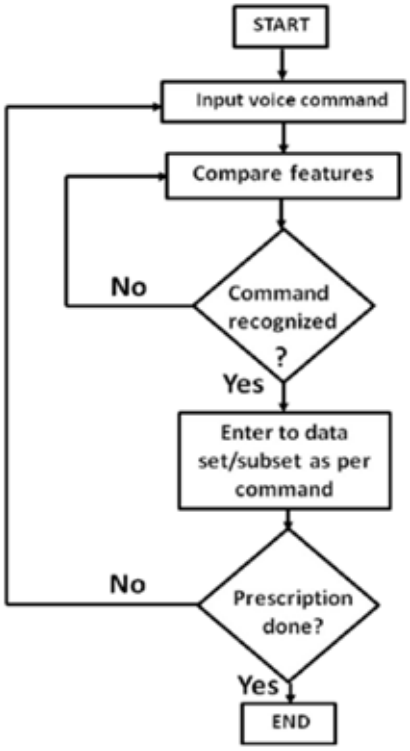


Fig. 1: Block Architecture

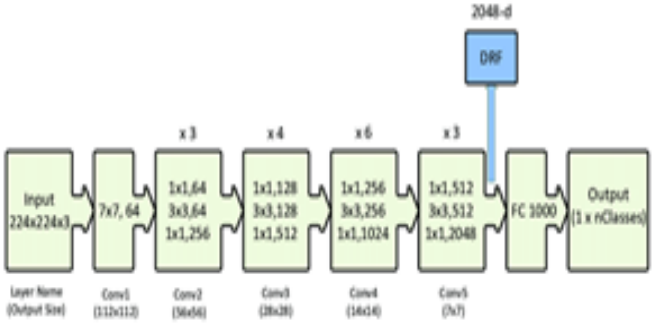
The block architecture for the proposed system is as shown in figure 1. It is mainly divided into three phases of implementation. First phase is generally known as the training phase. Second phase is testing and the third phase is implementation of fuzzy logic. Training phase is accomplished by implementation of feature extraction. Here voiced symptoms to be used are trained using MFCC technique (Atayero *et al.*, 2009; Jitendra Mahatpure *et al.*, 2019; Kory Kreimeyer *et al.*, 2017).

All the extracted features are stored in database for further use. In testing phase features are extracted for symptoms spoken by unknown users. Pattern the comparator is nothing but DTW. This block calculates minimum DTW path/score between unknown symptom and stored symptom by using their extracted features. Third phase consists of medical data for reference, and fuzzy decision logic.



System starts by taking voiced symptoms from the user. The MFCC features will be extracted for that input command. These features will be compared by DTW with MFCC features stored in the database. Once the input command is recognized its specific value is given to fuzzy decision logic. Depending on the recognized symptom

fuzzy enters the medical dataset. Thus final medicine prescription is done on simple voice Symptoms.



4. System Implementation

The prototype Voice E-Med was developed using python language and pandas library for data processing, Wkhtmltopdf for html to pdf file conversion, Tkinter for User Interface (UI), Tensor Flow as middle-ware, smtplib for sending email to the patient. The choice for these tools is because of their advantage as free software and efficient to use. Its main features include: Doctor gives voice command to his system for mentioning patient name, age, symptoms, and medicine. The voice is converted to text and then to pdf files which is then sent to patients email id.

5. Advantages of Proposed Solution

- Time and energy are saved using this system as writing a prescription on paper takes much time than speaking.
- Trees are also saved using this system as no paper will be used by introducing a digital prescription.
- This system also provides security as prescriptions will be directly send to patient's email address.
- Problem of handwriting is solved.
- Errors are decreased.
- Pharmacy workflow is improved.

6. Conclusion and Future Scope/Work

This implemented project will improve the communication between a doctor and a patient. Here, the problem of not understanding the handwriting is solved. A Doctor can access this framework from any desktop. Developers are also planning to integrate payment gateway so that cashless payment can be done. This voice based prescription application is a small step in digitizing the eco system for patients. The developers plan to test this application in nearby hospitals and analyze its after effects on health care system. The developers are also planning to add some other features like booking appointment with a doctor and getting prescriptions on phone call itself.

Reference

1. Sokol, D.K and Hettige, S.(2006). Poor handwriting remains a significant problem in medicine, J. R. Soc. Med., vol. 99, no. 12, pp. 645–646.
2. Bhatt, V., Li, L and Maharjan, B. (2021). "DocPal: A Voice-based EHR Assistant for Health Practitioners," *2020 IEEE International Conference on E-health Networking, Application & Services (HEALTHCOM)*, pp. 1-6, doi: 10.1109/HEALTHCOM49281.2021.9399013.
3. Azeta, A. A., Ikhu-Omoregbe, N. A. Ayo, C.K and Atayero, A. A. (2008). "Development and Deployment of VoiceXML-Based Banking Applications", Journal of Computer Science & its Application, An International Journal of the Nigeria Computer Society (NCS), Vol. 15 No.1 June Edition, pp. 59-72.
4. Atayero, A. A., Ayo C. K. Ikhu-Omoregbe, N. A and Azeta, A. A. (2009). "Implementation of 'ASR4CRM': An Automated Speech-Enabled Customer Care Service System", IEEE Xplore. 2009. Eurocon 09 IEEE International Conference, Saint-Petersburg, Russia. May 18 – 23 2009. pp. 1712-1715.
5. Jitendra Mahatpure., Piyush Kumar Shukla and Mahesh Motwani (2019). "An Electronic Prescription System powered by Speech Recognition, Natural Language Processing and Blockchain Technology", International Journal Of Scientific & Technology Research, VOLUME 8, ISSUE 08, AUGUST 2019 ISSN 2277-8616 1454. www.ijstr.org.
6. Kory Kreimeyer., Matthew Foster, Abhishek Pandey, Nina Arya, Gwendolyn Halford, Sandra F Jones, Richard Forshee, Mark Walderhaug and Taxiarchis Botsis (2017). "Natural language processing systems for capturing and standardizing unstructured clinical information: A systematic review", Journal of Biomedical Informatics, Volume 73, Pages 14-29, ISSN 1532-0464.
7. Gladson Maria Britto , J and Suresh Kumar, S. (2014).'Speaker Change Detection- An Enhanced

Comparative Study Using Support Vector Machines' ,International Journal of Applied Engineering Research, ISSN: 0973-4562, 9(2), pp. 4438-4442.

8. Azeta A. A., Ayo, C. K., Atayero A. A. and Ikhu-Omoregbe N. A. (2009). A Case-Based Reasoning Approach for Speech- Enabled e-Learning System", 2nd IEEE International Conference on Adaptive Science & Technology (ICAST), Accra Ghana.
9. IRxClinics, (2021) "Digital Prescription Writing & Smart Pen/iRx ClinicsDigitally Yours/Digitized patient record." [Online]. Available:https://www.irxclinics.com/. [Accessed: 02-Oct-2021.
10. "E PRESCRIPTION/e prescription software/e prescription India/e prescription benefits." [Online]. Available:http://www.igrandee.com/jsp/domain/health/product/eprescription.jsp.[Accessed: 02-Oct-2021.
11. "Prescription Pad/Prescription Writing Medical Software for Doctors."[Online]. Available: http://www.prescriptionpad.in/index.aspx.[Accessed : 02-Oct-2021]
12. "SlashDr Your own virtual physician assistant." [Online]. Available:https://slashdr.com/.[Accessed 02-Oct-2021]

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