

# **Personal Medical Assistant**

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## **ABSTRACT**

**In this report, I have explained an idea about a medical Assistant that can be used by common people as well medical field experts which helps them in fulfillment of basic medical needs of patients. Majority of the people in this world are not able to interpret their medical test results and have to consult with a professional or search the individual medical terms online. This assistant can interpret their medical results into simple languages and provide them with necessary steps for the future. Let's take an example if someone got their blood test done and their hemoglobin level is low then this assistant can explain them this occurrence and provide them with necessary precautions they should, on top of that it can also book an appointment with the doctor if the user wants to do that.**

**Multi-specialty hospitals can use this device to perform an analysis of the pathology report for a better explanation of the same to the patients, and necessary precautions they need to take. This will save a lot of time and man power of the hospital, and patients will be much more satisfied.**

## **1. Problem Statement**

### **1.1**

**Majority of the people in this world are not able to interpret their medical test results and have to consult with a professional or search the individual medical terms online. Many a times people feel like if there was someone who could constantly remind them about their medicine time and give them a proper health tips and precautions they need to take, it would be a great help for them.**

### **1.2**

**In Multi-specialty hospitals many a times patients have a lot of doubt related to their diagnosis/treatment. Medical professionals are not able to explain everything in layman terms. Doctors will be much easier if someone already studied the pathology reports and provide them with an overview and what could be the causes of any abnormality being experienced in the body.**

## **2. Assessment**

### **2.1) CUSTOMER NEED**

- **Domestic need-> Medical field is highly complex; it consists some many complex terms and operations. Majority times general public is not able to interpret their diagnosis and have to be completely depended upon the medical professional for the interpretation. Now if the medical professional is not available instantly then that can lead to a lot stress and can generate a lot of doubt in the person's mind. This can lead to various complexities and can result in decline of personal and professional loss.**
- **Hospital needs->Generally in hospitals we visit a doctor with a problem and doctor tells us to get tests done and when the report comes the doctor studies the report and does whatever is necessary, now if this task can be optimized and the entire process can be much more efficient that will be a beneficial to both the patients as well the doctor.**

## **2.2) Market Need Assessment->**

### **2.2.1) AI in domestic medical assistant->**

**With the increase in awareness about personal health and hygiene an AI medical assistant can be the next big thing. This device can keep a tab about your medical appointments, medicines, diets and any other special needs. This device can analyze your medical reports, check for any abnormality in it and explain you the problem in layman terms, and suggest you with necessary precaution you should take and will even book an appointment with a doctor if you ask. The device will be in high demand since people have started to take their personal health and immunity seriously due to the pandemic.**

### **2.2.2) AI in Hospital Assistant->**

**Due to the pandemic doctors have been really busy due to huge number of patients that have been constantly been admitted. In this if we can provide assistance by automatically analyzing the diagnostic reports of patients and segment them based on severity of abnormality or disease type.**

## **2.3) BUSINESS NEED->**

### **2.3.1) Domestic medical assistant**

**In the times of COVID pandemic many businesses have taken a huge blow but medical fields profit has increased many folds people have started to take their personal health seriously. Due to this I think if we introduce a personal health assistant then it will be very profitable.**

### **2.3.2) Hospital Assistant->**

**Due to increased number of patients being admitted to the hospital an assistant is the need of the hour because it will increase the efficiency of the hospital by reducing the laborious task of analyzing each and every diagnostic report, which in turn increase the profits for the medical institutions.**

### **3)Target Specification and Characterization**

**3.1) Domestic medical assistant->** This will be a robot which will be a personal medical assistant of people.

#### **Task performed by Robot->**

- 1. Analyze medical reports->** This robot will analyze your medical reports and explain you in layman terms if there are any abnormalities in your body.
- 2. Suggest Necessary Precautions->** After analyzing the report it will suggest you some health tips, diet tips and other necessary precautions you should take.
- 3. Book appointment->** Using automation it will book your medical check-up appointments automatically.
- 4. Medicine reminder->** It will remind you of your medicine time and will provide you a check list, so that you can see which medicines you have already taken.
- 5. Other miscellaneous Task->** Task like drinking enough water or reminder to eat fruit or necessary diet reminders will all be taken care by this robot

**3.2) Hospital Assistant->** For hospital the assistant will be just an AI app which when provided with the diagnostic reports will automatically analyze the reports and provide necessary insights to the medical professionals along with possible reasons for the abnormality and if any other tests are required.

#### **4) External Search (Information Sources)**

**There are abundant number of medical datasets which is available throughout the internet. We need medical diagnostic dataset which help us developing the prediction algorithm for anomaly in the body of patient. On top of this we need a recommender system which will suggest necessary precautions and if more diagnostic is required. We need to make sure there are no outliers in the dataset cause medical field is really sensitive and every will directly affect someone's treatment so we need to make sure the data is well cleaned and analyzed properly before usage.**

**Website link->**[\*\*https://data.world/datasets/health\*\*](https://data.world/datasets/health)

**This website contains medical dataset which we can use. But since medical field contains several diseases, we need to merge several and create a master dataset which contains information about nearly all major diseases, it's symptoms etc.**

**This will increase the usage of our model cause we don't our model to work on just some basic diseases.**

**5)BENCHMARKING->** There are currently no similar products in the markets. Cause most of the medical robots are used for surgeries. So benchmarking is not possible for this product.

**6)Applicable Patents->** This project is very simple in reality so we don't really have any patented techniques being used as of seen in the initial planning stage. If any patents stuff is required, they will be dealt it.

**7)Applicable regulations->**

**1. Regulating Robots (agriculture robots):** -legal framework Like Product defect the directive applies to all types of products including agricultural products. Under the law, “product” is defined as all movables even if incorporated into another movable or an immovable.

**2. Accidents and health and safety law:** - An undertaking is defined by the set of activities carried out by an organization; this extends to the design and manufacture of products such as bots and includes their use. Therefore, an accident whereby a member of the public is injured by a bot could result in a criminal prosecution against the owner/user of the bot, and/or the designer/manufacturer. The balance of this prosecution depending mainly on the nature of the accident.

**3. Accidents caused by agents, employees and contractors:** - Liability for accidents caused by third parties depends on whether the person who caused the accident is an agent or an independent contractor.



## **8)Applicable Constraints->**

- **The constraints in this product can be due to Availability of the right dataset, because there are huge number of diseases, we have to create a large database which contains all the diseases along with the symptoms associated with them, so due to this our prediction algorithm will contain a large number of target variable and that can lead to underfitting of the data.**
- **Since there are various diseases present but most them have quite similar type of symptoms so our algorithm may predict the diseases incorrectly and that can very problematic.**
- **Gaining trust of people and medical professional is also a challenge cause people won't rely upon a robot for their medical issues. So, we need to present them the results and benefits of this product.**

## **9)Business Opportunity->**

### **9.1) Domestic medical assistant**

**In the times of COVID pandemic many businesses have taken a huge blow but medical fields profit has increased many folds people have started to take their personal health seriously. Due to this I think if we introduce a personal health assistant then it will be very profitable. We will be able to easily market this product cause people want to but these kinds of products and also investors will love this idea so seed funding will also be very easily available.**

### **9.2) Hospital Assistant->**

**Due to increased number of patients being admitted to the hospital an assistant is the need of the hour because it will increase the efficiency of the hospital by reducing the laborious task of analyzing each and every diagnostic report, which in turn increase the profits for the medical institutions. So, the medical institutions can themselves fund our idea.**

## **10.) Concept Generation->**

**10.1) Personal Health Assistant->** This will be a robot which will analyze your diagnostic reports as well as fulfill all your medical needs like medicines reminders, dietary requirements, appointment scheduling etc.

**10.2) Hospital assistant->** This will be system software which when provided with a diagnostic report will analyze it and provide you necessary insight for the same.

## **11)Concept Development->**

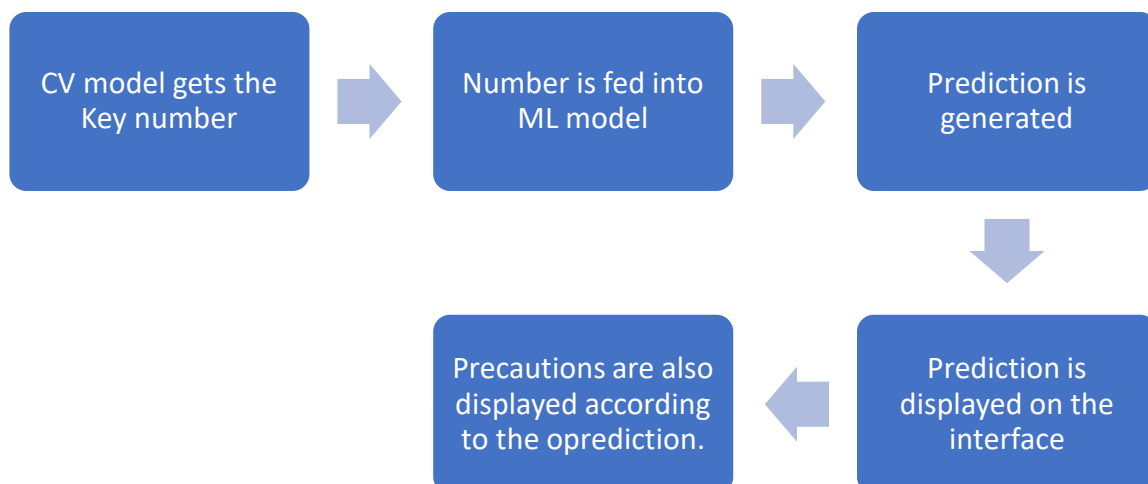
**11.1) Personal Health Assistant->** We will use robotics engineering to develop the external body of the robot and then in the backend we will use Linux OS which will run Machine-Learning, Computer Vision and all necessary scheduling and interaction apps.

**11.2) Hospital assistant->** This will be system software which will use Computer Vision along with Machine learning model and recommender system for the analysis of the reports.

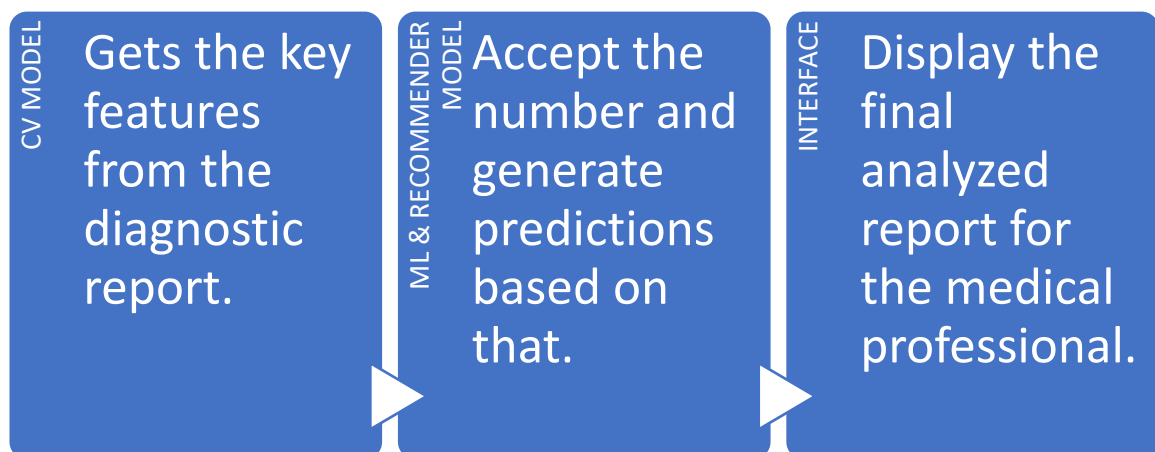
## **12) FINAL PROTOTYPE->**

### **12.1) Personal Heath Assistant->**

**This Robot will be programmed in python programming language and will be powered by Machine Learning, Computer Vision, recommender system. The external body will be made of Aluminum. It will contain micro-controllers for the movement of the body parts. It will analyze the reports using computer vision and try to extract key text points. It will be a prediction algorithm which will receive the numbers of the test results and based on that it will predict the possible anomaly in the body. Using Python language, we will create a scheduling algorithm and also automate the process of get the appointments done.**



**12.2) Hospital assistant->This will be system software which will use Computer Vision along with Machine learning model and recommender system for the analysis of the reports. The CV model will extract the key numbers from the report and pass it on to the both predictive as well as recommender system ML model and prediction will be generated and displayed on the interface.**



## **13) SERVICE DETAILS->**

### **13.1) How does it Work?**

#### **13.1.1) PERSONAL HEALTH ASSISTANT->**

**13.1.1) The Robot backend->**This Robot will be programmed in python programming language and will be powered by Machine Learning, Computer Vision, recommender system.

**13.1.2) The Body->** The external body will be made of Aluminum. It will contain micro-controllers for the movement of the body parts.

**13.1.3) Vision of the robot->**It will analyze the reports using computer vision and try to extract key text points. OCR (Optical character recognition) will be used for extracting the information from the document.

**13.1.4) Machine Learning->**It will be a prediction algorithm which will receive the numbers of the test results and based on that it will predict the possible anomaly in the body. The model will be build using Deep learning library TensorFlow. It will be a supervised machine learning problem which will receive the numbers extracted using the CV model and then predict the anomaly.

**13.1.5) Scheduling and automation->**Using Python language we will create a scheduling algorithm and also automate the process of get the appointments done.

**13.1.2) Hospital Assistant->** This will also use the CV model OCR technique for the analysis of the diagnostic report and then that information will be passed on the ML and recommender system model the ML model is explained in the previous section. The final result is displayed on the interface.

**13.2) DATA SOURCES-> The data should contain the information about various diseases and their symptoms.**

**Website links->**

- [kaggle.com](https://www.kaggle.com)
- [data.world.com](https://data.world.com)
- [nyam.org](https://nyam.org)

## 13.3) ALGORITHMS->

**13.3.1) Computer Vision-> OCR (Optical character recognition) will be used for the text extraction from the diagnostic reports. For this we need to mark the text region using the OpenCV library and then Pytesseract library will be used to apply OCR technique to the document.**



D. Brawn Manufacture

Invoice no. DVT-AX-345678

Payment date: 03/12/2006

Reference	Designation	Qty	Unit price	Total CHF	Sales
Work					
SERVICE D	COMPLETE OVERHAUL	1	5500.00	5500.00	220
SERVICE D	REFRESHING COMPLETE CASE	1	380.00	380.00	220
	AND RHODIUM BATH				
Exterior parts:					
JO.297.065.FP	FLAT GASKET	1	3.00	3.00	220
JO.197.075.FP	FLAT GASKET	1	4.00	4.00	220
JO.199.059.OS	FLAT ROUND GASKET	1	6.00	6.00	220
VI.261.036.BC	W.G.FIXATION SCREWS	10	4.00	40.00	220
AI.465.055.BC	WHITE GOLD "FOIL"	1	70.00	70.00	220
	PAIR OF HAND				
	LENGTH: 10/13.50MM				
	CALIBRE 2868				
	SPECIAL DISCOUNT		-3003.00	-3003.00	
	Discount		-900.00	-900.00	
	Total CHF			2100.00	
RETURN AFTER REPAIR					
NO COMMERCIAL VALUE					

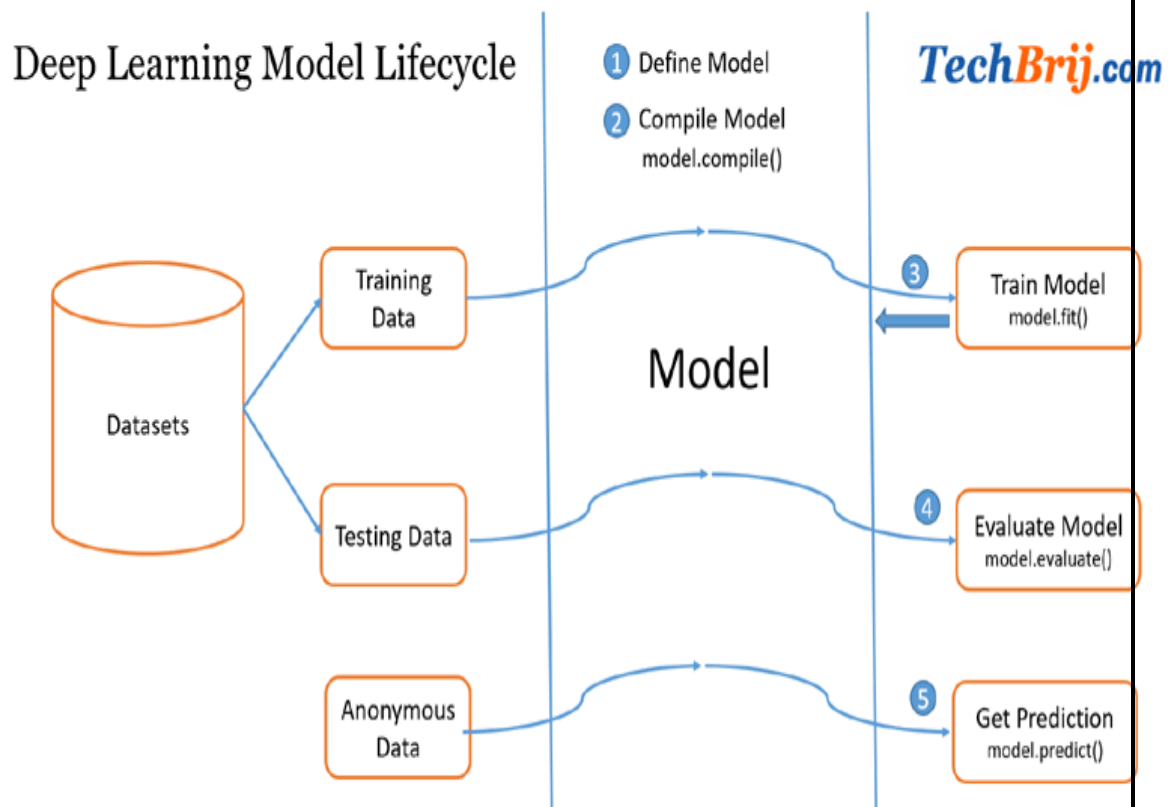
**Payment:**

Mr. John Doe  
Green Street 15, Office 4  
1234 Vernut  
New Caledonia

Credit Card: Visa  
Card No: 112345678



**13.3.2) Prediction Model->** It will be a deep learning model which will use supervised learning approach. TensorFlow library will be used for model training and development. We will use the Dataset that we have created, for the training and testing of the model. This model will receive the numbers from the OCR model and then generate the predictions accordingly.



**13.3.3) Recommender System->** This algorithm will use the cosine similarity principle for the generating the recommendations. It will be using python programming language and NumPy and scikit learn library.

**13.4) Team requirements-> We have 2 choices here where we can buy robots and the reprogram them accordingly or we can build robots from scratch.**

- **4 software engineers**
- **2 Data engineers**
- **3 Data scientist**
- **2 Data analyst**
- **2 Medical Domain experts**
- **2 Vision engineers**
- **2 Robot programmers**
- **2 robot engineers (only if we building it own robots)**

**13.5) COST->**

- **Pre-build Robot->Rs. 70,000**
- **Dataset-> Rs. 20,000**
- **Software Development-> Rs.50,000**
- **Software Testing and Deployment->40,000**

**The overall cost will be 1 Lakh 80 thousand.**

#### **14)Conclusion->**

**AI in the medical field will not only will be profitable to the medical professionals but also reduce the laborious task of analyzing each and every report from scratch, instead of that if a software can generate some pointers regarding the report, then it will increase the efficiency and the doctors can focus upon their main job. Using the personal medical assistant people will be able to understand their diagnostic report much more easily. On top of that there are medicine reminders and automated appointment schedulers which will make their life easier. Due to the current pandemic scenario people have started to take their help much more seriously, so this product will have no problem finding customers and hospitals will also find this product helpful, as this will enable them to work much faster and they will treat patients in less time hence increasing their profits and improving the quality of their medical professionals.**

