An Open Access Journal

# **AI Assisted Tele-Medicine KIOSK**

Associate Professor Dr Nandini S, Anusha k, Chethana D P, Ganasudha G K, Lavanya T

Department of ISE,

S J C Institute of Technology Chickballapur, Bangalore

Abstract- The growing prevalence of chronic diseases has resulted in a heightened need for primary healthcare services in numerous industrialized nations. Modern healthcare technology tools have the potential to address the shortage of primary care providers. In this study we discuss the creation and implementation of an automated healthcare kiosk in a primary care setting for managing patients with stable chronic conditions. One hundred individuals with stable chronic illnesses were enlisted from a primary care clinic and utilized the kiosk instead of traditional doctor appointments for two consecutive follow-up visits. Both patients and physicians expressed contentment with the usage of the kiosk with positive feedback in all areas. However the independent utilization of the kiosk was dependent on the patient's proficiency in language and level of education. The use of healthcare kiosks presents an alternative approach to managing stable chronic diseases potentially replacing the need for physician consultations and enhancing access to primary healthcare. Patients including those with limited literacy and education welcomed the use of these innovative healthcare technology tools. Prior to implementing kiosk-based technology in healthcare settings certain factors such as environment and patient needs should be optimized. Despite recent advancements in healthcare providing adequate medical services in rural India remains a persistent challenge that requires innovative solutions. To bridge this gap an Alassisted telemedicine robotic kiosk can be set up in any village providing easy access to expert doctors based on the individual's medical condition. Users can authenticate their identity through a biometric scanner followed by a consultation with a robot that inquires about their illness. The individual is then directed to an expert doctor via an e-sanjeevani app. Following the consultation necessary medication and services can be provided through a local Asha worker without any delay.

Keywords- Chatbot, Symptoms, DNN model, Doctor Consultation and Prescription

## **I. INTRODUCTION**

The utilization of mobile phones in healthcare has been gaining momentum in recent years. As mobile networks reach even the most remote regions in India these devices are proving to be crucial for improving communication between doctors and patients. The advancements in mobile technology have greatly enhanced the capabilities of handheld

devices smartphones and PDAs. As a result, these gadgets have started to replace traditional PCbased alternatives effectively addressing the need for mobility in the medical field. This has opened up opportunities for developing innovative mobile applications in developing nations potentially revolutionizing the way healthcare services are delivered and tackling the issues that have long plagued the healthcare systems.

© 2024 Dr Nandini S. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly credited.

Dr Nandini S. International Journal of Science, Engineering and Technology, 2024, 12:3

In the past few decades, there has been an increasing recognition of limitations of the public healthcare system in India and possible role of private sector in overcoming these limitations to a create more equitable and efficient healthcare system that fits within limited public resources. Private sector has already been predominant healthcare provider, especially in rural India covering more than 75% share of services provided in some areas. Analysis of healthcare financing and delivery in India, has prompted a greater role of the private sector in achieving national healthcare objectives.

However, the concentration of private sector in larger town and cities and its reluctance to penetrate deeper has been an area for concern. To geographical disparities, overcome The Government of India has proactively been promoting telemedicine and use of ICT. In the last few years many models of healthcare delivery using tele- medicine kiosks and mobile vans supported by satellite connectivity have evolved, where publicprivate partnership plays a dominant role. Some pilot projects have successfully demonstrated that ICT can facilitate basic healthcare services in remote rural areas.

## **II. METHODOLOGY**

Our innovative approach utilizes the conversational structure of ATMK and integrates the DNN algorithm and versatile neural embedding techniques to address a multitude of tasks. We leverage cosine similarity to evaluate the current state against a range of potential action states in our proposed system.

To generate feature matrices we opted for the Bagof-Words (BOW) approach in representing the user's message. These matrices then undergo an embedding process where embedding's are produced by dedicated dense layers for both user input and system actions. The present user input combined with the previous network output is then introduced to the recurrent model to compute attention. Since the upcoming inputs are not yet known the use of an interpolation gate is deemed

unnecessary. Subsequently, the recurrent network receives the combined output from the embedding layer and the attention mechanism which is then fed into another embedding layer to further manipulate the data.

The output of this layer together with the vector of system generated response is used as the final state embedding for dialogue generation.



Fig 1: System Architecture

#### 1. TF-IDF

TF-IDF is useful in solving the major drawbacks of Bag of Words by introducing an important concept called inverse document frequency.

The machine maintains a tally of the score by assessing the words utilized in a sentence and gauging their frequency within the entire text. In simpler terms, it is a numerical value assigned to emphasize the significance of each word in the entire document.

A specific percentage of the marks from each of these categories go toward some of the COs. IA (30%) and EA (70%), two metrics used to evaluate student performance in the Computer Networking (CNE) course, are used.

#### It's calculated as -

IDF =Log [(# Number of documents) / (Number of documents containing the word)] and

TF = (Number of repetitions of word in a document) / (# of words in a document).

The process to find meaning of documents using TF-IDF is very similar to Bag of words,

Clean data / Preprocessing -Clean data (standardize data), Normalize data (all lower case), and lemmatize data (all words to root words).

Tokenize words with frequency. Find TF for words.

Dr Nandini S. International Journal of Science, Engineering and Technology, 2024, 12:3

Find IDF for words. Vectorize vocab.

#### 2. DNN

The structure of DNN is comprised of stacked layers consisting of nodes and edges. This intricate network typically contains a minimum of two or more layers encompassing input-output and at least one intermediary layer known as the hidden layer.

A compact neural network implies that the layers are entirely interconnected with neurons. Each neuron within a layer obtains input signals from every neuron in the preceding layer indicating a dense interconnection between them. As the number of layers increases the depth of the network grows proportionately. Densely linked layers generate new knowledge by combining features from previous layers. Some key functions of this complex system include medical image analysis diagnostic assistance personalized medicine and natural language processing.

## **III. IMPLEMENTATION**

#### **1. Building Chatbot**

The virtual assistant will inquire about the user's health concerns and symptoms they are experiencing. This approach aims to bring a sense of satisfaction to the user by addressing their most troublesome issues. It operates akin to a form of positive reinforcement motivating the user to keep striving towards self-improvement. Our team is constructing a chat interface utilizing the Python Flask platform.

#### 2. Collecting Datasets

The current data set utilized in the fine-tuning process of the Dialo GPT model is composed of information obtained through web scraping of conversations from Counsel Chat. This compilation includes inquiries relating to various conditions or troubles that individuals may be seeking help for. Each inquiry is accompanied by a label specifying the topic it pertains to. Furthermore, each question has been answered by several certified therapists providing a diverse range of responses for the chatbot to draw from. However, the Dialo GPT

model was originally trained on a conversational data set which does not contain multiple threads of conversation. As a result, the context for each response may be limited. To address this issue the production of columns for question type question content illness category and answer would enable the generation of appropriate context when finetuning the text generation for responses.

#### **3. Topic Extraction**

The initial three categories encompassed fundamental details that needed to be completed regarding the person while the final category was designated as a free-form text box.

The inquiry prompt stated: "Kindly indicate any origins of physical manifestations people may experience in their health status during their lifetime." This question was deliberately constructed to identify a specific ailment based on its symptoms. Through this process, the automated system will suggest appropriate medication according to the predicted illness.

#### 4. Building DNN

The chosen model for training the chatbot is the Transformer architecture which operates entirely on the concept of Self-Attention. It has been preferred the Recurrent Neural Network over and Convolutional Neural Network due to its ability to produce higher quality results. Compared to RNNs which process input sequentially from left to right this model can handle the entire input at once. Another factor in selecting this architecture is that recurrent layers require sequential operations making them more complex. On the other hand Self-Attention mechanisms are efficient and effective.

In the Transformer the attention mechanism is viewed as a means of measuring the relevance of a set of information (values) based on given keys and queries. The resulting output is calculated as a weighted sum of the values with each weight being determined by a compatibility function between the query and corresponding key. In essence the attention function maps a query and a set of keyvalue pairs to a final output. Dr Nandini S. International Journal of Science, Engineering and Technology, 2024, 12:3

### Design Activity Diagram



## **IV. CONCLUSION**

The implementation of the Automated AI-Powered Health Station has the potential to spark a transformation within the medical field. Inadequate access to medical facilities and healthcare professionals often results in individuals not receiving timely medical care. This advanced technology allows patients with chronic illnesses such as cancer to receive routine check-ups without having to travel long distances. Additionally, the shortage of doctors can be addressed by utilizing this application. The AI-assisted system even aids in suggesting appropriate medication based on an individual's symptoms further improving the overall healthcare experience.

## REFERENCES

 Xipei Ren; Gabriele Spina; Simon De Vries; Annick Bijkerk; Babs Faber; Anna Geraedts ," Understanding Physician's Experience With Conversational Interfaces During Occupational Health Consultation ", Published in: IEEE Access2020 (Volume: 8).

- Marco Polignano; Fedelucio Narducci; Andrea Iovine; Cataldo Musto, "HealthAssistantBot: A Personal Health Assistant for the Italian Language", on 2020 Published in: IEEE Access2020 (Volume: 8).
- 3. Manyu Dhyani, Rajiv Kumar G. L. Bajai, " An intelligent Chatbot using deep learning with Bidirectional RNN and attention model," 2020 Selection and peer-review under responsibility of the scientific committee of the 3rd International Conference on Science and Engineering of Materials.
- 4. Rhio Sutoyoa, Andry Chowandaa,, Agnes Rini Wongsoa.: Designing Kurniatia, an Emotionally Realistic Chatbot Framework to Enhance Its Believability with AIML and Information States. 4th International Conference on Computer Science and **Computational Intelligence 2019**
- Achtaich Khadijaa, Fagroud Fatima Zahraa, Achtaich Naceur: Al-Powered Health Chatbots: Toward a general architecture. The 2nd International Workshop on Artificial Intelligence & Internet of Things (A2IOT) August 9-12, 2021, Leuven, Belgium.