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Data Science Nigeria

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1. Problem Statement/Definition

Local levels suffer several health backdrops, Inadequate accessibility to quality healthcare/medical attention. Hence, the need for the development of working Artificial Intelligence solutions/prototypes to solve Nigerian related health problems.

1.1 Prevalence of the problem

The major public health challenges Nigeria faces are infectious diseases, sewage disposal, health insurance, water supply, air pollution, noise pollution, environmental radiation, housing, solid waste disposal, disaster management, control of vector some diseases, doctor-population ratio, population-bed ratio, population per health facility, payment system/methods, utilization of care, access to care, improper co-ordination of donor funds, material mortality, infant mortality, health financing, poor sanitation and hygiene, incessant doctors strike, disease surveillance, smoking of tobacco, brain drain, rapid urbanization, non-communicable diseases, alcohol abuse, environment degradation, road traffic injuries etc.

Nigerians will continue to die unnecessarily from preventable conditions and disease if there are no proper programs designed to address each of these problems. The first WHO Global Status Report on non-communicable disease listed Nigeria and other developing countries as the worst hit with deaths from non-communicable diseases. These diseases with a rising burden in Nigeria include cardiovascular disease, cancer, diabetes, chronic respiratory diseases, sickle cell disease, asthma, coronary heart disease, obesity, stroke, hypertension, road traffic injuries and mental disorders. According to the 2011 World Health Statistics, malaria mortality rate for Nigeria is 156 per 100,000 populations. Nigeria has one of the highest Tuberculosis burden in the world (311 per 100,000) resulting in the largest burden in Africa. This is according to USAID. The proper design of programs to address the public health problems in Nigeria will no doubt go a long way in improving the health status of the people. Though there are programs designed to address some of the health issues, there is a need to solve many other health problems.

Currently, there is no program designed to tackle public health issues holistically. Some of the programs to be designed lie with health-related sectors such as the ministry of education, housing, transportation, works, water resources, science and technology, agriculture, information and environment. The lack of coordinated efforts among these sectors affects the design of programs to address public health problems. Reduction in the number of unnecessary deaths and increased life expectancy can only be guaranteed with the pursuance, adoption and implementation of a health policy that is based on universal coverage, emergency medical services, national health insurance as well as affordable preventive care.

So many factors are responsible for the inability to design appropriate programs to address the major public health challenges Nigeria faces. Some of them include lack of political will by government and political actors, improper investment in the health sector, the inability to see the link between health and development, lack of policy to address all the health problems and week health systems.

"***Design of programs to address most of the public health problems in Nigeria will greatly improve the nation's health indices."***

Source: **Bolaji Aregbeshola** - https://www.inigerian.com/addressing-the-public-health-challenges-nigeria-faces/

Background Ideas

Nigeria at a Glance

- ✓ Population: 190,886,311 (2017)
- ✓ Per capita income: $5,680
- ✓ Life expectancy at birth: F 54/M 53 years
- ✓ Infant mortality rate: 67/1,000 live births

Sources: World Bank 2018, Nigeria
Population Reference Bureau 2018, Nigeria

Nigeria Top 10 Causes of Death

- Lower respiratory infections
- Neonatal disorders
- HIV/AIDS
- Malaria
- Diarrheal diseases
- Tuberculosis
- Meningitis
- lschemic heart disease
- Stroke
- Cirrhosis

Source: GBD Compare 2018, Nigeria

1.2 Causes

- **Poor lifestyle choices**: such as smoking, overuse of alcohol, poor diet, lack of physical activity and inadequate relief of chronic stress.
- **Poor housing conditions** are associated with a wide range of health conditions, including respiratory infections, asthma, lead poisoning, injuries, and mental health. Addressing housing issues offers public health practitioners an opportunity to address an important social determinant of health.
- **Climate:** atmosphere we are living in, such as a hot climate or a damp house. But it's also man-made climates such as air conditioning in a car or working in an extremely hot environment (eg close to a furnace in a factory).
- **Food & Diet:** Remember the saying 'We are what we eat'? Food has a huge influence on how well we are and a lot of the problems we have, including tiredness, hay fever, headaches, stems from what we eat. As our energy comes from the food we eat, eating the right food for us is crucial to get and stay well.

- **Drug Intake:** some medicines have some strong side effects especially when misused. Antibiotics can give bad diarrhoea, a sign that the antibiotics has weaken the digestive system (or to put it another way, that it destroyed the gut flora).
- **Pathogenic factors:** These are basically our viruses and bacterial infections such as a cold or the flu.

1.3 Problem Documentation Team

- **Abiola David Olanrewaju {Team Leader}**

Professional bio: David is an undergraduate at the University of Ibadan. As a Computer science student, he is passionate about using technology to solve problems. He is a Deep Learning practitioner and also a Software Developer having mastered technologies and languages such as Java, Kotlin, JavaScript, React, Python and algorithms. He loves to read and make music in his free time.

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- **Olawole Akindele Michael**

Professional bio: Dele is an undergraduate of Computer Science at University of Ibadan. He is passionate about the world of softwares, Artificial Intelligence which thrilled him to master JavaScript, XML, Databases amongst many other…. He loves sight-seeing and talking football.

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- **Faleye Oluranti Victoria**

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- **Ogunjobi Victor Olanrewaju**

Professional bio: Victor is a Data Scientist, AI & Machine Learning Enthusiast, Chemical Engineering student at Obafemi Awolowo University, Former Data Analyst Intern at **Hash Analytic** and currently a Campus Ambassador at **Code Warriors** - an organization of repute, of the mission to train young brains to become great coders.

He loves the world of science and technology and this is evident in the ways he has harnessed a part of its powers (Programming skills) to design pretty many problem-solving models.

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1.4 Affected Group/Demography and its adverse effects

The most vulnerable populations in Nigeria include children, pregnant women, people living with disabilities, elderly, displaced, unemployed, retirees and the sick. Although these vulnerable groups sometime benefit from free health care services and exemption mechanisms, they largely have to pay for health care services.

Healthcare services and exemption mechanisms are expected to provide financial risk protection for the most vulnerable populations but evidence suggest that they are ineffective and have failed to achieve this aim.

1.5 Adverse effects of the problem

- **Diagnostic & Medication errors:** are one of the major causes of deaths and injuries of thousands of patients every year, contributing to soaring healthcare costs.
- **Financial Burdens:** Low quality healthcare increases the burden of health costs.

  And ultimately; Economic unproductivity as financial pressure eventually becomes the lots of the nation.

1.6 Why should the problem be solved?

Health care services and exemption mechanisms are often politically motivated, are poorly implemented, do not become fully operationalized, and sometimes only last a few years.

- Improve overall physical, social, and mental health status
- For diseases/illnesses prevention
- Enable quality detection, diagnosis, and treatment of illness
- Ensure quality of life
- Reduce mortality rate invariably.

1.7 Health Organizations in charge of these cases

The Organizations involved and their contacts are listed as follows:

1. **Federal Ministry of Health**

   Federal Secretariat Complex, Phase III, Shehu Shagari Way, Central Business District. Abuja FCT - Nigeria.
   Email: info@health.gov.ng

2. **Nigerian Institute of Medical Research**
   Phone number: +234 1 909 213 3886
   Email: info@nmir.gov.ng

3. **National Centre for Disease Control**
   Address: Plot 801, Ebitu Ukiwe Street, Jabi, Abuja

   NCDC Toll-free Number: 0800-970000-10
   SMS: 08099555577
   WhatsApp: 07087110839
   Twitter/Facebook: @NCDCgov
   Email: info@ncdc.gov.ng

4. **World Health Organization (WHO) Nigeria**
   Dr Walter Kazadi Mulombo, WHO Representative

   Phone: +234 807759006
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   Email: kazadimulombow@who.int

1.8 Major stakeholders leading advocacy or actively building solutions for this problem.

- **Nigeria Health Watch**: an informed advocacy and communication to influence health policy and seek better health and access to healthcare in Nigeria.

  Website: www.nigeriahealthwatch.com
  Email: info@nigeriahealthwatch.com

- **HACEY**: a development organization focused on improving the health and productivity of vulnerable and underserved populations in Africa.

  Website: https://www.hacey.org/
  Email: info@hacey.org

- **Meedan**: an organization that builds software and designs human-powered initiatives for newsroom, NGOs and academic institutions.

  Website: https://meedan.com/
  Email: hello@meedan.com
  GitHub: github.com/Meedan

- **Africa Check**: is an independent organization that fact-checks claims, raise the quality of information available to society across the continent.

  Website**:** https://africacheck.org/
  Email: info@africacheck.org

2. Existing Solutions

- Healthcare startups like NHIS (National Health Insurance Scheme), NICS (National Immunization Coverage Scheme) etc, have been established to investigate, report healthcare indicators and solve health problems in Nigeria.

- Also, Technological advancements/ innovations have put in place solutions to such problems. A good example is **TeleHealth.** Telehealth continues to be seen as a key solution to help address local healthcare access issues. Through telehealth, patients can see specialists in a timely manner while staying in the comfort of their home or local facility.

  Local healthcare providers can also benefit from subspecialists' expertise provided via telehealth. Another is innovation is **Web Service Healthcare Consumerism**. That is, anyone can access health facility of related agencies on their websites to know more about symptoms they are experiencing and ways to manage the illness.

  But as time goes on, these innovations gets improved. An example of such latest innovations in vogue is as stated below:

2.1 Existing Solution Review (Related Technology Solution from another country)

MediBot: A School project work by a group of students in India

Access link: https://github.com/jaideepkekre/MediBot

MediBot is a medical expert system that uses pre-existing knowledge to calculate the probabilistic score of a patient having a particular disease. It is a 5 - bucket based algorithm [-1, 0 , 1 , 2 , 3] solution of which each contains Diseases, Symptoms, Probability score, Patient's history etc.

The system uses these algorithms to ask the next most relevant question. User answers with **Yes or No** or even select from a list of options

Interface: It uses python-telegram-api library, so it was deployed on a Telegram app.

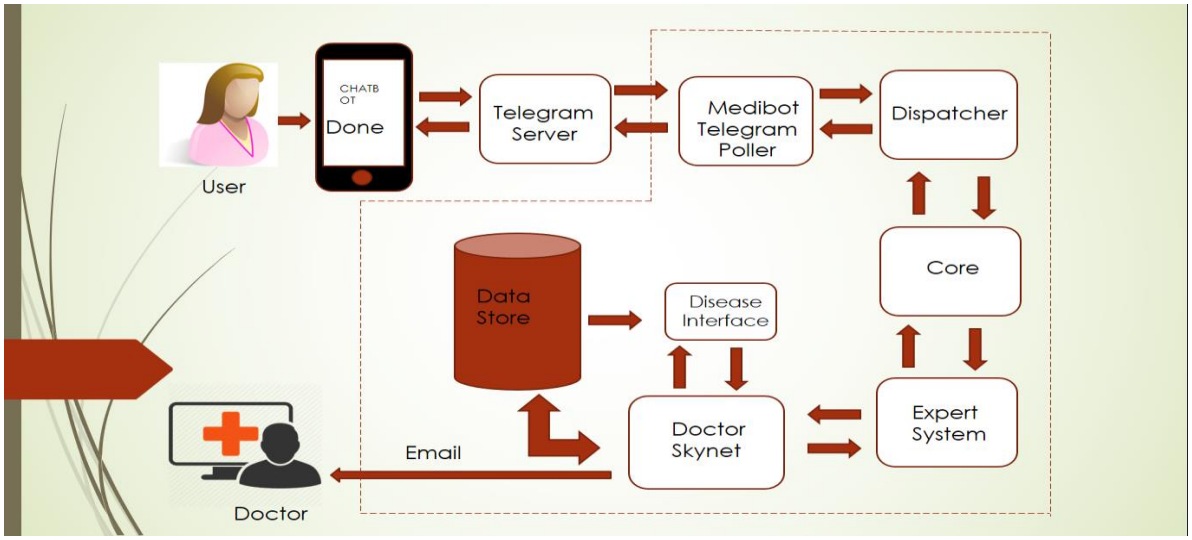

Figure 1. Working functionality of MediBot

Shortcomings:

- It is not conversational enough - in that the user responds with a Yes or No or select from available options and uses that to calculate a ratio score which then provides the diagnosis.
- The solution uses pre-existing knowledge (medical records) to calculate the probabilistic score of a patient having a particular disease.

Figure 2. User interface of MediBot

2.2 Technical Approach to the problems

As people become increasingly time poor and financially unstable, they find themselves more reliant on technology to help their lives run smoothly, and health is no exception.

Building a culture of wellbeing should be a commitment that is embraced and shared with the entire organization.

The following are problem-solving steps to follow to better approach the problem:

- Define the problem
- Identify the indicators of the problem
- Find data for the indicators/get one from healthcare startups
- Identify stakeholders in charge of the cases
- Identify key determinants
- Identify intervention strategies
- Identify implementation
- Evaluate

Also, embracing virtual healthcare enables a faster, more accessible and convenient route to health and wellbeing support.

3. What needs to happen to address the problem?

There is a toxic mix of problems including inaccessibility of quality health care, poor hygiene, corruption, malnutrition, lack of access to safe drinking water, poor health infrastructure, fake drugs, insufficient financial investment, and lack of sufficient health personnel. Below are the infrastructures that must be in place to address such problems:

3.1 Key physical infrastructures that must be in place

All healthcare services depend on the presence of basic infrastructure. Every health program—such as immunizations, infectious disease monitoring, cancer and asthma prevention, drinking water quality, injury prevention—requires health professionals who are competent in cross-cutting and technical skills, up-to-date information systems, and public health organizations with the capacity to assess and respond to community health needs. It includes these key infrastructures:

- A capable and qualified workforce
- Up-to-date data and information systems
- Agencies capable of assessing and responding to public health needs

- **Financing and coverage:** Political actors, policy makers and all stakeholders in the health sector should establish a government funded social and financial risk protection scheme through a general tax financing system for the poor and vulnerable, and invest in basic infrastructure for health care in rural areas for quality health care service delivery.

- **Equipped Information and Communication Technology (ICT) Department**: Due to poor communication infrastructure, the process of healthcare has been limited to national and provincial / region levels leaving behind majority of health workers living in remote / rural areas. But advancement in ICT will help marginalize health workers in developing countries especially those living in remote areas.

- **Law:** Nigeria can achieve universal health coverage through law and lack of its establishment in government policies is a setback to nation's healthcare sector. According to National Health Act 2014,
  This **Act** provides a framework for the regulation, development and management of a health system and sets standards for rendering health services in Nigeria.

- **Transportation:** means to reach and use services, such as transportation to services that may be located at a distance, and the ability to take paid time off of work to use such services.

3.2 Stakeholders involved in solving the problem

- **JOHESU {**Joint Health Sector Unions**}:** Umbrella body of health workers, unions & associations in Nigeria.

- **NHIS {**National Health Insurance Scheme**}:** The National Health Insurance Scheme is a body corporate established under Act 35 of 1999 Constitution by the Federal Government of Nigeria to improve the health of all Nigerians at an affordable cost. NHIS is to provide social health insurance in Nigeria where health care services of contributors are paid from the common pool of funds contributed by the participants of the Scheme.

- **NMA {**Nigerian Medical Association**}:** is involved in influencing health policy formulation in an ad hoc manner. This is done by making unsolicited recommendations to government on various health issues and also by making-inputs, whenever invited, to some of the national committee meetings on policy formulations.

- **WHO** {World Health Organization}: an international organization that ensure the safety of the air people breathe, the food they eat, the water they drink – and the medicines and vaccines they need.

3.3 Why is AI and Data presumed to be helpful in addressing the problem?

Although the field is quite young, AI has the potential to play major roles in the health-care system, some of such roles are:

- **Pushing boundaries of human performance:**

The flashiest use of medical AI is to do things that human providers even excellent ones cannot yet do. For instance, Google Health has developed a program that can predict the

onset of acute kidney injury up to two days before the injury occurs; compare that to current medical practice, where the injury often is not noticed until after it happens. Such algorithms can improve care beyond the current boundaries of human performance.

- **Automating drudgery in medical practice:**

AI can automate some of the computer tasks that take up much of medical practice today. Providers spend a tremendous amount of time dealing with electronic medical records, reading screens, and typing on keyboards, even in the exam room. If AI systems can queue up the most relevant information in patient records and then distill recordings of appointments and conversations down into structured data, they could save substantial time for providers and might increase the amount of face-time between providers and patients and the quality of the medical encounter for both.

- **Managing patients and medical resources:**

Finally, and least visibly to the public, AI can be used to allocate resources and shape business. For instance, AI systems might predict which departments are likely to need additional short-term staffing, suggest which of two patients might benefit most from scarce medical resources, or, more controversially, identify revenue-maximizing practices.

3.4 Impact of data and available data/datasets surrounding the health problems and the condition for their access

Healthcare data is a staple resource for most health and medical research. It is either collected during the course of ongoing patient care or as part of a formal clinical trial program.

Condition for their access:

In order to provide an accurate evaluation of the population health, national surveys of the most common chronic conditions are generally conducted to provide prevalence estimates. National surveys are one of the few types of data collected specifically for research purposes, thus **access is restricted to health channels** and can be viewed on their respective websites. Some of them include:

- Google Trends. Curated by: Google.
- **National Centre for Disease Control (NCDC)**
- Global Health Observatory **data**. Curated by: World Health Organization (WHO)
- **Data**.gov.ng.
- Earthdata

A good example is the one for DHS (Demographic and Health surveys) Program - The program is authorized to distribute, at no cost, unrestricted survey data files for legitimate academic research. The only condition for accessing the datasets is Registration.

Website: https://dhsprogram.com/Data/

All of the above-listed sources provide data that are readily available for use at all time.

Is such an approach feasible and sustainable?

It is feasible, in that the information required is openly sourced and can be easily updated.

And about sustainability, maintenance such as compiling and standardizing of the database to the cloud is needed to sustain the approach.

4 Possible Artificial Intelligence Solutions

4.0.1 Technical Features of the solution

- **Diagnostics accuracy**: Instead of following a routine checklist, healthcare professionals can benefit from the informative by-product of algorithms that can read data using computer vision, text and sound recognition, and natural language processing.

- **Clinical performance boost**: Data-driven software provides clinicians with the opportunity to make better sense of their data – schedule more efficiently, create smarter reports with Business Intelligence, and automatically manage supplies.
- **Data protection improvement**: Most security disasters in the healthcare industry are caused first by human error and misuse and physical theft and hacking second. But with AI, these errors are maximally reduced.

4.1 Must have

- **Problem- solving and assist with clinical decision support.**

Applied practically, Artificial Intelligence can help advance population health, care delivery and operations. And with **Clinical Decision Support System** (CDSS), AI is intended to improve healthcare delivery by enhancing make more informed medical choices with targeted clinical knowledge, patient information, and other health information.

4.2 Should have

- **Robotic process automation (RPA).**

RPA is an intelligent automation ingredient. Working together with the solution, technologies like robotic process automation (RPA) and low-code application development systems can be used to transform a series of slow, manual tasks into fast, error-free digital workflows. automate routine record-keeping and admin tasks, from scheduling patient appointments to managing accounts payable. You could also digitize and optimize more complex processes, such as hospital caseload management and insurance claims processing as well as power smart virtual assistants to retrieve information and files in the background, if required.

4.3 Could have

- **Speech Recognition**: through this technical feature, questions can be posed to the assistant by speaking. Based on user interactions with the bot engine, contextual health notifications and reminders, such as when to take medication, are periodically sent back to the user.

4.4 Would not have

- **Computer Vision**: The first version of this solution will not include the functionality of Computer Vision but can be added in subsequent versions as upgrades. It could be used to detect abnormalities on a scan which could be missed by the naked eye, and thus increasing the success rate of identification and monitor the real-time performance of the solution.

4.5 Documentation of the solution

Artificial Intelligence can be used to answer questions, to look for but also to process documents, fill in forms, to correctly route various types of requests or to perform translations.

CHATBOT

A chatbot equipped with AI can respond simultaneously to conversations that come at a given time, eliminating waiting times and, once having understood the needs of its interlocutor, can direct him to the right departments, help find the documentation needed, provide instructions to correctly submit written requests, if necessary also speaking in a foreign language, or translating the bureaucratic terms that the user does not understand.

In this way, public officials can be freed from the task of answering the simplest questions and tasks, which are often the most recurring, saving time to devote to other activities, to provide complex advice and better services.

In lieu of the background ideas garnered, The Team thought of utilizing some of the functionalities of AI to put up a solution that could be very much helpful in the field of healthcare. Which is a **Virtual Health Assistant.**

4.5.1 Presenting Virtual Health Assistant

VIRTUAL HEALTH ASSISTANT

Brief introduction of the model

Virtual Health Assistant is a medical assistant solution which detects illness symptoms of user when described and suggests remedies/ directs to a doctor if needed.

Virtual Health Assistant handles simple, repetitive tasks.

The Chatbot interacts with the patient/consumer using keystrokes (from laptop or phone), addresses each inquiry as a new or familiar inquirers (patients).

The model - **Virtual Health Assistant** mainly work on the idea of NLP.

The detailed analysis of the model goes thus • • •

Detailed information:
The healthcare sector is closely associated with human interaction, and it seems counterintuitive that conversational AI applications like chatbots are more prevalent.

Hospital administrators are spending their day in appointment scheduling and answering routine questions of patients. Continuing or repeating the same actions and words is neither necessary nor productive. Such jobs can be easily done with bot applications. It is obvious that patient feedback assessments are also possible by collecting user responses to maintain good patient flow.

A render question could help chatbot precisely understand the user's request. To achieve the intended response, the fusion of AI technology with natural language programming (NLP) has been done, because NLP is a helpful technology to draw the relationship between natural language understanding and decides complementary response outcomes.

The designed bot can handle user requests and identify message patterns with an Artificial Intelligence Markup Language (AIML). AIML is an XML-based markup dialect to create natural language software agents and gives the real human interactive experience to users. Depending on user responses, AIML logic retrieves symptomatic keywords to assess the existing user medical conditions. Ultimately, we aim to make sure the user feels like they are having a conversation with a health specialist.

The functionality of the chatbot designed using NLP is defined in two ways:

- Request Analysis
- Return response.

At first, chatbot evaluates the severity of the virus through feedback from a predefined questionnaire.
Simultaneously, if the user fails to acknowledge precise answers, the bot will fail to provide the correct response. In its response return, after the evaluation of a patient's condition, the

chatbot provides an obvious response in the form of either generic text or text retrieved from the knowledge base response.

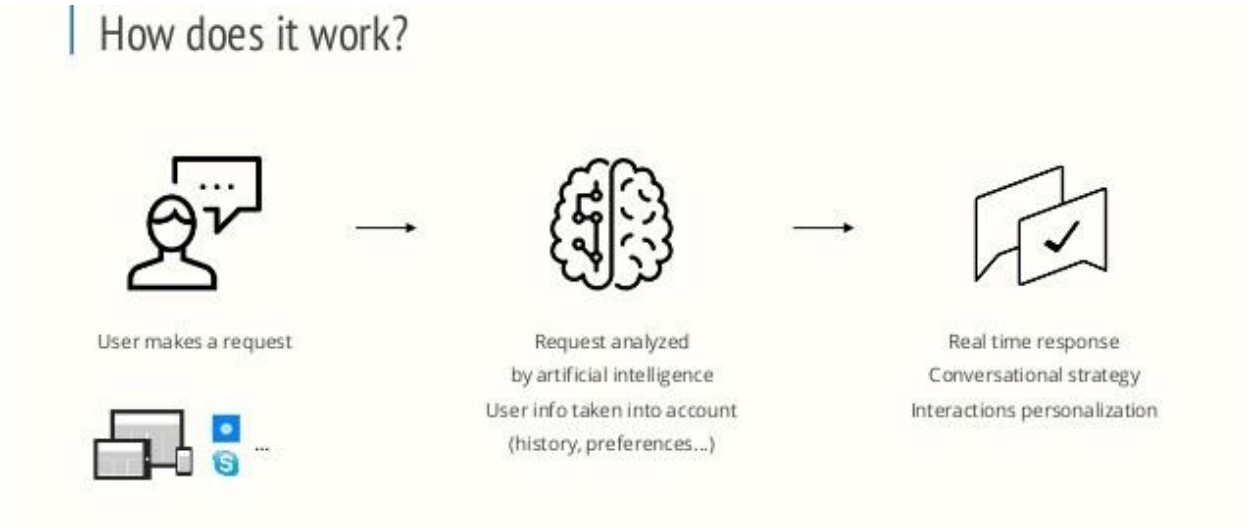

Figure 3. Working functionality of the developed chatbot

4.5.2 Aim and Objectives

- The aim of this project is to replicate a person's discussion - implement a conversational system that is as close to human interaction as possible such that a user sends input and receives response.
- To create a chat bot that serves a vast amount of known medical facts regarding diseases, symptoms, disease patterns, risk criteria, etc. in a Question and Answer interface.
- Reduce the cost of Healthcare organizations.

4.5.3 Technicality of the solution & Usage

There are 2 major approaches to making a chatbot:

- Retrieval-based approach: – the chatbot is trained on conversations in the datasets and only restricted to that. It does not give response out of context of the database.

- Generative model approach: – an approach that makes the chatbot even compose its own message to give response. This is super smart as this approach makes the solution converse like a human being!. Even though it is harder to build in that it requires extremely large database and it takes a lot more expertise, it will make much sense as it defines Artificial Intelligence. It can make mistakes (grammatical errors, some words could be misspelt as a result of word-formation), but for better functionality that makes less mistakes, it will require extremely large database.

Our solution – Virtual Health Assistant works on Retrieval-based approach, one that works on the response that is already curtained database.

Future plans of the team on the solution:

Our future plan is to make the chatbot work on generative model approach as well, to make it super intelligent.

Method of training the solution:

The data collection and cleaning were done on our local machine but training on the data was done on Google Colaboratory (Google Colab). So our chatbot is exposed to an API which eventually is consumed on Android (the mode of the solution deployment).

4.5.4 Accessing the solution {Virtual Health Assistant} and supporting materials

The solution is made open-source so it is available for others to learn from and contribute immensely. The solution is presented alongside some supporting materials – a PDF that helped during the course of building the solution and a Powerpoint presentation document (pptx file) which illustrates practical demonstration of Virtual Health Assistant.

Access solution here: https://github.com/DeleMike/Virtual-Health-Assistant

4.5.5 Database/Datasets used for the course of this solution.

Since the system is aimed at addressing local health issues through virtual conversation, It is very important to look for datasets that contains Medical -based Dialogue. Hence during our datasets hunt, our search keywords led us to database of several models that are designed with Questions and Answers conversation between medical agents and users that need medical assistance – exactly what we need to feed and train the system!.

The datasets used were gotten from here: https://github.com/LasseRegin/medical-question-answer-data .

The Team has cleaned the data and have them all merged (including all the features in the tags) into a single file using python library PANDAS and can as well be accessed through the solution link: https://github.com/DeleMike/Virtual-Health-Assistant

Future plans of the team on the solution:

Our current solution is deployed on Android and requires internet to access the API.

But the future plan of the team is that: Alongside improving the chatbot to work on generative model approach to make it super intelligent, the on-device chatbot will require **no** connectivity to the internet or server.

5.0 Impact

- **How is this solution different from already existing approaches?**

It is true that the government has intervened in solving the problems especially by deploying Task forces like Healthcare agencies to tackle the such problems.

Aside that, some big hospitals now have virtual nurses to care for people especially those who require home services. All of these are implemented by humans which may not be immediate or efficient enough.

Our solution (Virtual Health Assistant) can help to streamline these tasks and thus substantially reduce costs, as well as decrease the number of personal visits to doctors in that it does remote consultation, diagnosis and treatment (proffers probable solutions).

- **How will this solution empower problem owners and champions?**

Benefit for those directly impacted by the problem:

Since Virtual Health Assistant is handy, It gives those affected by health problems the convenience of accessing immediate healthcare.

For those championing the problem:

Improved services for patients through always-available virtual assistance and proactive human like patient interactions beyond geographical boundaries. The solution is an excellent tool to handle large volume of queries and of course this helps in better governance of the health sector.

- **How can this solution be sustainable?**

    - This solution can be sustained by constantly updating the data through crowdsourcing.
    - It can as well be sustained by encouraging researchers to carry research with the vision to improve the solution.
    - Also hackathons can be done where technical experts can be invited to brainstorm and add more features to the App.
    - If made open-source, developers all over the world can contribute to add more features.
    - Funding from Investors and Government would be needed to properly implement the solution.

- **How this solution could help share more knowledge about problem solving**

    The functionality of the solution being developed in a short time would inspire more people to see the good in knowledge sharing and hence inspire problem owners and developers to look at problems in their vicinity and rise up to the task of problem solving.

    It would also serve as an eye-opener to many individuals how well they can affect their environs by utilizing end-to-end AI models for the use of people to solve problems.

    And lastly, It is a good head-start for those already nursing Artificial Intelligence ideas.

5. Conclusion

Our idea behind this study is to present sophisticated AI medical chatbots for users, especially during unknown pandemics like COVID-19. The presented AI chatbot will have a large impact on patient life during serious epidemics. It would provide the advantage of putting access to virtual doctors or medical personnel into their hands. We bring health specialists and professionals into our platform to feed medical information into a bot engine, also to the availability of every user whenever the possibility of infection is detected.

To note:

Even though AI systems learn from accurate, representative data, there can still be problems if that information reflects underlying biases and inequalities in the health system.

A hopeful vision is that providers will be thrilled and enabled to provide more-personalized and better care!.

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