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# Medical Report Creation from Audio Using Cloud Services

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**ABSTRACT:** Many new technologies have been introduced and those technologies reached many heights. Such innovation saves time for humans, but there are only few technologies that reduces the risk in travelling with health issues. If a patient with health issue needs to consult a physician or a doctor he/she needs to travel to the hospital. In the times of pandemic when the communicable disease can transfer easily, such travels and human contacts needs to be avoided. To give comfort in medications to the humans without the risk of exposure to the pan demic diseases the best solution is to use the technologies that are already in hand. A Mobile Application that gives a medical report from the audio recorded by the patient will be useful. Such reports can be transferred to the physician and based on the severity he/she can reach the hospital for the doctor consultation. The major transfer of the medical reports is done by papers which should be reduced. If the recordings can be converted into medical report there is no need for paper works and the risk of human contacts will be reduced. Such report will be generated by this system.

**KEYWORDS:** Medical Report, Automatic Speech Recognition (ASR), AWS Medical Transcribe, AWS Medical Comprehend etc.

## I. INTRODUCTION

Mobile Many machine learning techniques are used in our day to day life in many fields like physics for simulations, Chemistry for prediction and in Mathematics for problem solving. But in the field of medicine the use of machine learning is very low. By making the use of machine learning and cloud services we produced a medical report creator.

The main aim of the application is to create a medical report from the audio that is recorded by the patient or even the recording of conversation between the doctor and the patient, this report can also be used for the person who met with an accident. However the application creates a medical report the patient needs to consult the doctor based on the severity of the patient's condition.

In the 1980s, Haitians were singled out as a high-risk group of human immunodeficiency virus transmission, which prompted strict migrant control. The severe acute respiratory syndrome outbreak in 2003, H1N1 influenza (swine flu) outbreak in 2009, Ebola fever outbreak in 2014, Zika virus outbreak recorded in Brazil in 2015 and in Covid-19 virus outbreak in 2020 became matters of global concern within a very short period of time. The Covid-19 outbreak is a major concern even in the year of 2021.

Many healthcare system transfers a medical report by papers which may give way for communicable diseases, this system reduces the risk of contacting the communicable disease. The application didn't give or suggest any kind of treatments for any diseases it gives a medical report that classifies your audio to text file under few categories for reducing the risk of getting human to human transfer of communicable disease which will be discussed on the further topics.

## II. LITERATURE SURVEY

Literature survey is the most important step in the software development process. Before developing the tool it is necessary to determine the time factor, economy and company strength. Once the programmers start building the tool the programmers need a lot of external support.

The major decision is the product as mobile application or a web application. As it will be handy as a mobile application it will be start of the project. The Cloud platform that is needed to be used for the development will be the second decision. For example Google Cloud Services provide products that convert audio into text and for mining the text we can train the model based on domains, but Amazon Web Services - AWS provides a product that converts medical speech to text which uses a medical domain specific trained model.

Using AWS reduces the time and cost of training the ASR model on our own. As an advantage AWS also provide an option to train the Model by giving the data set to them. AWS also provides the necessary computing environment, including CPUs, storage, memory (RAM), networking, and operating system, and it is an example of “infrastructure as a service” (IaaS).

Using AWS reduces the time and cost of training the ASR model on our own. As an advantage AWS also provide an option to train the Model by giving the data set to them. Now the AWS service that this product use comes under the category of “Function as a Service” (FaaS).

The specific functions AWS Medical Transcribe and AWS Medical Comprehend is used in the proposed system. AWS also provides the necessary computing environment, including CPUs, storage, memory (RAM), networking, and operating system, and it is an example of “infrastructure as a service” (IaaS). The S3 bucket and DynamoDB used in the proposed system comes under the Infrastructure as a service (IaaS).

## III. AMAZON WEB SERVICES

AWS provides the necessary computing environment, including CPUs, storage, memory (RAM), networking, and operating system, and is an example of “infrastructure as a service” (IaaS). Amazon Transcribe is a product which converts audio to text by using Automatic Speech Recognition (ASR). Amazon Transcribe Medical is a development on two Amazon’s products, Amazon Transcribe which is launched in 2017 as an automatic speech recognition service and Amazon Medical Comprehend. The Medical Comprehend allows developers to identify medically relevant information, including diagnoses, symptoms, treatments, etc. from an unstructured medical text. Amazon Medical Comprehend will extract the required details from the input text file which uses Natural Language Processing for mining the required text from the unstructured text input. It classifies the text into personal details, medical conditions, anatomy, test and treatment and medications. These classifications are further classified based on the inputs The Amazon gives storage facilities like S3 buckets and DynamoDB. The S3 buckets can be used for the storage of any type of files which can be referenced using their object id. The DynamoDB is a relational database structure. The pricing for using these resources are based on our usage so there is no cost barrier.

## IV. SYSTEM ARCHITECTURE

The system has only three major modules as cloud module, the Mobile module and the mobile storage.

1. The cloud module includes the Amazon S3 bucket, Amazon medical transcribe, Amazon medical comprehend, Amazon lambda and Dynamo DB.
2. The Mobile module involves the user interface for recording and viewing the Medical Report.
3. The Mobile storage includes the text and the audio files.

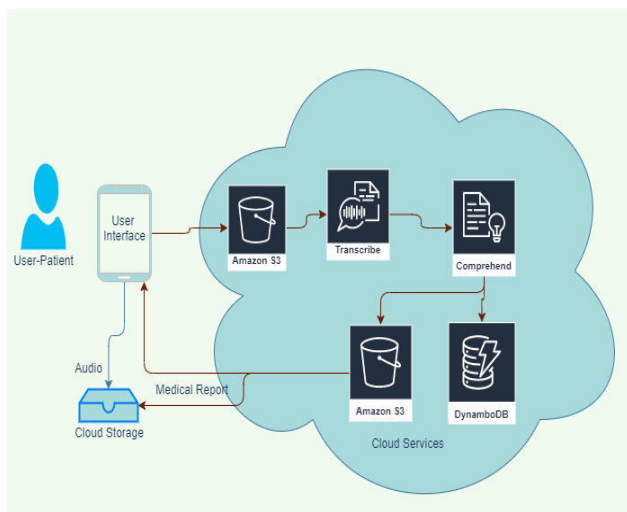


Fig.1 System Architecture

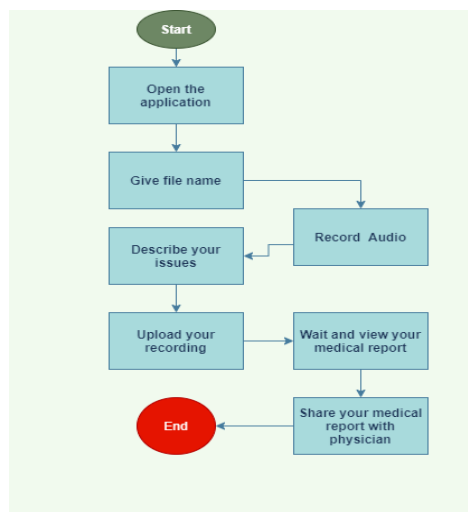


Fig.2 Work Flow

**Cloud Module:**

Amazon S3- The storage system provide by the Amazon cloud services which needs to be configured for accepting recording from the android application. There will be three buckets.

1. First bucket for accepting audio with .wav extension.
2. Second bucket for .json file storage.
3. Third and last bucket for storing text file.

Amazon Medical Transcribe- The audio to text conversion will be done by this product which is provided the AWS cloud services.

Amazon medical comprehend- This deep-learning natural language processing (NLP) service Amazon Comprehend Medical has many use cases in healthcare, but of primary interest is its ability to take unstructured data from applications including electronic medical records, and correlate sensitive data such as PHI/PII into meaningful insights.

Amazon lambda- AWS Lambda is a server less service that runs your code in response to events and automatically manages the underlying compute resources for you. AWS Lambda can automatically run code in response to multiple events, such as HTTP requests via Amazon API Gateway, modifications to objects in Amazon S3 buckets, table updates in Amazon DynamoDB. This act as connectivity between the Amazon transcribe and Amazon comprehend and it programmatically access the modules inside the AWS cloud.

Dynamo DB- It is a storage for all the outputs which stores the extracted details from the input audio.

**Mobile Module:**

This module includes a record, pause and also has upload options, along with the user input for giving file name.

This module stores the recorded audio file and the created Medical report as a text file which can be shared to the doctor.

**USAGE FLOW**

The usage flow of the system will be very simple and understandable. The work flow starts from opening and giving the audio file name, ends with sharing the medical report to the medical consultant as shown in figure 2.

The patient needs to open the application and give the file name. The second step is to record the audio by describing his/her issues. After recording the audio the patient needs to upload the audio and wait for few seconds. After few seconds the medical report will be displayed on the application and the audio and the text file will be in the mobile’s local storage which can be used for sharing.

**IV. ALGORITHMS**

The machine learning algorithms used in this system are Automatic Speech Recognition by Amazon Medical Transcribe and HIPAA - eligible Natural Language Processing.

Automatic Speech Recognition (ASR) is a deep learning process used by AWS Medical Transcribe. The deep learning model (Figure 3) is trained by the Amazon Web Services and it can also be custom trained by the developer.

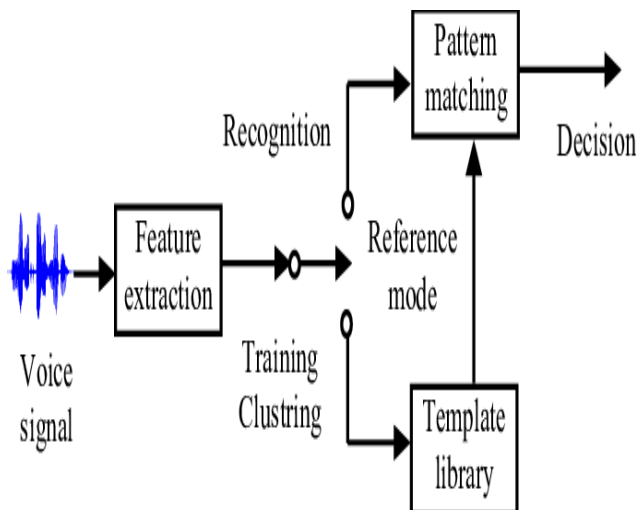


Fig 3 Basic Structure of ASR

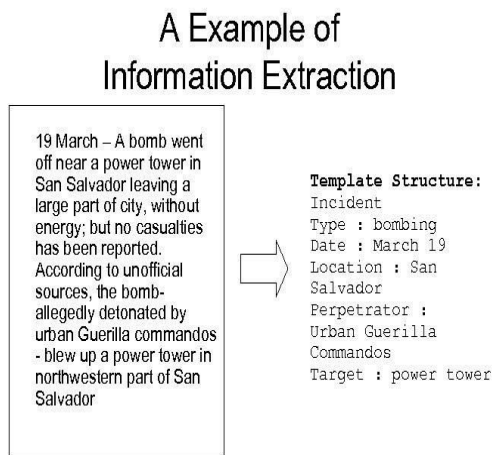


Fig 4 Information Extraction

HIPAA – eligible Natural Language Processing uses Machine Learning to extract the health data from medical text. HIPAA means Health Insurance Portability and Accountability Act of 1996, which is applicable in United States. Other countries have equivalent Acts and the Comprehend will be applicable to the equivalent acts of the specific countries.

Natural language has many internal fields for sentiment analysis, classification and information extraction. In this project the system will be using the Information extraction which extracts the required information from the text sample. The figure 4 shows the sample text and the information extracted from the sample text.

For the custom training the developer needs to Amazon have Custom Language Models which will allow the developers to submit a corpus of text data to train custom language models that target domain-specific use cases.

Hence the domain specific training can be given based on the patient’s medical history.

#### IV. RESULTS

The front end of the system has an option to give the file name and also options for start and pause recording.

#### Landing Page:

The landing page of the application contains the recording and uploading options and the bottom space of the page is for viewing the Medical report. The figure 5 shows the landing page.

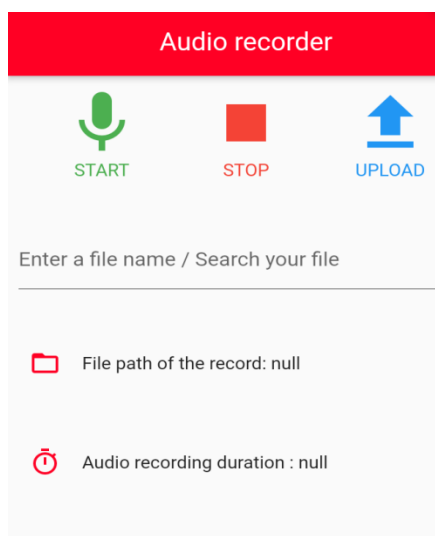


Fig 5 Landing Page

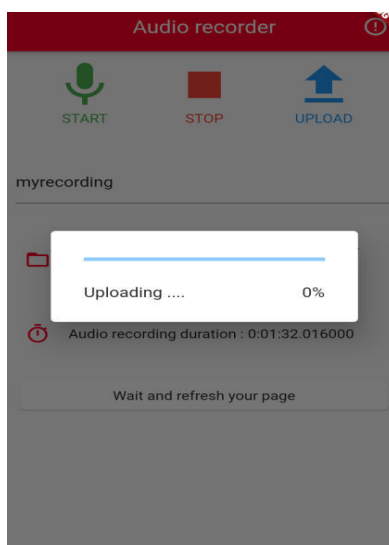


Fig 6 Record and Upload

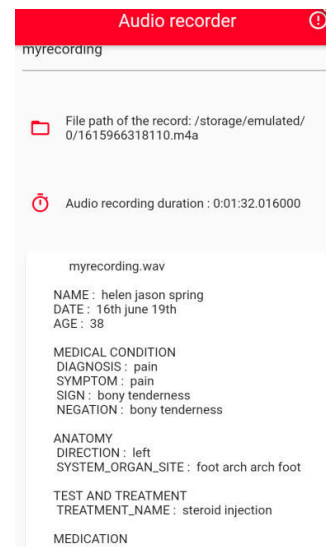


Fig.7 Output

**Record and Upload:**

The recording can be started only after giving the name of the file by touching the start option and then the audio can be uploaded which is shown in the figure 6.

**Output:**

The result will be shown at the bottom of the landing page which is shown in the figure 7. The text file location will also be shared at the landing page as soon as the text file is created. As seen the audio file is converted into the Medical report which contains Name, Date, Medical Condition, Diagnosis, Anatomy, Test and Treatment and Medication fields. Few fields may don't have any fields because the required details may not present in the audio input.

**V. CONCLUSION AND FUTURE WORK**

The conversation between the doctor and the patient can also be used for creation of the creation of Medical report. This can also be used in the hospitals for creating the medical records and it can also be used in ambulance service for sending the report and keeping the equipments and the medical teams ready for receiving the patient from the ambulance. The application can also be used for the analyzing the history of the patient, to keep records and digitalized cloud data storages.

Machine learning is evolving in all the field of science and mathematics, but it is a step behind in the medical field hence the improvement and usage of the Natural Language Processing will enhance the medical field. The proposed solution will provide a way for the enhancement for the human beings and it saves time and health in the times of pandemic. It will reduce the risk of getting communicable diseases. .

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