

A Survey on Healthcare Assistant using Machine Learning and NLP Models

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ABSTRACT

The Healthcare conveyance framework is cost-restrictive, inefficient, and unsustainable in the current situation. Supporting this, Machine Learning (ML) has changed the manner in which associations and people use the information to improve the proficiency of a framework. AI calculations permit planners to manage an assortment of organized, unstructured, and semi-organized information. In this survey, various applications of Machine Learning and Natural Language Processing to ease the functionality of the health-care system was included. With the increase in workforce shortages and discontent in healthcare services, there is a need to provide assistant to professionals and normal people to ease the facilities and services on time, cost-effective, and efficiently at the local level. Artificial Intelligence is used to predict diseases based on a list of symptoms and provide treatment available. This will minimize the gap between service providers and localists.

Keywords: Natural Language Processing, Machine Learning, Health Assistant, Artificial Intelligence.

I. INTRODUCTION

Advances in current innovations have caused a move towards computerized well-being in medical services, where clinical and authoritative exercises can be helped by Machine Learning algorithms and Natural Language Processing Models to provide healthcare services at ease. This requires efficient utilization of accurate medical records for analysis. An automatized Healthcare assistant chatbot system is a framework with human communication utilizing normal language analysis to give the basic medical guide to save time and money.

Technical devices need a stage where they can comprehend the essential language of people and

decipher it in a reasonable structure. Assuming a sound clip of an individual or individuals talking, determine the textual representation of the speech. This is something, contrary to text to discourse and is one of the amazingly troublesome issues informally named AI-complete. In normal discourse, there are not really any stops between progressive words, and thus speech segmentation is a necessary subtask of speech recognition. These models are used to interact with users to provide healthcare and medical guidelines.

It has been discovered that the expense of getting a regular checkup from medical professionals, for an hour is expanded. Individuals don't discover time to look after their health. For clients with such a

bustling timetable, the healthcare bot gives major help. Medical services towards this path will convey incredible advantages to society, acquiring material upgrades normal life expectancies, and personal satisfaction. This will welcome on advanced development of the wellbeing area, described by the capacity to rapidly diagnose, identify emergency clinics and the professionals that are best prepared to treat the condition. Machine learning (ML), an important application of artificial intelligence (AI) that focuses on the advancement of computer programs that can access data and use it to train for themselves. The use of machine learning algorithms will produce prediction and recommendation based desired output for a particular system. The objective of Machine Learning in healthcare is very perplexing and requesting. Finding exact therapy alternatives for an individual dependent on their own medical history, lifestyle routines, hereditary information, and persistently changing neurotic tests. Normally, we have to bring the most remarkable AI procedures — profound Machine Learning algorithms, AI-driven inquiry calculations/recommendation's fortification learning, probabilistic graphical models, semi-directed learning to handle the issues.

II. LITERATURE REVIEW

The zone of Computer Science that centers around creating advances to improve wellbeing, prosperity, and medical care is generally known as eHealth. E-Health can be defined as a way to interact with patients using technology. The aim is to assist the patients by lessening the complexity of their most basic tasks in the health domain, so as to add to the public medical services framework in a roundabout way. The Systems surveyed are described underneath.

Divya Madhu et al. (2017) [1] proposed a system for predicting the disease based on symptom analysis and

provides output in form of available treatment. The approach included Medical Assistance using a trained chatbot.

The chatbot is built on different terms such as machine translation, virtual agent, dialogue system, and Chatterbot. The system also contained Medical details so as to deliver the desired information to the user whenever required. The proposed model is a simple and real-time chat system that works in cross-platform devices and is easily integrated and upgradable. The medicine dosage recommended is based on age and weight provided by the user.

Amruta Kulkarni et al. (2017) [2] elaborates on the prediction of diabetes and displays the use of an android device as a front end to store the collected data in cloud. The data stored in the cloud is used for accurate prediction of diabetes. The system relies on stored health parameters collected using heart sensors, glucose meter, etc. The service of the system is accessed using utilities of an android device such as a speaker, microphone, etc. The major algorithms used in prediction were Random Forest Algorithm and Logistic Regression. The predictive model analyses diabetes using stored data and predicts output with an accuracy of 80.01%. The design of the system satisfactorily eases its use for especially older patients.

Sushree Satapathy et al. (2018) [4] proposed a Geographic Information System (GIS) based system that aims at providing information about nearest healthcare centers, helpline number in emergencies, prior first-aid knowledge, and availability of transport for a medical emergency by using technologies like machine learning and Geographic Information System (GIS). The main focus was to reduce the response time during medical emergencies and save lives by providing a platform for collaboration with caregivers like Clinics, Blood bank, Ambulance Services, etc. The prominent technologies used in the

system are Mapbox GL JS to manipulate spatial data and NodeJS to develop the back end along with the PostgreSQL database. The proposed system comprises three modules for three different stakeholders namely, User, Hospital, and Ambulance. Due to the presence of various stakeholders, all the essential medical emergency data is provided in a single application for easy usage.

Muhammad Azeem Sarwar et al. (2018) [3] discusses the predictive analytics in healthcare by using six different machine learning algorithms on a specified dataset. The research also include comparison of algorithms in terms of accuracy and performance. The main goal of analysis is to ease the prediction of diabetes for doctors and practitioners using Machine learning techniques. Among various algorithms like SVM, KNN, LR, DT, RF, and NB, SVM and KNN gives highest accuracy for predicting the Indian dataset consisting 768 records. The both algorithms provide 77% accuracy in comparison with other techniques.

NaliniPriya G et al. (2019) [5] presents a smart personal health care assistant that tracks one's activities, moods and suggests precautions actions accordingly. The system makes use of personal assistance chatbot to manage and revert the messages from the users by using machine learning techniques. The user can track their own lifestyle through the use of a system which will lead to a healthier life. The system comprises a wearable device containing sensors along with the mobile phone, connected via Bluetooth. This helps to keep a measure of body temperature, heart-beat rate, body movement, and breathe rate. The sensors embedded in the wearable devices sense the temperature and other parameters of a person and send the data to the control center. The system has the ability to capture the user's voice message to revert it by matching the input with the database used. The system deals with Analog as well

as Discrete data. The system is based on Logistic regression to provide an accuracy of 0.96 more than other machine learning algorithms.

Moshuir Rahman et al. (2019) [6] demonstrates the implementation of Healthcare chatbot in the Bangla language. The system makes use of Machine Learning algorithms and customized Bangla datasets. The demonstration includes the use of six various supervised Machine Learning algorithms, concluding SVM for best performance. The system collects the user's basic details in the preferred language in textual form, where the Name Entity Recognition algorithm is used to extract the name from the input provided by the user.

The later phase consists of two basic commands mainly, Disease classification command and General command. The Disease classification command collects symptoms from the user and generates appropriate results based on training and testing dataset. Whereas in General command the user is provided with the information related to questions asked regarding health issues and its classification. The accuracy of the system is maintained by the use of the SVM algorithm.

Prakhar Srivastava et al. (2020) [7] uses AIML (Artificial Intelligence Mark-up Language) to withdraw the patterns of messages. The symptoms extracted from the pattern snippets of the messages from the user's conversation are matched with the database and further sent to the bot engine for prediction and diagnosis. Algorithms like K-nearest neighbor (KNN) and SVM hold good command over complex classification tasks to split the data in training and testing sets, so as to accurately classify the disease and pass on the suggestions. The bot makes use of a closed-source, external recognition engine to revive the functionality of diagnosis.

Zhibin Liao, Qi Wu et al. (2020) [8] proposed a Medical Data Enquiry system using a Question Answering model based on Natural Language Processing. The QA system was developed in PyTorch. The system built is for health professionals which are based on SQuAD models and BERT. The system was fine-tuned using a dataset for 100 epochs, also the Bilinear similarity model is trained with the Adam optimizer by reducing the learning rate after epochs. The system was trained initially by 75 real questions and 455 back-translated questions with a retrieval accuracy of 78%.

Marco Polignano, Fedelucio Narducci et al. (2020) [9] presents a system containing HealthAssistantBot (HAB) along with different modules. Initially, the user can create a profile, and the system identifies the condition of the user by System Checker (SC). These symptoms are analyzed and passed on to Recommender System (RS) where Machine learning algorithms are used to provide the outcome. The Virtual assistant processes the user's input using Natural Language Processing models. To implement this intuitive process, the team designed the assistant as a Conversational Agent (CA) to interact with users in natural language. The CA comprises of Intent Recognition (IR) and Entity recognition (EI). The classification of disease in the Recommender system module is implemented using manual clustering of the dataset. The system gained a success ratio of 76.271% on real use cases.

Lekha Athota et al. (2020) [9] proposed the system based on Artificial Intelligence that diagnose the disease and display basic details about the disease before taking professional medical consult. The system is basically a chatbot that stores the database to recognise the question and makes query decision to answer the question. Ranking and question similarity

calculation is estimated using n-gram, TF-IDF and cosine similarity.

III.CONCLUSION

This paper represents an analysis of the existing use of Machine Learning algorithms and Natural Language Processing models to decrease the time lapse between the health service and end-user to perfect the medical profession. Customized chatbot assistants, to provide medical care represents few difficulties, as the precision of result and implementation of efficient algorithms could ease the gap between doctors and patients today. By analyzing the above algorithms, the use of efficient algorithms like KNN, SVM, and Decision Tree achieves precision. This approach understands the need of a patient (user) before the need of the organization, to provide health care efficiently and on time. The accuracy is increased by making use of an appropriate dataset, and training the dataset to yield the precise result and prediction. According to the survey, efficient algorithms and accurate datasets lead the system to a safe and successful health-care assistance system.

IV. REFERENCES

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