HEALTHCARE CHATBOT POWERED BY ARTIFICIAL INTELLIGENCE

A Project Report

Submitted by

NALLAGARI UDAY KUMAR REDDY	**20181CSE0464**
MOHAMMED FURQAN AHMED	**20181CSE0430**
N VASEEM BASHA	**20181CSE0458**
MOHAMMED ABDUL WAHAB AHMED	**20181CSE0425**
MOHAMED FAHAD IDREES	**20181CSE0422**

Under the guidance of

SAPNA R

in partial fulfillment for the award of the degree

of

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At

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF ENGINEERING
PRESIDENCY UNIVERSITY

CERTIFICATE

This is to certified that the Project report **HEALTHCARE CHATBOT POWERED BY ARTIFICIAL INTELLIGENCE** being submitted by **NALLAGARI UDAY KUMAR REDDY, MOHAMMED FURQAN AHMED, N VASEEM BASHA, MOHAMMED ABDUL WAHAB AHMED, MOHAMED FAHAD IDREES** bearing roll numbers: 20181CSE0464, 20181CSE0430, 20181CSE0458, 20181CSE0425, 20181CSE0422, in partial fulfillment of requirement for the award of degree of **Bachelor of Technology in Computer Science and Engineering** is a bonafide work carried out under my supervision.

Dr. C. KALAIARASAN
Associate Dean-CSE
Department of CSE
Presidency University

SAPNA R
Assistant Professor-CSE
Presidency University

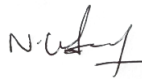
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SCHOOL OF ENGINEERING

PRESIDENCY UNIVERSITY

DECLARATION

I hereby declare that the work, which is being presented in the internship report entitled **HEALTHCARE CHATBOT POWERED BY ARTIFICIAL INTELLIGENCE** in partial fulfilment for the award of Degree of **Bachelor of Technology** in **Computer Science and Engineering**, is a record of our own investigations carried under the guidance of **Dr. SAPNA R, Professor, Department of Computer Science and Engineering, School of Engineering, Presidency University, Bangalore.** We have not submitted the matter presented in this report anywhere for the award of any other Degree.

NALLAGARI UDAY KUMAR REDDY	**20181CSE0464**	
MOHAMMED FURQAN AHMED	**20181CSE0430**	
N VASEEM BASHA	**20181CSE0458**	
MOHAMMED ABDUL WAHAB AHMED	**20181CSE0425**	
MOHAMED FAHAD IDREES	**20181CSE0422**	

ABSTRACT

Equipped with vast knowledge and the ability to assess information, analyze queries, and answer users with a convincing response, this Chatbot eliminates the need for a human consultant to be present (at least at an intermediate level). Our Chatbot will be ruled-based with predefined inputs and responses to focus on achieving better accuracy. As this Chatbot acts as a first layer of communication during the entire diagnosis, it is crucial for the Chatbot to comprehend the symptoms of the sickness, so that it can warn the user if the severity levels are high and therefore advise to consult a doctor. For this purpose, the Chatbot will be trained to determine various diseases based on their specific severity levels (mild, moderate, severe) and advise accordingly.

Although, in most cases, following diagnosis, the patient will be shown their predicted disease with a concise description along with a few precautions and safety measures as per the symptoms identified.

By implementing these ideas, we believe that we can tackle a few problems that exist in the current healthcare system or at least offer an inexpensive way to smooth out the process as a whole. Interestingly enough, by removing unproductive steps from the process, we can not only make it more efficient but also free both parties from non-sensical hurdles within the system and ultimately save lives as well as time!

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ACKNOWLEDGEMENT

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NALLAGARI UDAY KUMAR REDDY

MOHAMMED FURQAN AHMED

N VASEEM BASHA

MOHAMMED ABDUL WAHAB AHMED

MOHAMED FAHAD IDREES

INTRODUCTION

Health certainly is one of the greatest blessings bestowed by the **God Almighty**. One should always be grateful, and it is the individual's responsibility to take care of his well-being, which can be maintained by either taking precautions against forbidden substances (which are toxic to the human body) or by seeking a cure for any illness. Therefore, Healthcare plays a very prominent factor in leading a healthy lifestyle.

The rise in Information technology has led to many advancements in prominent fields like Economy, Transport, and Telecommunications throughout the globe in the last few decades, Medical Science being one of them. Building a robust healthcare system with all the latest & greatest medicine, from large-scale health centers to highly qualified medical practitioners, would be futile if there's no proper access to the mass public. Generally, for a self-checkup, a patient needs to call in an appointment to meet with the respective doctor. This process already seems quite prolonged and also during certain adversities, there can be many disruptions or delays. A relatable situation that was observed worldwide was during the Covid-19 pandemic, where this existing system suffered a huge impact due to the amount of demand which was inconceivable.

Thanks to technology and portable medical equipment, there have been many methods like home doctor visits and online doctor consultations for our ease. These methods have no doubt made it convenient, especially if compared to the conventional methods. However, at the end of the day, it is all dependent on the consultant to supply aid to the patient, which brings the issue of limitation because this facility can't be available everywhere as remote areas may be lacking resources. The consultant's inability to provide service is also sometimes a drawback. Here is where the concept of an AI assistant comes into the picture.

LITERATURE REVIEW

[I] E-Health is defined as the supply of health care supported by electronic processes and communications.

Everyone these days is talking about e-health, but only a few individuals have come up with a coherent definition of this relatively new phrase. This term, which was barely in use before 1999, now appears to function as a broad "buzzword," describing not only "Internet medicine," but essentially anything relating to computers and medicine. Rather than scholars, industry executives and marketers are said to have coined the phrase. They coined the term, along with other "e-words" like e-commerce, e-business, e-solutions, and so on, to convey the promises, principles, and hype surrounding e-commerce (electronic commerce) to the context of health, as well as to describe the innovation the Digital age is expanding rapidly in the field of health care.

[II] It demonstrates how developing technologies are changing the way people think about healthcare.

Current healthcare technologies were previously original concepts, care models, and gadgets, as well as new therapies. Emerging technologies (ETs) are being created and used at a rapid rate in healthcare organizations today. To enhance clinical practice, nurses, nurse informaticists, and nurse educators should have a thorough understanding of the role of developing technologies in healthcare.

[III] People are relying on health tracking gadgets, linked health equipment, and tailored and proximity medicine at an increasing rate.

IoT technology improves patient-doctor communication through remote monitoring and virtual visits; it assists hospitals in tracking personnel and patients; and IoT healthcare devices aid with chronic illness management. IoT automates patient care workflow; it quickly culls, analyses, and disseminates data to keep everyone on the same page; it reduces inefficiency and

errors; it optimizes the pharmaceutical manufacturing process, potentially lowering drug prices; it maintains quality control and manages sensitive items while in transit; and it can even lower healthcare costs by streamlining the overall process.

[IV] Chat bots can be programmed to answer in the same manner every time, to respond differently to messages that include specific keywords, and even to utilize machine learning to modify their responses to the scenario.

Chatbots allow users to communicate utilizing artificial intelligence which use a text or speech interface. A chat bot will usually converse with a human.

Online Chatbots are now being used by a growing number of hospitals, nursing homes, and even private centers for human services on their websites. These bots interact with visitors to the site, assisting them in finding specialists, scheduling appointments, and obtaining appropriate therapy. In any event, the use of artificial intelligence in a field where people's lives are at risk raises concerns. It raises the question of whether the above-mentioned task should be delegated to human employees.

[V] Online Chat bots are being used by an increasing number of hospitals, nursing homes, and even private centers to provide human services on their websites.

Chatbots are computer programs that respond to messages automatically. Chatbots can be programmed to answer in the same way every time, to respond differently to messages that contain specific keywords, and even to utilize machine learning to modify their responses to the scenario. This healthcare chatbot system will assist hospitals in providing online healthcare support 24 hours a day, seven days a week. It answers both detailed and general questions. It also assists in the generation of leads and the automatic delivery of lead information to sales. By asking the questions in order, the patient is aided in determining what he or she is seeking for.

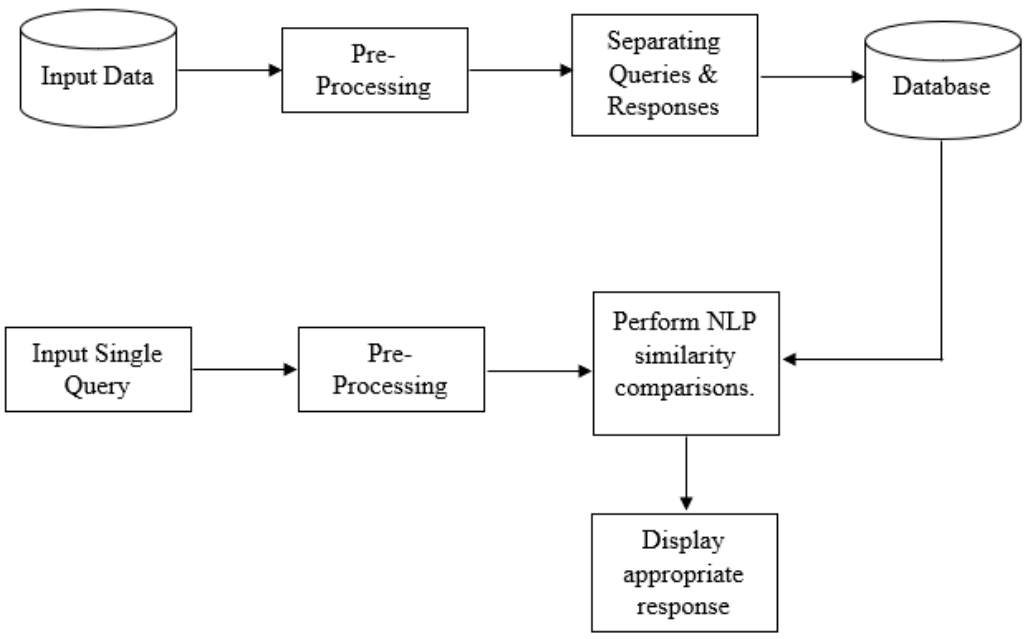
EXISTING SYSTEM

- Undergoing doctor appointments
- Medical consultations are mostly paid
- Time consuming travelling, queues, waiting time, etc
- Unreliable online information

PROPOSED WORK

- Medical assistance anytime anywhere
- Rapid response with minimal delay
- A unique tailored individualistic experience suiting specific need
- Severity checker
- Extensive knowledge base
- Quick remedies and precautions

SYSTEM ARCHITECTURE



APPLICATIONS

- Hospitals can implement chatbot on their website or application
- Chatbot can be the first contact point from the entire process
- Chatbot will provide a quick self-diagnosis summary, which will be helpful not only for the patient but also the doctor
- Online search results most of the time provide unreliable information and sometimes it could be misleading, whereas Chatbot can evaluate a personalized response
- Implementation is inexpensive compare to other investments

FUTURE ENHANCEMENTS

Support for unavailable languages, such as regional languages or rural languages.

Monitor applications can be fed data from the chatbot by storing each user’s past interactions, diagnostic results, symptoms, etc.

Basic words can be separated into semantic categories and used in NLP algorithms.

Google and other companies are experimenting with Deep Neural Networks (DNNs) to push the boundaries of natural language processing and make human-machine interactions feel as natural as human-to-human interactions.

Chatbots can be utilized by paramedics in case of any exigency.

Instead of focusing on keywords or themes, smarter search allows a chatbot to understand a customer's request and enable "search like you talk" capabilities (much like you could question Siri).

PREREQUISITES

SYSTEM REQUIREMENTS

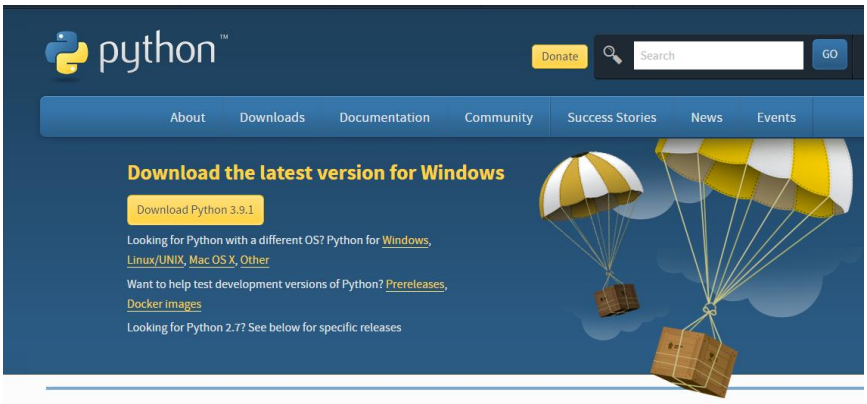
Hardware Configuration

- Processor — x86 64-bit CPU (Intel / AMD architecture)
- RAM — 4 GB (or more)
- Storage — 1 GB

Software Configuration

- Operating System — Windows 7+
- Server-side Script — Python 3.6+
- IDE — PyCharm
- Libraries Used — Pandas, Numpy, Sklearn, Tkinter

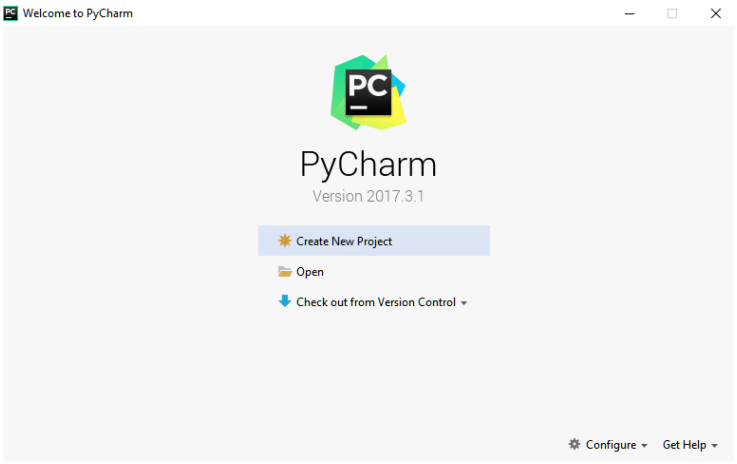
A. Installing Python



1. To download and install Python visit the official website of Python https://www.python.org/downloads/ and choose your version.
2. Once the download is complete, run the exe for install Python. Now click on Install Now.
3. You can see Python installing at this point.
4. When it finishes, you can see a screen that says the Setup was successful. Now click on "Close".

B. Installing PyCharm

1. To download PyCharm visit the website https://www.jetbrains.com/pycharm/download/ and click the "DOWNLOAD" link under the Community Section.
2. Once the download is complete, run the exe for install PyCharm. The setup wizard should have started. Click “Next”.
3. On the next screen, Change the installation path if required. Click “Next”.
4. On the next screen, you can create a desktop shortcut if you want and click on “Next”.
5. Choose the start menu folder. Keep selected JetBrains and click on “Install”.
6. Wait for the installation to finish.
7. Once installation finished, you should receive a message screen that PyCharm is installed. If you want to go ahead and run it, click the “Run PyCharm Community Edition” box first and click “Finish”.
8. After you click on "Finish," the Following screen will appear.



C. Installing packages

1. You need to install some packages to execute your project in a proper way.
2. Open the command prompt/ anaconda prompt or terminal as administrator.
3. The prompt will get open, with specified path, type “pip install *package name*” which you want to install (like numpy, pandas, scikit-learn, matplotlib)
   ex: pip install numpy, pip install pandas, etc.

COMPONENTS

Chatbot (a.k.a. chatter bot)

A chatbot is a type of software that can help customers by automating conversations and interact with them through messaging platforms. The term "ChatterBot" was originally coined by Michael Mauldin (creator of the first Verbot) in 1994 to describe these conversational programs.

There are two basic types of chatbot models;

- Retrieval based (Rule based)
  A retrieval-based chatbot uses predefined input patterns and responses.
  It is widely used in the industry to make goal-oriented chatbots.

- Generative based (Self Learning)
  Here, chatbots are trained to learn and generate new dialogue depending on the situation. Although the domain is unrestricted, it may sound repetitive and cannot promote stable human conversation.

Artificial Intelligence (AI)

Artificial intelligence (AI) is the ability of a computer or a computer-controlled robot to accomplish tasks that are normally performed by intelligent beings. As human language is riddled with ambiguities, writing software that accurately interprets the intended meaning of text or voice input is extremely challenging.

Therefore, we will be using a branch of AI which specializes in learning Human Language.

Natural Language Processing (NLP)

The ability of computers to analyze, understand, and generate human language, including speech, is called natural language processing.

Using these powerful technologies, we will be building our software for our users to interact, known as Chatbot.

ALGORITHMS

Decision Tree Classifier

The Decision Tree Algorithm is a supervised non-parametric learning approach for classification and regression. The goal of this algorithm is to learn simple decision rules using data attributes to develop a model that predicts the value of a target variable. Decision trees provide visitors with precise and targeted responses to their questions and necessitate a detailed examination of previous customer service enquiries and data.

The advantages of using a Decision Tree Based chatbot are:

- The conversation flow is highly customizable.
- The analysis and setup is easy, therefore making it quick to setup.
- The handover to a human agent is straight forward.
- They provide pointed and more accurate answers with higher customer satisfaction

Support Vector Machines (SVM)

SVM is a supervised machine learning technique that may be used for both classification and regression. The goal of the SVM algorithm is to find a hyperplane in an N-dimensional space that categorizes data points clearly.

Simply explained, the kernel does some fairly sophisticated data transformations before determining the best method for separating the data based on the labels or outputs specified.

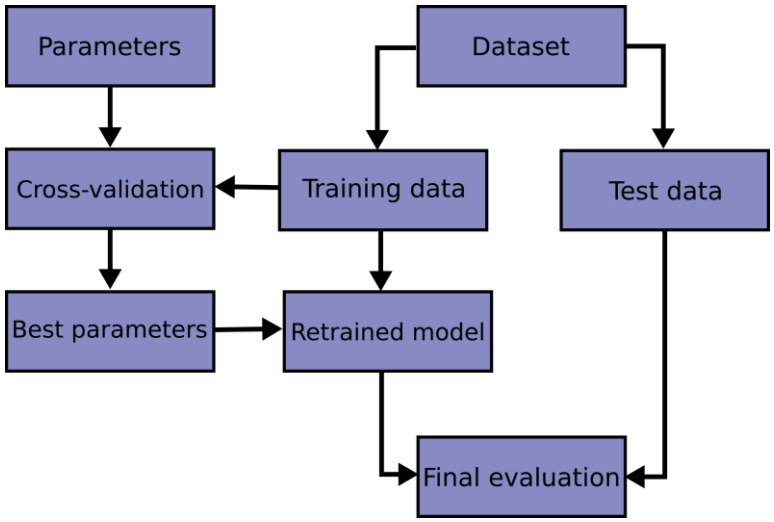
Advantages of SVM

- Effective in high dimensional cases
- Its memory efficient as it uses a subset of training points in the decision function called support vectors

Cross Validation

Cross validation is a technique that allows us to train our model using a subset of the dataset and subsequently evaluate it using the complementary subset of the dataset.

Learning the parameters of a prediction function and then evaluating it on the same data is a methodological error: a model that simply repeats the labels of the samples it has already read will get a perfect score but will fail to predict anything valuable on unseen data. This is referred known as overfitting. For this purpose, we use cross validation technique.



Steps involved in cross-validation

1. Reserve some portion of sample dataset.
2. Using the rest dataset train the model.
3. Test the model using the reserve portion of the dataset.

TESTING

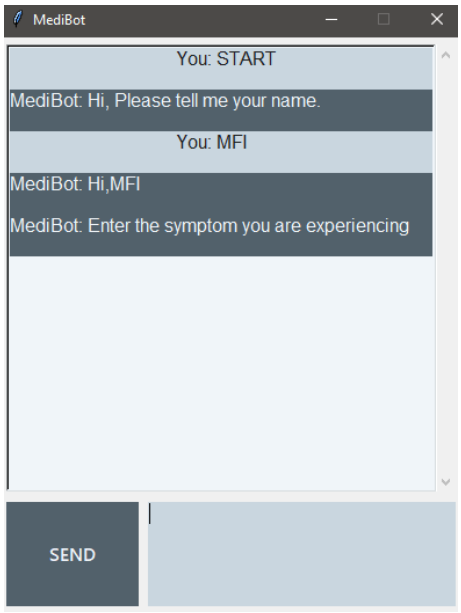
When the testing the dataset with the algorithm with splitting strategy of *cv = 5,*

```
OUTPUT
[0.96863469 0.987061   0.97227357]
0.9759897506553624
```

Average of the resultant values i.e., *mean = 0.975*

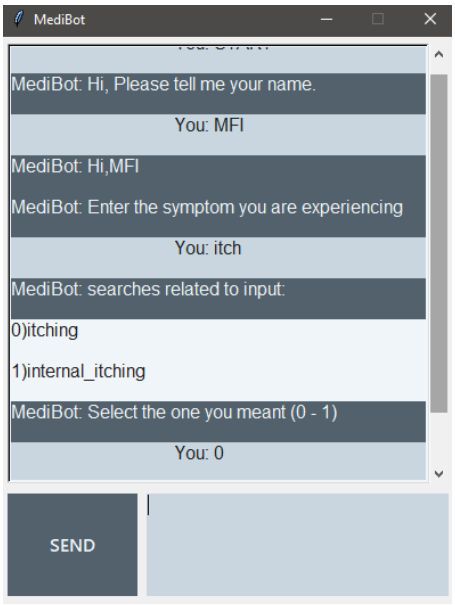
Rounding off the score, we arrived at an accuracy of *98%*

RESULT

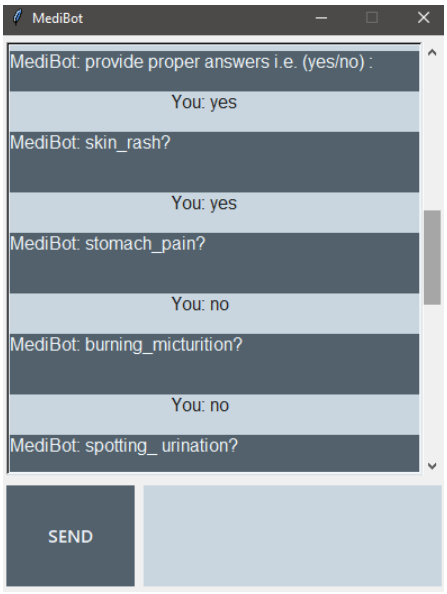


chatbot initiating conversation

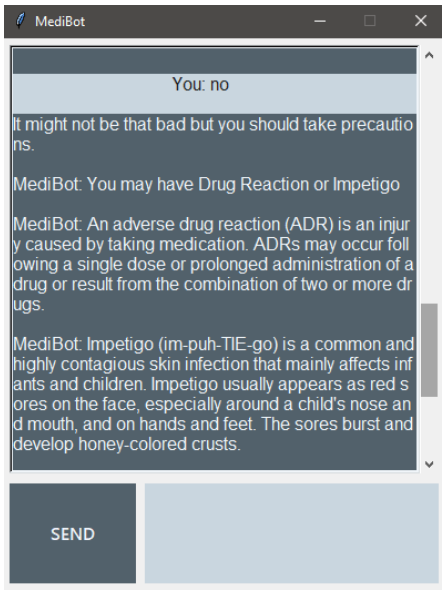
1. User is asked to provide the symptoms which he/she is facing



matching results are presented to user



chatbot narrows each conversation until the symptoms are diagnosed



Disease is predicted successfully

2. Precaution is advised depending upon the severity of the illness.
3. Allergies/illness with a short description is displayed to the patient.
4. Finally, a few precautions are suggested based on the condition before finishing the diagnosis

CONCLUSION

Chatbots are a thing of the future that has yet to be recognized. Given their growing popularity and frenzy among businesses, it is safe to assume that they will remain here. It is fascinating to see different sorts of chatbots being created, as well as to see the rise of a new domain in technology while exceeding the previous level. We decided to invent this system because of the immediate need for change in our current poorly managed healthcare hierarchy. There is no doubt that some countries have developed a sophisticated and well-organized medical care process, but unfortunately, many other fail to prioritize public wellbeing. This scenario can be better comprehended if admitted to a community/government-funded hospital. Thus, the MediBot (chatbot) will provide firsthand medical aid to the needy while we wait for the core system to change, **God** willing.

REFERENCES

[1] A. Allen, ‘‘Morphing telemedicine-telecare-telehealth-ehealth,’’ Telemed Today, Special, no. 2000, 2000.

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

[3] 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).

[4] BenildaEleonor V. Comendador, “Pharmabot: A pediatric generic Medicine consultant Chatbot”, proceeding of the JACE, April 2015.

[5] 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-Volume 3. International Foundation for Autonomous Agents and Multiagent Systems, 2011., pp. 1135–1136

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

[7] Bickmore, T., Gruber, A., Picard, R.: Establishing the computer–patient working alliance in automated health behavior change interventions. Patient Education and Counseling 59, 21-30 (2005).

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

[9] Divya, Indumathi, Ishwarya, Priyasankari, “A SelfDiagnosis Medical Chatbot Using Artificial Intelligence”, proceeding MAT Journal, October-2017.

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

[11] K. Myers, P. Berry, J. Blythe, K. Conley, M. Gervasio, D. L. McGuinness, D. Morley, A. Pfeffer, M. Pollack, and M. Tambe, ‘‘An intelligent personal assistant for task and time management,’’ AI Mag., vol. 28, no. 2, p. 47, 2007.

[12] S. L. Murphy, J. Xu, K. D. Kochanek, and E. Arias, ‘‘Mortality in the United States, 2017,’’ NCHS Data Brief, no. 328, pp. 1–8, Nov. 2018.

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