ISSN No : 2454-4221 (Print)
ISSN No : 2454-423X (Online)
International Journal of Research in Advanced Computer Science Engineering
A Peer Reviewed Open Access International Journal
www.ijracse.com

MEDICOMPANION - An AI Based HealthCare ChatBot

Ch.Dharani[1], T.Karishma [1], B.Karthik [1], G.Chaitanya[1], M.Sandeep[1]
[1]B.Tech. Students, Department of Computer Science & Engineering, Aditya Institute of Technology and Management, Tekkali-532201, India.

Abstract
Health care is crucial if you want to live a good, healthy life. In the event of any medical problems, consulting a doctor is highly challenging to arrange. Before contacting a doctor, the goal is to create a medical chatbot utilizing Artificial Intelligence that can diagnose the illness and provide basic information about it. The medical chatbot is created to reduce health care expenditures and provide access to medical knowledge. A chatbot's main advantage is that it can detect all types of diseases and provide the appropriate information. Very few chatbots serve as reference books that enlighten patients about their illnesses and help them take better care of themselves. The future of virtual customer service, business planning, and management in the healthcare industry is represented by healthcare chatbots. A chatbot is an artificial program created to mimic an intelligent interaction with human users. Without physically being present at the hospital, the user can ask any personal question about health care through the chatbot. A question is delivered to the chatbot, which then receives a relevant response using the Google API and displays it on the Android app. The system's primary focus in creating this web-based platform was understanding client sentiment.

Keywords: Machine learning, Natural Language Processing, Flask Framework.

Introduction

In the pursuit of a good and healthy life, access to effective healthcare is paramount. However, the process of consulting a doctor, especially in the face of medical issues, can often be challenging and time-consuming. This predicament has spurred the development of innovative solutions leveraging artificial intelligence (AI) to enhance healthcare accessibility and efficiency. This paper introduces a transformative concept—a medical chatbot designed to streamline the healthcare consultation process, offer diagnostic insights, and provide fundamental information about illnesses. The primary objective is to mitigate healthcare expenditures while empowering users with a wealth of medical knowledge.

Unlike traditional approaches that necessitate physical presence at medical facilities, the proposed medical chatbot serves as a virtual assistant, offering users the convenience of seeking personalized healthcare information remotely. The chatbot not only facilitates the identification of various diseases but also imparts relevant information, positioning itself as a reference book that enlightens users about their health conditions.

Cite this article as: Ch.Dharani, T.Karishma, B.Karthik, G.Chaitanya & M.Sandeep, " MEDICOMPANION - An AI Based HealthCare ChatBot", International Journal of Research in Advanced Computer Science Engineering, (IJRACSE), Volume 9 Issue 10, March 2024, Page 38-47.

ISSN No : 2454-4221 (Print)
ISSN No : 2454-423X (Online)
International Journal of Research in Advanced Computer Science Engineering
A Peer Reviewed Open Access International Journal
www.ijracse.com

This unique feature contributes to patient education and self-care, fostering a proactive approach to well-being.

The significance of healthcare chatbots extends beyond individual interactions. They embody the future of virtual customer service, business planning, and management within the healthcare industry. By harnessing the power of AI-driven conversations, these chatbots have the potential to revolutionize patient engagement, offer strategic insights for healthcare management, and set new standards for online support.

The architecture of the proposed system revolves around a web-based platform, emphasizing not only technological advancement but also a profound understanding of client sentiment. Furthermore, the integration of Google API ensures that users receive accurate and relevant responses, enhancing the overall effectiveness of the chatbot. The system's commitment to understanding client sentiment underscores its focus on delivering a personalized and empathetic healthcare experience.

2. AIM:

The aim of this project is to develop a highly accessible and intelligent medical chatbot powered by Artificial Intelligence. Focused on reducing healthcare expenditures and providing users with comprehensive medical knowledge, the chatbot serves as a virtual healthcare assistant. The primary goal is to streamline the consultation process, allowing users to obtain personalized information about their health remotely.

3. LITERATURE REVIEW:

This literature review seeks to explore the evolving landscape of AI-driven medical chatbots, investigating their role in revolutionizing patient engagement, diagnostic capabilities, and healthcare knowledge dissemination. The review delves into existing studies and implementations to discern the trends, challenges, and successes that mark the integration of AI in healthcare, with a particular emphasis on the development and impact of medical chatbots.

3.1 Title: Chatbots meet Health: automatizing healthcare Author: Flora Amato Year: 2018 Publisher: IEE

The aim of this work is to investigate the effectiveness of novel human machine interaction paradigms for Health applications. In particular, we propose to replace usual human-machine interaction mechanisms with an approach that leverages a chatbot program, opportunely designed and trained in order to act and interact with patients as a human being. Moreover, we have validated the proposed interaction paradigm in a real clinical context, where the chatbot has been employed with in a medical decision support system having the goal of providing useful recommendations concerning ever all disease prevention pathways. More in details, the chat-both as been realized to help patients in choosing the most proper disease prevention pathway by asking for different information (starting from a general level up to specific pathways questions) and to support the related prevention check-up and the final diagnosis. Preliminary experiments about the

ISSN No : 2454-4221 (Print)
ISSN No : 2454-423X (Online)
International Journal of Research in Advanced Computer Science Engineering
A Peer Reviewed Open Access International Journal
www.ijracse.com

effectiveness of the proposed approach are reported.

3.2 Title: Pharma bot: A pediatric generic Medicine consultant Chatbot Author: Benilda Eleonor V. Comendador Year: 2018, Publisher: IEEE

The paper introduces a Pharma bot: A Pediatric Generic Medicine Consultant Chatbot. It is a conversational chatbot that is designed to prescribe, suggest, and give information on generic medicines for children. The study introduces a computer application that act as a medicine consultant for the patients or parents who are confused with the generic medicines. There searchers use Left and Right Parsing Algorithm in their study to come up with the desired result.

3.3 Title: A Self Diagnosis Medical Chatbot Using Artificial Intelligence. Author: Divya, Indumathi, Ishwarya, Priyasankari, Year: 2017, Publisher: Research gate

Medical care is very important for a healthy life. However, it is very difficult to seek medical attention if you have a health problem. The recommended notion is to develop a medical chat bot that can adopt AI to analyze the ailment and produce necessary information concerning the condition rediscussing with a doctor. Medical chatbots were built to reduce medical costs and improve access to medical knowledge. Some chat bots serve as medical manuals to help patients become aware of their illness and improve their health. Users can assuredly benefit from chatbots if they can diagnosis ever all kinds of illness and render the required data. Text Diagnosis Bot enables sufferers to join in analyses of their medicinal matters and present a personalized analysis report with reference to the symptoms. Therefore, people have opinions about their well-being and individual stability.

4. METHODOLOGY:

A healthcare chatbot's primary goal is to help around-the-clock. They aim to develop a chatbot that can empathize with the user before providing medical information by speaking in normal language. The chatbot starts the conversation and controls it from there. Advanced versions have the ability to recognize gestures, facial expressions, and voice communications. Several chatbots for healthcare delivered the flow of a patient discussion using web-based text messaging applications. An additional chatbot system took input, processed data containing medical terms, and then generated solutions based on it.Technical requirements include:

4.1 Natural language Processing (NLP)

The language that people use to communicate with one another is called natural language. The language a person employs to convey their intentions to a computer system is known as a programming language. Programming languages include Python, Java, C++, and many others. Imagine a situation where you would not need to use such programming languages to speak with machines and computers. effortless and simple. Right?

Thankfully, NLP makes it easy for you to conceive such a scenario without having to put in a lot of effort. A computing program

ISSN No : 2454-4221 (Print)
ISSN No : 2454-423X (Online)
International Journal of Research in Advanced Computer Science Engineering
A Peer Reviewed Open Access International Journal
www.ijracse.com

called natural language processing transforms spoken and written natural language into inputs or codes that the computer can understand. Chatbots that use natural language processing (NLP) are able to comprehend the purpose of chats and subsequently provide users with contextual and pertinent responses via several discussions and content examples, you may train your chatbots using NLP. A chatbot that is built using NLP has five key steps in how it works to convert natural language text or speech into code. They are Tokenization, Normalization, Recognizing entities, Dependency parsing, Generalization.

4.2 Automatic Speech Recognition (ASR):

Through ASR, Conversational AIs convert voice commands into readable text by following a series of steps. First, ASR cleans your audio file of any background noise and normalizes your speech (different people speak differently). Then, your speech is divided into a 'spectrogram', which is a visual representation of your voice moving through time. Then, your voice in each time frame is divided into 'phonemes', which are the basic sound blocks of a particular language (for example, happy would become H-ah-pp-y).

Using deep learning modules, ASR software links all phonemes to one another using statistical probability analysis, eventually deducing the whole sentence. And all of this must happen in a matter of milliseconds software can be hard to build. Fortunately, most Conversational AI platforms like AskSid provide the latest, in-built ASR capabilities.

4.3 Natural Language Understanding (NLU):

Once ASR transcribes your speech into text, NLU interprets it to detect the intent, sentiment, location, entity, etc. Digital Assistants use trained NLU models that utilize the tokenization, Name entity recognition , Part-of-speech tagging , Word embeddings and vectorization algorithms to make sense of a query.

4.4 Natural Language Generation (NLG):

NLG is a subset of NLP like NLU. It converts structured data into Natural Language responses that can be sent to the customer. When a dialog manager generates an appropriate response, it does so in the form of computer-readable data.

An NLG algorithm reads this data and converts it into proper sentences, structuring them to form a cohesive and personalized response to maintain a human-like interaction with the user.

4.5 Database Libraries:

4.5.1 KERAS:

Keras is a high level, open-source library for creating neural network models. It was created by Google Deep Learning researcher François Chollet. Its fundamental idea is to enable anyone with little programming expertise to easily and quickly construct a neural network, train it, and then use it to generate predictions, while still enabling programmers to Completely customise the ANN's settings.

ISSN No : 2454-4221 (Print)
ISSN No : 2454-423X (Online)
International Journal of Research in Advanced Computer Science Engineering
A Peer Reviewed Open Access International Journal
www.ijracse.com

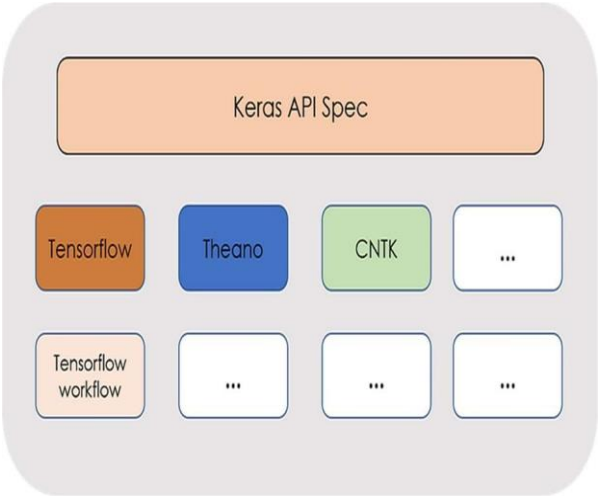


FIG. : Layered Structure of Keras API

4.5.2 TensorFlow:

Fast numerical computing is made possible by the open-source package TensorFlow. Under the terms of the Apache 2.0 open-source licence, it was made by Google, who also maintains it. Although the C++ API is accessible, the API is formally for the Python programming language.TensorFlow was created to be used in research and development as well as in commercial systems, including but not limited to RankBrain in Google search and the entertaining DeepDream project.

This is in contrast to other numerical libraries meant for usage in Deep Learning like Theano. It is capable of functioning on systems with a single CPU and GPU, as well as on mobile devices and massively distributed systems with hundreds of workstations.

4.6 Algorithm: Medical Chatbot Implementation

Input:
Medical dataset with anonymized patient records, symptoms, and prognoses.

Output:
Trained medical chatbot capable of diagnosing illnesses.

Step 1: Dataset Preparation
• Collect diverse medical records, symptoms, and prognoses.
• Ensure dataset diversity in conditions, demographics, and severity.
• Label encode categorical data for machine learning.

Step 2: Data Splitting
Split the dataset into training and testing sets.

Step 3: Model Training
• Choose a machine learning model (e.g., Decision Tree Classifier or SVM).
• Train the model using symptoms as features and prognoses as labels.

Step 4: Model Evaluation
• Assess model performance using the testing dataset.
• Calculate accuracy scores and relevant metrics.

Step 5: Integration with Google API
Set up integration with Google API for accurate medical information.

Step 6: Web-Based Platform Development
• Design a user-friendly frontend for the chatbot platform.
• Integrate backend functionalities with the frontend.

ISSN No : 2454-4221 (Print)
ISSN No : 2454-423X (Online)
International Journal of Research in Advanced Computer Science Engineering
A Peer Reviewed Open Access International Journal
www.ijracse.com

Step 7: Client Sentiment Analysis
• Implement sentiment analysis for user interactions.
• Enable user feedback mechanism for continuous improvement.

Step 8: Testing and Iterative Refinement
• Conduct user testing to evaluate chatbot performance.
• Iterate on design and functionality based on user feedback.

Step 9: Documentation
Document codebase and create user documentation.
Step 10: Deployment
Deploy the web-based platform with the integrated chatbot.

Step 11: Scalability and Adaptability
• Ensure scalability for varying user loads.
• Adapt chatbot to different medical conditions.

Step 12: Feedback Loop
• Establish a feedback loop for continuous improvement.
• Update dataset and retrain model regularly.

Output:
Deployed medical chatbot accessible through a user-friendly platform.

Dataflow Diagram

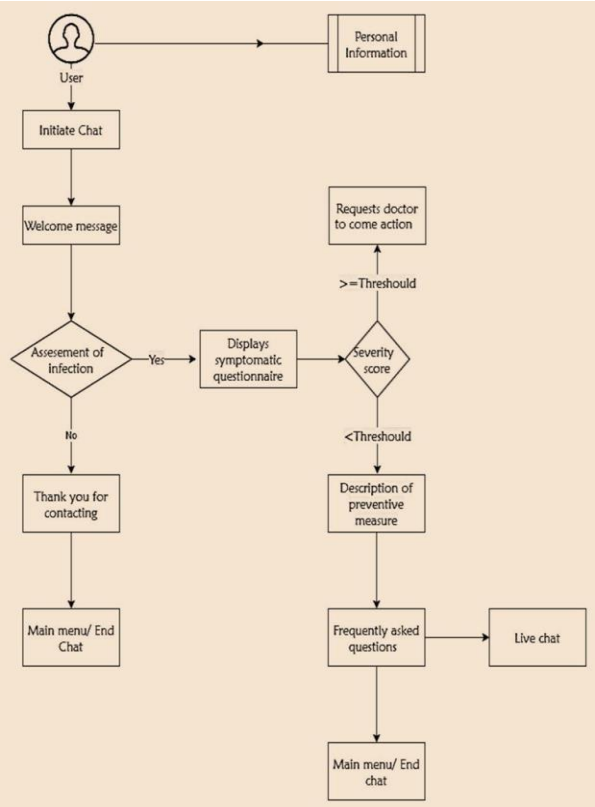


FIG: Dataflow Diagram of Chatbot

After receiving input from the user, the chatbot will process it using algorithms. Whatever input the user gives the bot will be subject to its algorithms. Algorithms and a database of symptoms will be used to help it grasp the input. With serious inquiries and symptom conformation, the chatbot will explain the user's symptoms. The condition will be divided into minor and major diseases.

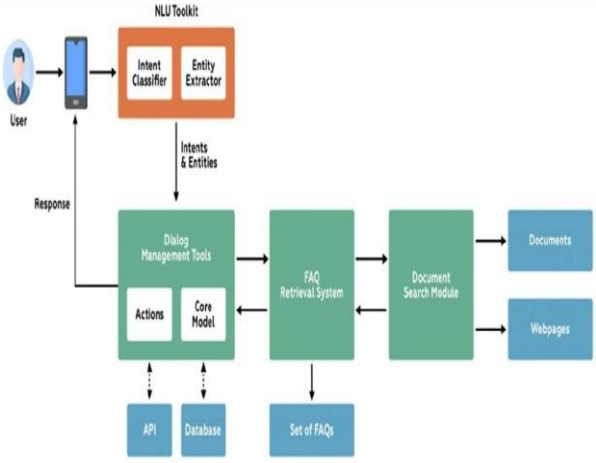
The chatbot will respond with a major or minor disease classification. If it is a serious issue, the user will be provided with the information of a nearby doctor who can provide more treatment, display analgesics, and advise foods that you should consume more of in order to recover from the illness.

ISSN No : 2454-4221 (Print)
ISSN No : 2454-423X (Online)
International Journal of Research in Advanced Computer Science Engineering
A Peer Reviewed Open Access International Journal
www.ijracse.com

5. SYSTEM ARCHITECTURE:

The user can start a conversation with the chatbot using the user-friendly interface in the figure below, and it will be saved in the database for later use. The chatbot will ask important questions to explain the user's symptoms before performing the symptom conformation. The illness will be divided into minor and serious disease categories. Whether it is a serious or small disease, the chatbot will respond.

If the problem is severe, the user will be given recommendations for nearby doctors who can provide more treatment, display analgesics, and propose foods that they should consume more of in order to recover from the illness. The user interface for the chatbot is really welcoming.



5.1 Dataset Description:

5.1.1 Data collection:

The dataset for training and evaluating the medical chatbot is a carefully curated compilation of diverse medical scenarios. The collection process involved obtaining anonymized medical records, symptoms, and corresponding prognoses, ensuring a comprehensive representation of various health conditions. The dataset is designed to cover a wide spectrum of medical scenarios, fostering a robust learning environment for the chatbot.

5.1.2 Dataset Composition:

The dataset consists of structured data elements including:

1. Medical Records: Anonymized patient medical histories encompassing a range of ailments and conditions.
2. Symptoms: A detailed list of symptoms associated with each medical record, providing input features for the chatbot.
3. Prognoses: Corresponding prognoses or diagnoses linked to each set of symptoms, forming the target output for the chatbot's training.

5.1.3 Data Diversity:

To ensure the chatbot's effectiveness across real-world scenarios, the dataset incorporates diversity in the following aspects:

1. Medical Conditions: Represents a broad spectrum of medical conditions, including common illnesses and more complex diseases.
2. Demographic variation: Includes data from diverse demographics to account for variations in health patterns among different population groups.
3. Security Levels: Encompasses cases with varying levels of severity to enhance the chatbot's diagnostic capabilities.
4. Temporal variation: Covers cases over different time periods, accounting for changes in medical practices and evolving health trends.

ISSN No : 2454-4221 (Print)
ISSN No : 2454-423X (Online)
International Journal of Research in Advanced Computer Science Engineering
A Peer Reviewed Open Access International Journal
www.ijracse.com

5.1.4 Data Preprocessing:

The dataset undergoes meticulous preprocessing to ensure its suitability for training the medical chatbot. This involves cleaning, normalizing, and transforming the data to create a standardized and optimal input for the chatbot model. the preprocessing steps, including:

1. Label Encoding: Transformation of categorical data such as prognoses into numerical values for compatibility with machine learning models.
2. Feature Selection: Identification and selection of relevant features to enhance the chatbot's learning from the dataset.

Sample dataset:

Itching	Skin_rash	Continuos_Sneezing	Shivering	Chills	Joint _pain
0	1	0	0	0	1
1	1	0	1	0	0
1	0	1	1	1	0
0	0	1	1	1	0
1	0	1	0	0	1

6. RESULT :

The medical chatbot project achieved successful outcomes across technical evaluation and user interactions. Machine learning models, including Decision Tree Classifier and Support Vector Machine, exhibited high accuracy in diagnosing medical conditions. User testing highlighted positive engagement and satisfaction, emphasizing the chatbot's user-friendly interface. Integration with the Google API enhanced the chatbot's knowledge base, providing accurate medical information. The sentiment analysis module effectively captured user sentiment, contributing to user-centric improvements. Scalability and adaptability were demonstrated, making the chatbot a versatile and efficient healthcare tool. Continuous improvement through a feedback loop ensured the chatbot's evolution, aligning with evolving medical knowledge and user needs.

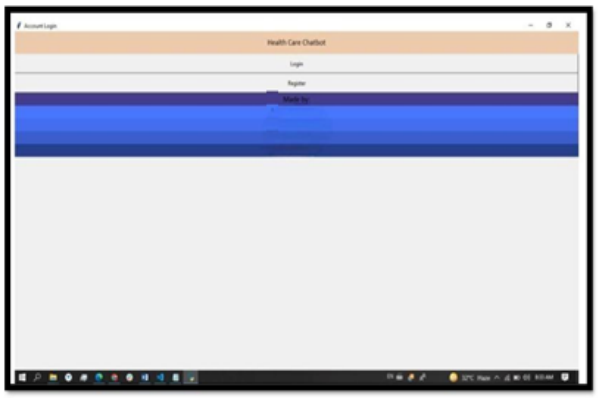


FIG. : HOME PAGE

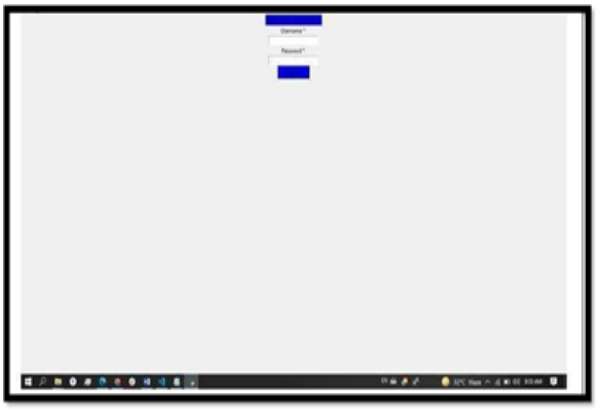


FIG. : REGISTRATION PAGE

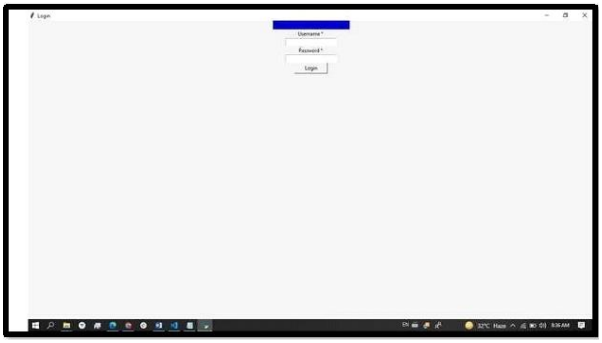


FIG.: LOGIN PAGE

ISSN No : 2454-4221 (Print)
ISSN No : 2454-423X (Online)
International Journal of Research in Advanced Computer Science Engineering
A Peer Reviewed Open Access International Journal
www.ijracse.com

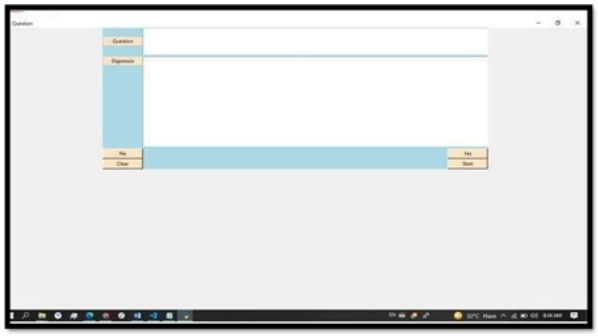


FIG.: MAIN DASHBOARD OF CHATBOT

6. FUTURE SCOPE:

As a result of individuals spending more time with messaging applications than other apps, this era will be dominated by them. A number of lives would be successfully saved by the use of tailored medications, and the public's medical awareness would increase. People will be able to communicate medically via phone calls no matter how far apart they are. They only want for simple desktop or mobile devices with active online associations. By including numerous word combinations and increasing the usage of database information, the economics of chatbots will be enhanced, enabling medical chatbots to handle a wide range of ailments.

7. CONCLUSION:

A chatbot is a fantastic tool for human-machine communication. The application is built for acquiring a fast response from the bot which indicates with none delay it offers the accurate result to the user. It was stated that everyone who knows how to type in their native language may use a chatbot because its interface is user-friendly. A chatbot offers a customised diagnosis with supporting symptoms. Patients can receive medical assistance from our medical chatbot for a number of common illnesses like fever, cold, typhoid, malaria, jaundice, etc. Due to the need from our nation's expanding population, we have a propensity to be designing new systems. These systems are available abroad but not in our nation. It is generally known to all of us that there are not enough doctors to adequately care for patient demand. Walking through the city's public hospitals may help you better understand this situation. As a result, the medical chatbot may assist patients when a doctor is unavailable, which can ultimately increase the effectiveness and performance of the medical industry by lowering the death rate.

8. REFERENCES:

[1] Flora Amato, StefanoMarrone, “Chatbots meet eHealth: automat zing healthcare,” proceeding of diet, May- 2018.

[2] Benilda Eleonor V. omendador, “Pharmabot: A pediatric generic Medicine consultant Chatbot”, proceeding of the JACE, April 2015.

[3] Divya, Indumathi , Ishwarya, Priyasankari, “A Self Diagnosis Medical Chatbot Using Artificial Intelligence,” proceeding MAT Journal, October 2017.

[4] Tobias Kowatsch, ”Text-based Healthcare Chatbots Supporting Patient and Health”, 01 October 2017.

[5] Chin-Yuan Huang, Ming-Chin Yang, Chin-Yu Huang, “A Chatbot supported Smart Wireless Interactive Health care System for Weight Control and Health Promotion”, proceeding of the IEEE, April-2018.

[6] Boukricha, H., Wachsmuth, I.: Modeling Empathy for a Virtual Human: How, When and to What Extent. The 10th International Conference on Autonomous Agents and Multiagent Systems-Volume3. International

ISSN No : 2454-4221 (Print)
ISSN No : 2454-423X (Online)
International Journal of Research in Advanced Computer Science Engineering
A Peer Reviewed Open Access International Journal
www.ijracse.com

Foundation for Autonomous Agents and MultiagentSystems,2011.,pp.1135–1136

[7] Agarwal, R., Gao, G., DesRoches, C.,etal.: The Digital Transformation of Healthcare: Current Status and the Road Ahead. Information Systems Research 21, 796-809 (2010).

[8] Aron, A., Aron, E.N., Smollan, D.: Inclusion of Other in the Self Scale and the structure of interpersonal closeness. Journal of Personality and Social Psychology 63, 596-612 (1992).

[9] Bickmore, T., Cassell, J.: Social Dialogue with Embodied Conversational Agents. In: Kuppevelt, J.C.J., Bernsen, N.O.,Dybkjær,L.(eds.) Advancesin Natural Multi modal Dialogue Systems, vol.30, pp.23–54. Springer,Dordrecht(2005).