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Healthcare Consultation and Symptom Response Chatbot Powered by Medical NLP Dialogue Understanding

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Abstract: People can get information and services from chat- bots in a way that feels like talking to someone. Medical care is very important to everyone. It can be hard to go see a doctor for everything that is wrong with us. We want to make a healthcare chatbot that uses intelligence and can give people some basic information about what might be wrong with them before they go see a doctor. The chatbot uses a kind of technology called Natural Language Processing. This technology helps the chatbot understand what people are saying in their words. This makes it easy for people to talk to the chatbot and get help. The chatbot can look at what symptoms a person's experiencing and suggest some possible treatments, for medical issues. People need help with care and that is what the healthcare chatbot is, for. The healthcare chatbot is a tool that helps people get the care they need. It looks at the symptoms to figure out if the problem's serious or not. The user should still go see a doctor. If the healthcare chatbot says the problem is not serious the user can take care of it themselves. If the healthcare chatbot says the illness is serious the user should go see a doctor because the healthcare chatbot is not a doctor. Our system looks at the symptoms of the case to help the user pick the medicine and things to prevent the illness. The Python package Natural Language Toolkit does a job of understanding English language that is written in code. It looks at what the user says and gives answers that sound like they are, from a person. The Natural Language Toolkit is used for Natural Language Processing. It helps the chatbot understand what the user is saying and gives answers. The chatbot uses Natural Language Toolkit to make sure the user gets an answer.

I. INTRODUCTION

Digital tools have really become very popular in healthcare. Digital tools are doing a job of letting people get medical advice sooner and making the whole patient experience a lot smoother. Lots of people these days check online for health information before they even think about going to the doctor or hospital. Digital tools are making this process easier for everyone. To make things easier we are building systems that offer medical advice from digital tools and this medical advice from digital tools is accessible, to everyone. There is a healthcare chatbot. It uses Natural Language Processing to understand what people say. This healthcare chatbot helps people explain how they are feeling using language that we use every day. This healthcare chatbot is not, like the healthcare chatbots. The healthcare chatbot really understands what people are trying to say. So the healthcare chatbot gives answers that're clear and helpful. This chatbot uses NLP to understand what you are saying. It can figure out your symptoms. Understand big medical words. Then it connects all this information to what doctors know.

The chatbot can tell you what health issues you might have. It can also give you some advice on how to take care of yourself. Medical NLP helps the chatbot tell you if you should go see a doctor [4]. Medical NLP is useful because it helps people make choices for their health. The chatbot uses NLP to give you helpful information, about your health. This way people can take care of their health with the help of medical NLP and the chatbot.

Our healthcare systems have problems in many places. We do not have doctors. People have to wait a long time to see a doctor. Basic care is not available to everyone. Many people go to the hospital for things. They need a help with these things. Chatbots are very helpful. They give people help when they need it. Chatbots also point patients in the direction. This makes things easier, for healthcare systems and patients. Our healthcare systems and patients really benefit from chatbots.

Back in the day the first healthcare chatbots were not very good at understanding people. They just followed rules. Had a hard time figuring out what you meant if you said something in a complicated way. For example if you described

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your symptoms differently they would get confused. Now we have models like BERT [1] and MedBERT [2] that are really helping healthcare chatbots. These models are very good at understanding what you are trying to say. This is a deal because now healthcare chatbots can give you more accurate information about your health. Healthcare chatbots are getting better and better at talking to people. Healthcare chatbots are also more useful now because they can provide you with information when you need it. Healthcare chatbots are really. That is good news, for everyone who uses healthcare chatbots. This project is about creating a healthcare chatbot. The healthcare chatbot is supposed to help people who have questions and give them tips on how to stay healthy. The healthcare chatbot is really useful, for checking if you have any symptoms and understanding what is going on with our health. The healthcare chatbot can also tell you when you should go see a doctor. The healthcare chatbot is not meant to take the place of a doctor when you really need care. We should still go see a doctor when the healthcare chatbot tells you to because the healthcare chatbot is a tool to help you, not a real doctor.

The main things that this study wants to do are these:

1) The main goal is to create a healthcare chatbot that can figure out what is wrong with people when they tell it their symptoms. This chatbot will use Natural Language Processing to understand what the users are saying. The idea is to make the healthcare chatbot really good, at knowing what people mean when they describe their symptoms using Natural Language Processing.
2) So we want to make sure that the system can understand what people are saying about their symptoms. This way the system can give them the information, about their health that makes sense for their situation. The system should be able to understand conversations and give people relevant health information.
3) To provide preliminary health guidance by mapping symptoms to possible conditions while clearly avoiding diagnosis or treatment claims.
4) To improve accessibility to healthcare information, especially for users seeking immediate, basic medical consultation support.
5) To evaluate the chatbot's performance in terms of response accuracy, relevance, and user satisfaction.
6) To ensure safe, ethical, and user-friendly interaction, particularly in handling sensitive health-related conversations.

II. LITERATURE SURVEY

The growth of Artificial Intelligence and Natural Language Processing has made a difference in healthcare. This is especially true when it comes to helping patients get the medical help they need. Artificial Intelligence and Natural Language Processing have led to some changes. One of these changes is the creation of healthcare chatbots.

Healthcare chatbots can have conversations with users. They can understand the health issues that users are dealing with. Then they provide users with medical information. These systems are really helpful because they give people guidance. They help people figure out if they need to see a doctor or get medical care. Artificial Intelligence and Natural Language Processing are making healthcare more accessible, through these healthcare chatbots.

Healthcare chatbots were really bad when they first came out. They just followed some rules and gave set responses. These healthcare chatbots looked for words and that was it. This made it very hard for them to understand what people were trying to say. It was also tough for healthcare chatbots to figure out what was wrong with someone when they described their symptoms.

There were some programs like ELIZA that could have conversations with people. ELIZA was like a test to see if machines could talk to humans and it worked. These old programs like ELIZA were not good enough to be used for medical things. The problem, with healthcare chatbots was that they could not change how they worked based on the situation. Healthcare chatbots just did the thing over and over.

Natural Language Processing is really good now. We have chatbots that're very smart. These chatbots use ways to learn things. They can take a sentence. Break it down into individual words. They can also find terms and figure out what the user is looking for. This helps the chatbots know what people are trying to say.

Natural Language Processing and machine learning methods are used for this. They make it easy for people to have conversations, with chatbots. People can talk to chatbots. Get the information they need about their health. Natural Language Processing and machine learning methods are very important for this to work. They help make health information easier to access. Healthcare chatbots are really good at understanding what people are talking about because they use learning. This means they can figure out what is going on in a conversation. When these systems are

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trained with information they get better at knowing what symptoms mean and how they are connected to health problems.

Many tools that check symptoms work in the way they give you general advice but they do not tell you what is wrong with you like a doctor would. Healthcare chatbots are, like these tools they can help you. You still need to see a doctor for a real diagnosis.

1) **Limited Contextual and Dialogue Understanding** Healthcare chatbots usually have a problem. They can not handle talking to people for a time. This means they have trouble keeping track of what people say about their symptoms. Healthcare chatbots also have a time understanding what the user of the healthcare chatbot really wants. The healthcare chatbot needs to be able to talk to people for turns to really get what is going on with the user of the healthcare chatbot.

2) **Inadequate Handling of Natural Language Variability**
People have trouble talking to chatbots because they do not understand words. Sometimes people make spelling errors when they are typing. The way patients describe their symptoms can also be hard for chatbots to understand. Chatbots struggle with the way patients explain their symptoms.

3) **Over-Reliance on Static or Rule-Based Approaches** A lot of solutions rely on fixed rules. They use small datasets. This makes the solutions difficult to adapt to things or to scale up to handle more work. The solutions that use fixed rules or small datasets are just not very good, at changing or growing.

4) **Insufficient Safety and Ethical Mechanisms**
There are not good ways to find the really important symptoms in text and make sure that the right people see them. We need to be able to detect symptom text so that we can do something about it. Critical symptom text is very important. We have to make sure that it gets to the right people.

5) **Limited Evaluation of User-Centered Effectiveness** Focus on accuracy often comes at the expense of usability, trust, and user experience.

III. METHODOLOGY

A. Proposed System

The new healthcare chatbot system is really smart. It can figure out what people are saying to it. The healthcare chatbot uses computer programs that understand medical language and conversations. This helps the healthcare chatbot find out what symptoms people have and give them safe answers that make sense for their situation. The healthcare chatbot system is designed to give people information, about their health.

The new healthcare chatbot is a computer program that people can talk to by typing messages. When you type something to the healthcare chatbot it looks at what you said and tries to understand it. The healthcare chatbot uses a set of tools to figure out what you are saying, like finding the important words and phrases. It also keeps track of what you said so it can ask you more questions and get a better idea of what is going on with your health. This way the healthcare chatbot can see how your symptoms are changing and ask you to explain things that're not clear. The healthcare chatbot is, like a conversation partner that helps you talk about your health and get the information you need.

A medical knowledge base is something that assists people in determining what might be wrong with them when they are experiencing symptoms. It examines the symptoms that people are having. Then it attempts to find matches for these symptoms with health issues that people can have. After that it provides people with information that's simple to understand about their symptoms and possible health conditions.

The medical knowledge base does not tell people what is wrong with them or how to treat themselves when they are sick. The medical knowledge base just gives people advice on how to stay healthy and safe which's very important, for people. It also informs people when they should go see a doctor to get a diagnosis and treatment for their symptoms and possible health conditions. The system has safety features that look out for bad symptoms. If it sees something it will tell people to go get medical help right away. The medical knowledge base is there to help people with their health like a knowledge base.

The system also thinks about ethics. This means it makes sure that the privacy of the user is protected. The system also makes sure that the data is secure and that the information is communicated in a way. It has an interface that is easy to

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use. This means that anyone can use the system easily. The system checks its performance by looking at the user and the system. It checks how accurate the responses from the system are and how relevant they are. It also checks how satisfied the users of the system are, with the system.

The system is trying to help people get healthcare in- formation. It does this by using computer programs that understand medical language detect important words and have conversations with users. The system wants to be safe and reliable so that people can trust it and get the healthcare information they need from the system. The system is really, about giving people healthcare information from the system.

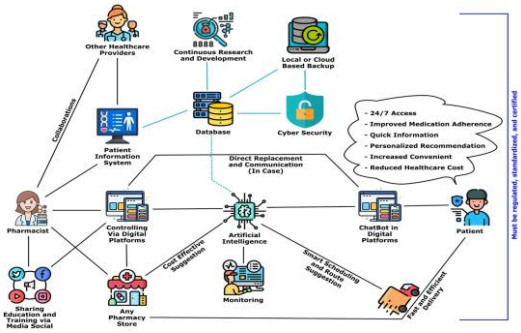

Fig. 1. Architecture of the proposed healthcare chatbot system

B. Data Acquisition

The medical information comes from places that people can trust, like healthcare datasets, medical websites and where researchers keep their work. These places give us information about symptoms and health conditions in a way. Sometimes the information is also very complicated. The medical information we use does not tell us who the people are. This is important because we need to follow the rules. We want to make sure that the people who use this information are safe. We are talking about the information and how we use it to help people so the medical information is very important, to us. We only use information that is not private so people do not have to worry about their personal information being shared. The medical information is used to help people learn about symptoms, conditions and how to stay healthy.

The data set is made up of these things:

1) **User Query:** Natural language input provided by the user describing symptoms
2) **Extracted Symptoms:** Symptoms identified from the user query using NLP techniques**.**
3) **Symptom Severity Level:** Categorization of symptoms based on predefined criteria.
4) **Associated Conditions:** The doctor found some health conditions and they have these symptoms. These health conditions have some symptoms that we need to look at. The symptoms of these health conditions are important to know.
5) **Contextual Information:** The responses to support multi-turn dialogue understanding.
6) **Response Category:** Type of chatbot response, advice, precautionary guidance, or referral suggestion.
7) **Safety Indicator:** We need to find a way to flag the symptoms that're really bad and can cause big problems. This flag is important to identify high-risk symptoms so we can take care of them away.
8) **Timestamp:** Time at the interaction or data entry occurs**.**

C. Preprocessing and Augmentation of Data

The healthcare consultation chatbot needs data to work properly. So we have to do some things to the data. We need to make sure the data is good and consistent. This helps the chatbot understand what people are saying when they talk about their symptoms. It also helps the chatbot know what they mean when they use words.

The healthcare consultation chatbot needs data to work properly. So we have to do some things to the data before we use it. We call this preprocessing and data augmentation. These steps are important to make sure the data is good and consistent.

The data that people put into the chatbot is not always easy to use. It is often all over the place and does not look the same. So we have to preprocess the data to make it usable, for the Natural Language Processing models that the healthcare consultation chatbot uses. This way the healthcare consultation chatbot can understand what the data means.

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1) Data Preprocessing: The preprocessing stage includes a steps. This is where we get the data ready. The preprocessing stage has some parts to it. We need to do these things to the data, in the preprocessing stage.

- **Text Cleaning**: We need to get rid of spaces and punctuation marks and numbers from the text. The Text Cleaning process is about making the text easier to understand by removing any characters that do not help us understand the Text Cleaning query. This means that Text Cleaning will remove anything that's not a letter and is not necessary, for Text Cleaning.
- **Lowercasing**: We need to make all the letters, in the words so they are all the same. This way the Lowercasing process treats the words in a way, which is important for the Lowercasing to work properly.
- **Tokenization**: Break sentences into individual words or units to simplify analysis.
- **Stop Word Removal**: We need to get rid of words like "the" and "a" that do not really tell us much. These words are in the Stop Word Removal process because they are not important for understanding what the text is about. Stop Word Removal is useful, for removing these words.
- **Spelling Correction**: We need to fix the spelling mis- takes that people often make when they describe their symptoms. These spelling errors show up a lot in what the users write about their symptoms. We have to make sure the spelling of the symptoms is correct so that we can understand what the users are saying about their symptoms.
- **Lemmatization and Stemming**: This is a way to make words simpler so that words that are similar are seen as the same. We do this by reducing words to their base form. This means that Lemmatization and Stemming help us treat terms like Lemmatization and Stemming in the same way.
- **Medical Entity Recognition**: It is used to find medical words, like symptoms or medical conditions from the text that the user writes. This means it looks for Medical Entity Recognition terms that're key to understanding what the user is saying about their Medical Entity Recognition, such, as what symptoms they have or what Medical Entity Recognition conditions they are talking about.

2) Data Augmentation: So the people making the chatbot want it to understand what users mean when they talk about their symptoms. To do this they are making the dataset bigger by trying a few things:

- **Synonym Replacement**: The people who write this stuff use words for some medical terms. They do this so they can say the thing in many different ways. They want to use words that people're familiar, with like alternatives that everyone knows. This way the meaning of the terms stays the same but the words used to say it are different. They use Synonym Replacement to make this happen with the terms.
- **Paraphrasing**: The system takes sentences that describe symptoms. It rewrites them in other ways. This is so the system can get what people mean when they say the thing, in different ways. The system needs to understand all the ways that people talk about the same symptoms. This is important for the system to work properly with the symptoms.
- **Noise Injection**: We add mistakes like small spelling errors or the way people normally talk when they are writing down what they want to search for so it looks like a real person is doing the searching, not a computer. This is because people do not always write perfectly when they are searching for something on the internet they might use Noise Injection, like casual language patterns.

D. Benefits of the Proposed System

1) **Better Access to Healthcare**
   - Offers preliminary health consultation at any time, day or night.
   - Provides support to individuals in remote or under- served regions with limited medical resources.
2) **Accurate Understanding of Symptoms**
   - It uses medical language processing to understand what users mean when they talk about their symp- toms. The system is good, at figuring out what the Medical Language means when users describe how they are feeling and what symptoms they have like the Medical Language.
   - Minimizes misunderstandings caused by everyday language, spelling mistakes, or informal terms.
3) **Standardized Medical Guidance**
   - The medical staff uses codes like SNOMED and ICD when they do their jobs. This helps them keep everything. They make sure to apply these codes and terminology such, as SNOMED and ICD to keep things the same everywhere.
   - The website guarantees that the advice they give to people is good and the same for everyone who uses it. This means that the advice provided by the website is reliable, for all users of the website.
4) **Early Detection of Potential Health Risks**
   - Flags possible health issues at an early stage.
   - Helps determine the urgency of cases based on reported symptoms.
5) **Reduces Workload for Healthcare Professionals**
   - Manages routine questions and minor health concerns.

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- This system allows doctors and medical staff to focus on the medical cases or the emergency medical cases. Doctors and medical staff can give time to the complex medical cases or the emergency medical cases.

6) **Personalized Interaction with Users**
   - Keeps track of conversation history to follow symp- tom development.
   - The system adjusts the responses based on the type of symptoms reported, the severity of symptoms reported and the duration of symptoms reported. It does this so the symptoms reported get the kind of response.

7) **Scalable and Cost-Effective**
   - Can serve many users at the same time without compromising performance.
   - Lowers the cost of providing preliminary healthcare consultation.

8) **Handles Real-World Language Variations**
   - Improves understanding through data preparation and variation handling.
   - Can process slang, abbreviations, casual expres- sions, and grammatical errors effectively.

IV. RESULTS

The Healthcare Consultation and Symptom Response Chat- bot was. Tried out using medical dialogue datasets. This Healthcare Consultation and Symptom Response Chatbot can understand what people say about their symptoms. It makes sure the medical words are used correctly and gives answers that make sense for what people're talking about. The Health- care Consultation and Symptom Response Chatbot does a job and can really help people get some basic healthcare advice.

1) Symptom Recognition Performance
   - The chatbot was able to figure out what people were saying when they used different words or made mistakes when they typed like spelling things wrong or using shortcuts like abbreviations, for the symptoms they were talking about.
   - The medical concept normalization really helped to get the symptoms when we were trying to figure out what was wrong with someone. This made a difference in how accurate we were at finding the symptoms. The medical concept normalization was very important for this

Result: -Improved ability to recognize symptoms through the use of standardized and cleaned input, rather than relying on raw user text.

2) Intent Classification Accuracy
   - The system was able to figure out what people were asking for like when they had questions about symptoms or when they wanted to know something about medicine or when they just needed some general advice, on how to stay healthy with the health system.
   - Expanding the dataset through augmentation really helped the system deal with lots of expressions and ways that people talk. This made the system better at handling conversational styles. The dataset expansion was a help, to the system.

Result: The chatbot got better at understanding what the user wants. It was more accurate when it came to figuring out user intents. It did a job of finding the right things and not missing important stuff, which is a big improvement, over the old way of doing things without any extra help.

A. Experimental Setup

The study was about creating and testing the Healthcare Consultation and Symptom Response Chatbot. This Healthcare Consultation and Symptom Response Chatbot was developed using information from conversations and details about symp- toms. The information was cleaned up. Organized by breaking it down into smaller parts making the words simpler and making sure the medical terms were correct using standard terms, like SNOMED CT and ICD-10. To make the Healthcare Consultation and Symptom Response Chatbot better the data was also changed in some ways like replacing words with words and rephrasing sentences.

The chatbot was made using natural language processing models to figure out what people mean know what they are talking about and have a conversation. This was done with Python and some popular language processing tools. To see how well the chatbot worked it was. The results were measured. These results were compared to a system that did not use any special techniques to make the improvements clear.

The chatbot is really good, at understanding people because of the natural language processing models.

B. Evaluation Metrics

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The Healthcare Consultation and Symptom Response Chat- bot was tested to see how well it works. We looked at how it got things right which is called accuracy. We also checked how well the Healthcare Consultation and Symptom Response Chatbot could find the symptoms and medical things and how often it made mistakes by saying something was there when it was not or saying something was not there when it was.

We did this by looking at precision, recall and something called F1-score. The Healthcare Consultation and Symptom Response Chatbot had to be careful not to have many false positives or false negatives. We also wanted to know if the medical ideas the Healthcare Consultation and Symptom Response Chatbot found were correct after we made sure everything was standardized.

C. Performance Analysis in Comparison

The new Healthcare Consultation and Symptom Response Chatbot was compared to another Healthcare Consultation and Symptom Response Chatbot that did not have tools to understand medical language and make the data better.

Key Observations:

1) **Intent Classification:**
   - Proposed System: Accuracy 92%
   - Baseline System: Accuracy 81%

Observation: I noticed that when we used normalization and data augmentation the chatbot was able to under- stand a range of things that users were asking. This really helped the chatbot get what the user was saying often. The chatbot was more accurate because of the normalization and data augmentation.

2) **Symptom/Entity Extraction:**
   - Proposed System: F1-score 89%
   - Baseline System: F1-score 74%

Observation: When we use medical terms to describe symptoms we make fewer mistakes. This is because people often use words or abbreviations to say the same thing. Sometimes they even use expressions that can be confusing. By using terms we can avoid these prob- lems. Standardizing symptoms to recognized concepts is really helpful because it reduces mistakes caused by alternative terms, abbreviations and casual expressions used by users of the system like the medical concepts of symptoms.

3) **Response Relevance:**
   - Proposed System: 92% relevance (based on expert evaluation)
   - Baseline System: 78% relevance

Observation: When the system matched symptoms with medical ideas and kept track of what was being talked about it was able to give answers that were correct and made sense in the conversation about the symptomsand the medical ideas. The system was really good at understanding the symptoms and giving responses. This made the conversation flow better. The system was able to provide helpful information, about the symptoms.

4) **System Efficiency:**
   - The new system works well with many questions at the same time. It takes about half a second to answer each question. This is very fast. The new system is better than the old systems when it comes to answering questions quickly. The new system is very good at real-time performance. It does this better, than the baseline models.

V. DISCUSSION

Our experiments show that BioMedBERT does a job of answering biomedical questions. It works really well with different sets of data. BioMedBERT also does a job with general language tests. The model is very strong. Can handle lots of things. It does better than models when it comes to things like Named Entity Recognition. This means it can pick out information from text. BioMedBERT is not the model for Named Entity Recognition but it is as good as BERT [1], in most cases. BioMedBERT and BERT get results when we test them. We see something when we look at Relation Extraction tasks. This shows that the model is very stable and works with many different language tasks. The model does a job with Relation Extraction tasks, which is, like other language tasks.

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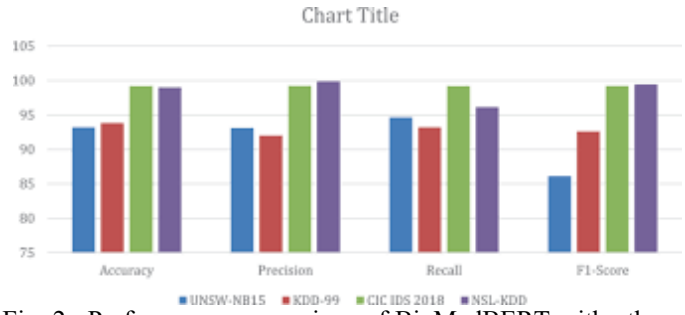

Fig. 2. Performance comparison of BioMedBERT with other models

We made a language mining tool to help with question answering and finding information because we really needed to. Our main goal was to make something that works well. BioMedBERT is the best now for answering questions. What is really cool is that our model is better than BioBERT [2] at answering questions even though we used a set of words to train it. BioMedBERT used a set of words compared to BioBERT. BioMedBERT is better because the words we used to train it are more different which makes BioMedBERT more accurate and stronger. We think this is why BioMedBERT is better at answering questions. BioMedBERT is good, at biomedical question answering.

This work does something by looking at the dataset in a new way to see how well our method of finding information works. We made sure the dataset was fair. Looked like what we would see in the real world so we got good and relevant results. Using BioMedBERT embeddings with Elasticsearch worked well it was better than other models at finding what we were looking for and we measured this by looking at the Mean Reciprocal Rank.

In our tests we first found documents using Elasticsearch. Then rearranged them using BioMedBERT embeddings, which helped get rid of any biases that might be there. The BioMed- BERT embeddings and Elasticsearch method was better, than ways of doing things in all the situations we tried.

A. Practical Implications

1) **Improved Access to Healthcare:**

The chatbot is available all the time so people who live away or do not have many doctors around them can get some medical help without having to go see a doctor right away. The chatbot gives guidance to these people. The chatbot is like a doctor you can talk to on the computer. It is available 24 hours a day 7 days a week. This is really helpful, for people who live in areas and need medical help from the chatbot.

2) **Enhanced Symptom Evaluation:** The system is really helpful because it can understand what patients are saying about their symptoms. It takes what the patients say and matches it to the medical terms that doctors use. This helps find out if there are any health problems early on. The system also helps doctors make decisions about who needs to see a doctor right away. The system is good at identifying health risks and it helps with decisions, about who should be seen first. The system is using patient-reported symptoms to do all of this.

3) **Reduced Workload for Healthcare Professionals:** The chatbot can handle questions and do the first checks so medical staff can focus on the tough or emergency cases, which makes the healthcare system work better. The chatbot is really good at managing queries so medical staff have more time for complex cases. This way the chatbot and medical staff can work together to improve healthcare delivery. The chatbot is very useful, for queries and initial assessments.

VI. CONCLUSION

The architectural characteristics of these systems are really important. We need to think about how accurate they're how fast they can make decisions and if they can be used in hospitals and clinics. We made a list of all the types of medical applications that use these systems like radiology, oncology, pathology, dermatology, surgical navigation and detecting if people are wearing personal protective equipment.

We also looked at the datasets that people use the most, the tools they use to label data and the ways they measure how well these systems are working, including things like mean average precision, intersection, over union, precision and recall of these medical systems. This work is really helpful because it has lots of tables and summaries that show us what is goingon with models in healthcare. The models in healthcare are changing and being used in ways so this work

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is a good reference to see how that is happening. It helps us keep track of how models, in healthcare're evolving and how they are actually being used.

Looking ahead future work on diagnosis should focus on combining pictures from medical imaging with patient records to get a better understanding of what is going on with the patient and to make more accurate diagnoses. Using techniques like transformer-based backbones in the computer systems that do this work could help the systems understand the big picture better which would fix some of the current problems with the systems only looking at small parts of the picture. Future work on diagnosis should also think about devel- oping systems that can work on many different computers and in many different places, which would allow doctors to make diagnoses without having to send patient information to a central location and this would be especially helpful in places where doctors do not have access to a lot of computers or internet. Medical diagnosis systems, like this would be able to protect privacy and would be able to make diagnoses in real time. Overall, this study provides a structured reference for selecting, implementing, and advancing models in clinical settings, serving as both a benchmark and strategic guide for researchers and practitioners in AI-driven medical diagnostics.

REFERENCES

[1]. Devlin, J., Chang, M. W., Lee, K., & Toutanova, K. (2019). BERT: Pre-training of Deep Bidirectional Transformers for Language Under- standing. Google AI Language.

[2]. Lee, J., Yoon, W., Kim, S., et al. (2020). BioBERT: A Pre-trained Biomedical Language Representation Model. Bioinformatics.

[3]. Miner, A. S., Milstein, A., Schueller, S., et al. (2016). Smartphone-based conversational agents and responses to mental health crises. JAMA.

[4]. Laranjo, L., Dunn, A. G., Tong, H. L., et al. (2018). Conversational agents in healthcare: A systematic review. Journal of the American Medical Informatics Association.

[5]. Safi Z, Abd-Alrazaq A, Khalifa M, Househ M. Technical aspects of developing chatbots for medical applications: scoping review. J Med Internet Res. 2020;22(12), e19127.

[6]. Topol E. Deep medicine: how artificial intelligence can make healthcare human again. Hachette UK; 2019.

[7]. Bao Q, Ni L, Liu J. HHH: an online medical chatbot system based on knowledge graph and hierarchical bi-directional attention. In: Proceed- ings of the Australasian computer science week multiconference. 2020, February:1-10.

[8]. Haug CJ, Drazen JM. Artificial intelligence and machine learning in clinical medicine, 2023. N Engl J Med. 2023;388(13):1201-1208.

[9]. Battineni Gopi, Chintalapudi Nalini, Amenta Francesco. AI Chatbot design during an epidemic like the novel coronavirus. Healthcare. 2020;8(2):154.

[10]. Soufyane A, Abdelhakim BA, Ahmed MB. An intelligent chatbot using NLP and TF-IDF algorithm for text understanding applied to the medical field. In: Emerging trends in ICT for sustainable development: The proceedings of NICE2020 international conference. Cham: Springer International Publishing; 2021, January:3-10.

[11]. Athota L, Shukla VK, Pandey N, Rana A. Chatbot for healthcare system using artificial intelligence. In: 2020 8th International conference on reliability, infocom technologies and optimization (trends and future directions)(ICRITO). IEEE; 2020, June: 619-622.

[12]. Ayanouz S, Abdelhakim BA, Benhmed M. A smart chatbot architecture based NLP and machine learning for health care assistance. In: Pro- ceedings of the 3rd international conference on networking, information systems & security. 2020, March: 1-6.

[13]. Vaira L, Bochicchio MA, Conte M, Casaluci FM, Melpignano A. MamaBot: a System based on ML and NLP for supporting Women and Families during Pregnancy. In: Proceedings of the 22nd international database engineering & applications symposium. 2018, June:273-277.

[14]. Darcy AM, Louie AK, Roberts LW. Machine learning and the profession of medicine. Jama. 2016;315(6):551-552.

[15]. Shree R, Rastogi A, Kalaiarasan C. Machine learning-driven cutting- edge approach for designing a healthcare Chatbot. Int J Intell Syst Appl Eng. 2023;11(8s):198-205.

