# Healthcare Chatbot

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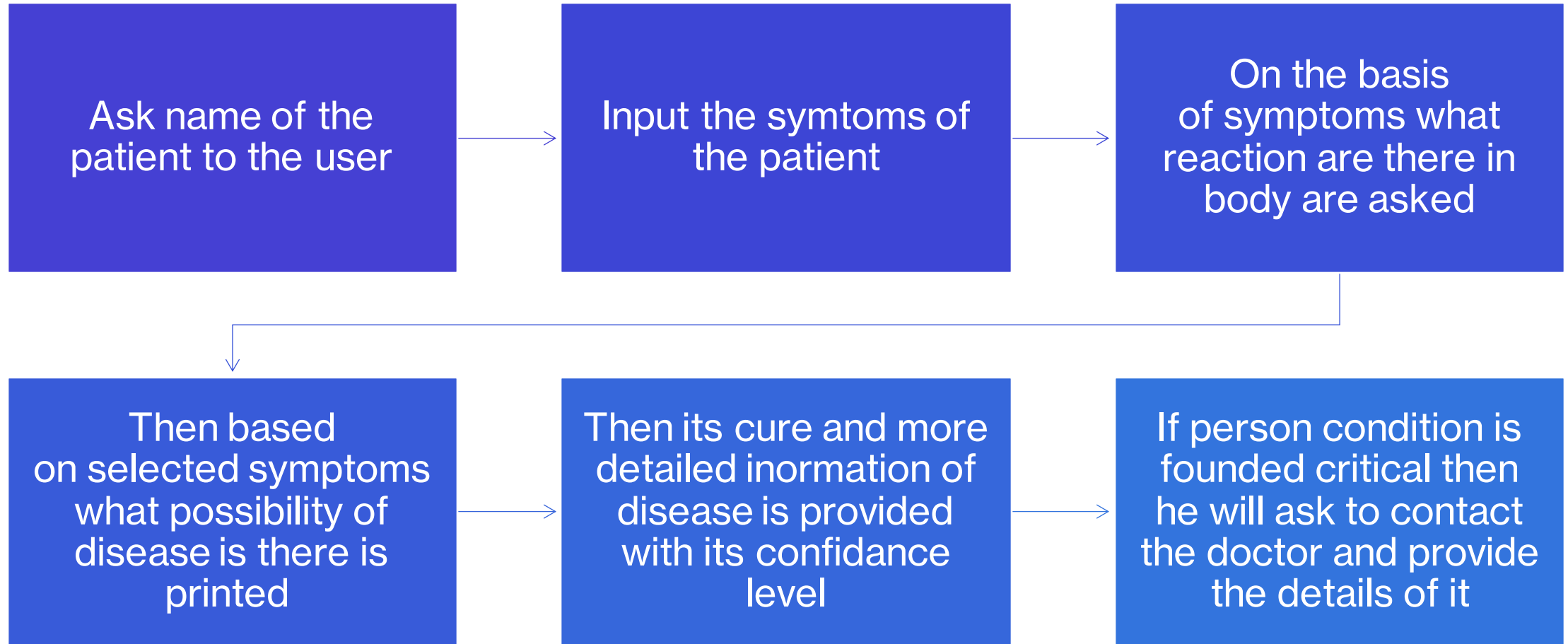

- Guided by : Prof Sunil Tayde

# Introduction



Today in the fast-moving world, every individual has loads of work. Due to which a person is bound to have small or big health issues in their life, and they should go to the doctor once a year. In this job-oriented world, they must attend to their work and while doing so they will try to skip the long doctor's queue for appointments. We have a brilliant solution to tackle this problem, just bring the doctor home with our **Health Care Assistant powered by AI and Deep Learning**.

# Flowchart

| | | |
|---|---|---|
| Ask name of the patient to the user | Input the symtoms of the patient | On the basis of symptoms what reaction are there in body are asked |
| Then based on selected symptoms what possibility of disease is there is printed | Then its cure and more detailed inormation of disease is provided with its confidance level | If person condition is founded critical then he will ask to contact the doctor and provide the details of it |

# Problem Statement-1

Predicting the disease name based on various symptoms given by patient to bot using ML algorithms and reliable datasets

# Flowchart

- Importing the Datasets containing symptoms and disease names

- Slicing the dataset at *appropriate* location

- Splitting the data into train and testing Dataset

- Apply the DecisionTreeClassifier for training the synptoms and binary dataset

- Prediction of appropriate disease on the basis of symptoms selected

# Dataset

| | A | B | C | D | |
|---|---|---|---|---|---|
| | | | | | |
| | Fungal infection | itching | skin_rash | nodal_skin_eruptions | dischro |
| | Fungal infection | skin_rash | nodal_skin_eruptions | dischromic_patches | |
| | Fungal infection | itching | nodal_skin_eruptions | dischromic_patches | |
| | Fungal infection | itching | skin_rash | dischromic_patches | |
| | Fungal infection | itching | skin_rash | nodal_skin_eruptions | |
| | Fungal infection | skin_rash | nodal_skin_eruptions | dischromic_patches | |
| | Fungal infection | itching | nodal_skin_eruptions | dischromic_patches | |
| | Fungal infection | itching | skin_rash | dischromic_patches | |
| | Fungal infection | itching | skin_rash | nodal_skin_eruptions | |
| | Fungal infection | itching | skin_rash | nodal_skin_eruptions | dischro |
| | Allergy | continuous_sneezing | shivering | chills | wateri |
| | Allergy | shivering | chills | watering_from_eyes | |
| | Allergy | continuous_sneezing | chills | watering_from_eyes | |
| | Allergy | continuous_sneezing | shivering | watering_from_eyes | |
| | Allergy | continuous_sneezing | shivering | chills | |
| | Allergy | shivering | chills | watering_from_eyes | |
| | Allergy | continuous_sneezing | chills | watering_from_eyes | |
| | Allergy | continuous_sneezing | shivering | watering_from_eyes | |
| | Allergy | continuous_sneezing | shivering | chills | |
| | Allergy | continuous_sneezing | shivering | chills | wateri |
| | GERD | stomach_pain | acidity | ulcers_on_tongue | vomitir |
| | GERD | stomach_pain | ulcers_on_tongue | vomiting | cough |
| | GERD | stomach_pain | acidity | vomiting | cough |
| | GERD | stomach_pain | acidity | ulcers_on_tongue | cough |

| ring | chills | joint_pain | stomach_ | acidity | ulcers_on | muscle_w | vomiting | burning_n | spotting_ | fatigue | we |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | |

# Algorithm

▪ **Decision Tree Classifier**

Decision Trees (DTs) are a non-parametric supervised learning method used for classification and regression. The goal is to create a model that predicts the value of a target variable by learning simple decision rules inferred from the data features



Types of Decision Tree

Deep Tree

Balanced Tree

Bushy Tree
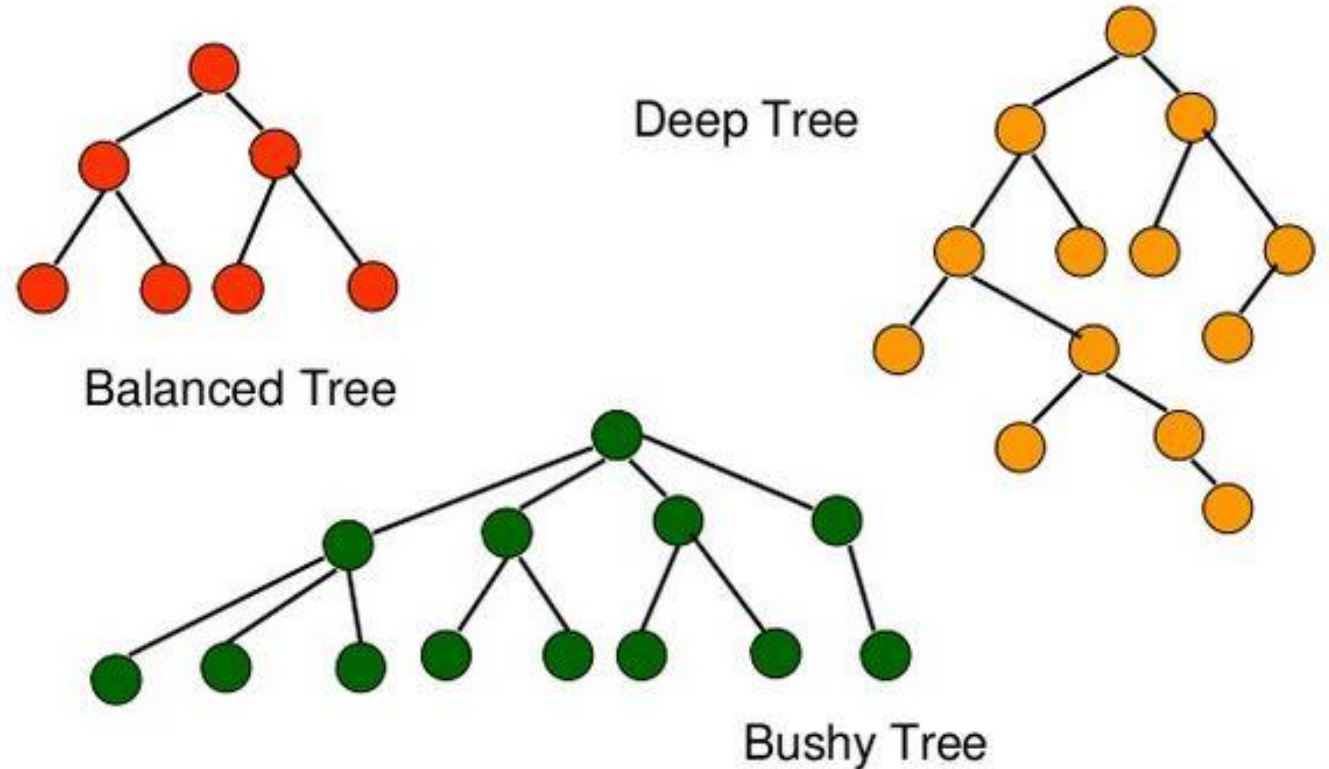
By : Mohd. Noor Abdul Hamid, Ph.D
(Universiti Utara Malaysia)

# Decision tree for Simple and Complex disease
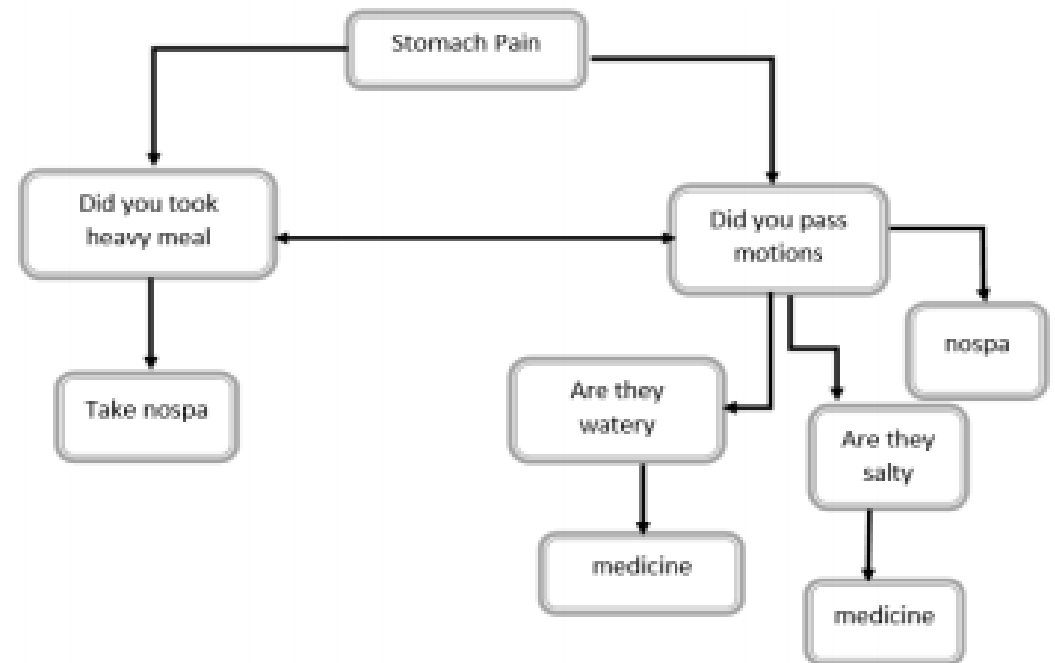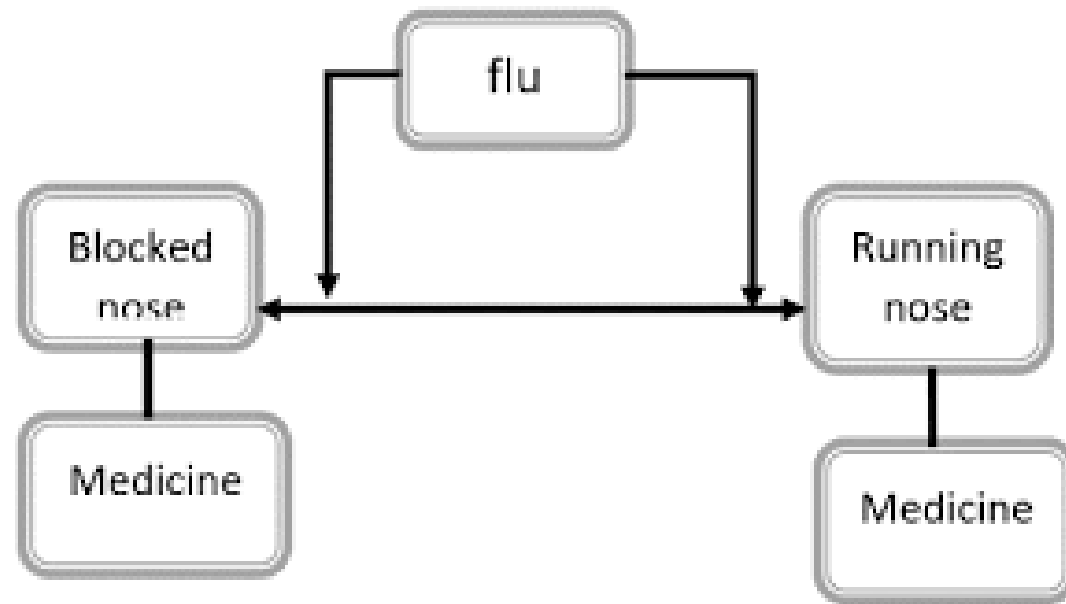
# Advantages

When using Decision tree algorithm, it is not necessary to normalize the data.

Decision tree algorithm implementation can be done without scaling the data as well.

When using Decision tree algorithm, it is not necessary to impute the missing values.

The data pre-processing step for decision trees requires less code and analysis.

The data pre-processing step for decision trees requires less time.

The concept behind decision tree is more familiar to programmers and comparatively easier to understand than other similar algorithms.

# Result

```
Your Name
                                                              ->Naman

hello  Naman
Enter the symptom you are experiencing
                                                              ->fever

searches related to input:
0 ) high_fever
1 ) mild_fever
Select the one you meant (0 - 1):  0
Okay. From how many days ? : 4
Are you experiencing any
back_pain ? : yes
weakness_in_limbs ? : no
neck_pain ? : yes
dizziness ? : no
loss_of_balance ? : yes
It might not be that bad but you should take precautions.
You may have  Cervical spondylosis
```

# Symptoms and its Description-Dataset

| Disease | | | | |
|---|---|---|---|---|
| Drug Reaction | stop irritation | consult nearest hospital | stop taking drug | follow up |
| Malaria | Consult nearest hospital | avoid oily food | avoid non veg food | keep mosquitos ⋯ |
| Allergy | apply calamine | cover area with bandage | | use ice to compre |
| Hypothyroidism | reduce stress | exercise | eat healthy | get proper sleep |
| Psoriasis | wash hands with warm soapy water | stop bleeding using pressure | consult doctor | salt baths |
| GERD | avoid fatty spicy food | avoid lying down after eating | maintain healthy weight | exercise |
| Chronic cholestasis | cold baths | anti itch medicine | consult doctor | eat healthy |
| hepatitis A | Consult nearest hospital | wash hands through | avoid fatty spicy food | medication |
| Osteoarthristis | acetaminophen | consult nearest hospital | follow up | salt baths |
| (vertigo) Paroymsal Positional Vertigo | lie down | avoid sudden change in body | avoid abrupt head movment | relax |
| Hypoglycemia | lie down on side | check in pulse | drink sugary drinks | consult doctor |
| Acne | bath twice | avoid fatty spicy food | drink plenty of water | avoid too many p |
| Diabetes | have balanced diet | exercise | consult doctor | follow up |
| Impetigo | soak affected area in warm water | use antibiotics | remove scabs with wet compressed cloth | consult doctor |
| Hypertension | meditation | salt baths | reduce stress | get proper sleep |
| Peptic ulcer diseae | avoid fatty spicy food | consume probiotic food | eliminate milk | limit alcohol |
| Dimorphic hemmorhoids(piles) | avoid fatty spicy food | consume witch hazel | warm bath with epsom salt | consume alovera |
| Common Cold | drink vitamin c rich drinks | take vapour | avoid cold food | keep fever in che |
| Chicken pox | use neem in bathing | consume neem leaves | take vaccine | avoid public place |
| Cervical spondylosis | use heating pad or cold pack | exercise | take otc pain reliver | consult doctor |
| Hyperthyroidism | eat healthy | massage | use lemon balm | take radioactive i |
| Urinary tract infection | drink plenty of water | increase vitamin c intake | drink cranberry juice | take probiotics |
| Varicose veins | lie down flat and raise the leg high | use ointments | use vein compression | dont stand still fo |
| AIDS | avoid open cuts | wear ppe if possible | consult doctor | follow up |
| Paralysis (brain hemorrhage) | massage | eat healthy | exercise | consult doctor |

| Disease | Description |
|---|---|
| Drug Reac | An adverse drug reaction (ADR) is an injury caused by taking medication. ADRs may occur following a single dose or prolonged administration of a drug or result from |
| Malaria | An infectious disease caused by protozoan parasites from the Plasmodium family that can be transmitted by the bite of the Anopheles mosquito or by a contaminate |
| Allergy | An allergy is an immune system response to a foreign substance that's not typically harmful to your body.They can include certain foods, pollen, or pet dander. Your |
| Hypothyr | Hypothyroidism, also called underactive thyroid or low thyroid, is a disorder of the endocrine system in which the thyroid gland does not produce enough thyroid ho |
| Psoriasis | Psoriasis is a common skin disorder that forms thick, red, bumpy patches covered with silvery scales. They can pop up anywhere, but most appear on the scalp, elbow |
| GERD | Gastroesophageal reflux disease, or GERD, is a digestive disorder that affects the lower esophageal sphincter (LES), the ring of muscle between the esophagus and s |
| Chronic ch | Chronic cholestatic diseases, whether occurring in infancy, childhood or adulthood, are characterized by defective bile acid transport from the liver to the intestine, |
| hepatitis A | Hepatitis A is a highly contagious liver infection caused by the hepatitis A virus. The virus is one of several types of hepatitis viruses that cause inflammation and affe |
| Osteoarth | Osteoarthritis is the most common form of arthritis, affecting millions of people worldwide. It occurs when the protective cartilage that cushions the ends of your bo |
| (vertigo) F | Benign paroxysmal positional vertigo (BPPV) is one of the most common causes of vertigo â€" the sudden sensation that you're spinning or that the inside of your he |
| Hypoglyce | Hypoglycemia is a condition in which your blood sugar (glucose) level is lower than normal. Glucose is your body's main energy source. Hypoglycemia is often relate |
| Acne | Acne vulgaris is the formation of comedones, papules, pustules, nodules, and/or cysts as a result of obstruction and inflammation of pilosebaceous units (hair follicl |
| Diabetes | Diabetes is a disease that occurs when your blood glucose, also called blood sugar, is too high. Blood glucose is your main source of energy and comes from the food |
| Impetigo | Impetigo (im-puh-TIE-go) is a common and highly contagious skin infection that mainly affects infants and children. Impetigo usually appears as red sores on the face |
| Hyperten | Hypertension (HTN or HT), also known as high blood pressure (HBP), is a long-term medical condition in which the blood pressure in the arteries is persistently eleva |
| Peptic ulc | Peptic ulcer disease (PUD) is a break in the inner lining of the stomach, the first part of the small intestine, or sometimes the lower esophagus. An ulcer in the stoma |
| Dimorphic | Hemorrhoids, also spelled haemorrhoids, are vascular structures in the anal canal. In their ... Other names, Haemorrhoids, piles, hemorrhoidal disease . |
| Common | The common cold is a viral infection of your nose and throat (upper respiratory tract). It's usually harmless, although it might not feel that way. Many types of viruses |
| Chicken p | Chickenpox is a highly contagious disease caused by the varicella-zoster virus (VZV). It can cause an itchy, blister-like rash. The rash first appears on the chest, back, a |
| Cervical s | Cervical spondylosis is a general term for age-related wear and tear affecting the spinal disks in your neck. As the disks dehydrate and shrink, signs of osteoarthritis |
| Hyperthyr | Hyperthyroidism (overactive thyroid) occurs when your thyroid gland produces too much of the hormone thyroxine. Hyperthyroidism can accelerate your body's me |
| Urinary tra | Urinary tract infection: An infection of the kidney, ureter, bladder, or urethra. Abbreviated UTI. Not everyone with a UTI has symptoms, but common symptoms inclu |
| Varicose v | A vein that has enlarged and twisted, often appearing as a bulging, blue blood vessel that is clearly visible through the skin. Varicose veins are most common in olde |
| AIDS | Acquired immunodeficiency syndrome (AIDS) is a chronic, potentially life-threatening condition caused by the human immunodeficiency virus (HIV). By damaging y |
| Paralysis ( | Intracerebral hemorrhage (ICH) is when blood suddenly bursts into brain tissue, causing damage to your brain. Symptoms usually appear suddenly during ICH. They |

# Result

```
Your Name
                                           ->Naman

hello  Naman
Enter the symptom you are experiencing
                                           ->fever

searches related to input:
0 ) high_fever
1 ) mild_fever
Select the one you meant (0 - 1):  0
Okay. From how many days ? : 4
Are you experiencing any
back_pain ? : yes
weakness_in_limbs ? : no
neck_pain ? : yes
dizziness ? : no
loss_of_balance ? : yes
It might not be that bad but you should take precautions.
You may have  Cervical spondylosis
Cervical spondylosis is a general term for age-related wear and tear affecting the spinal disks in your neck. As the disks dehy
drate and shrink, signs of osteoarthritis develop, including bony projections along the edges of bones (bone spurs).
Take following measures :
1 ) use heating pad or cold pack
2 ) exercise
3 ) take otc pain reliver
4 ) consult doctor
```

# Problem Statement-2

To provide information of diseases when searched by user using NLTK

# Flowchart
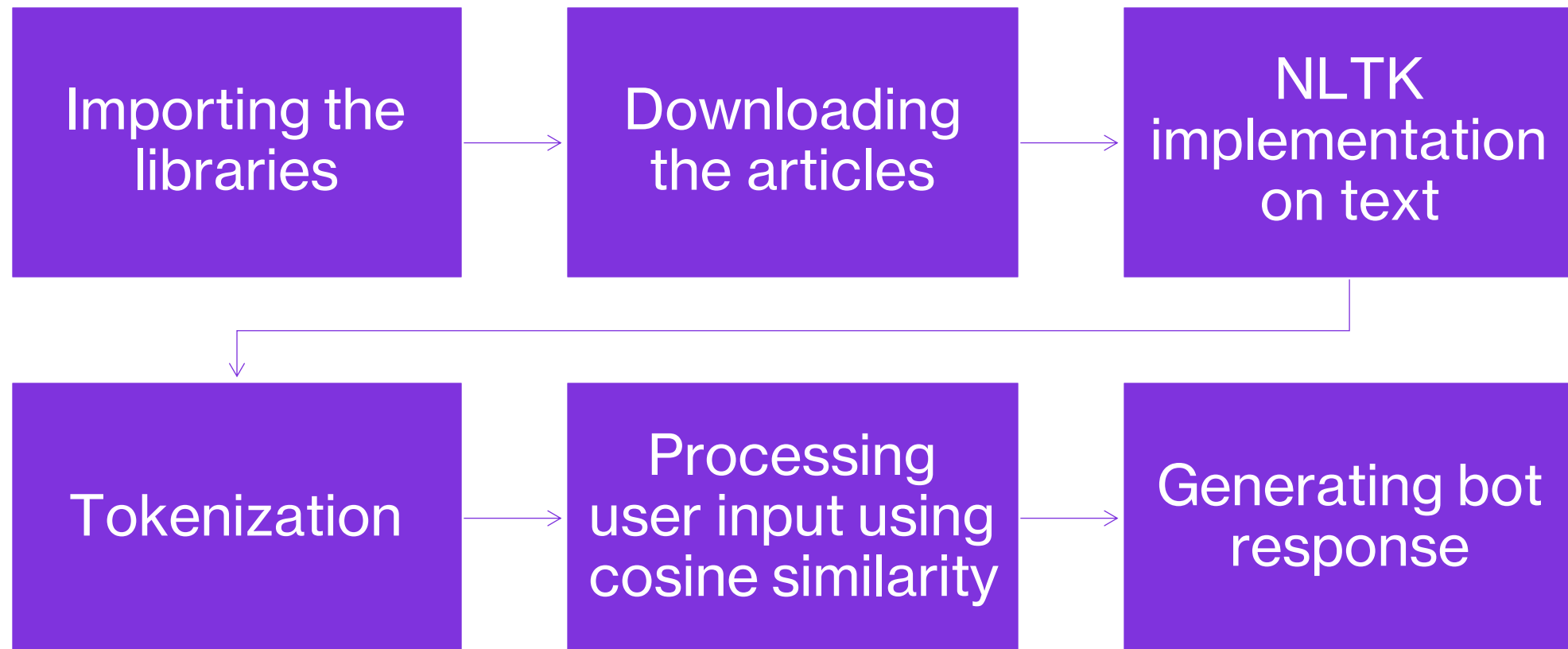
# Natural Language Processing

- Bag of Words (BoW)
- Stemming
- Lemmatization
- Tokenize
- CountVectorizer
- TF-IDF Vectorizer

# Cosine Similarity

- Cosine similarity is a metric used to measure how similar the documents are irrespective of their size.

- Mathematically, it measures the cosine of the angle between two vectors projected in a multi-dimensional space.

- The cosine similarity is advantageous because even if the two similar documents are far apart by the Euclidean distance (due to the size of the document), chances are they may still be oriented closer together. The smaller the angle, higher the cosine similarity.

```python
def bot_response(user_input):
    user_input = user_input.lower()
    sentence_list.append(user_input)
    bot_response=''
    cm = CountVectorizer().fit_transform(sentence_list)
    similarity_scores = cosine_similarity(cm[-1], cm)
    flatten = similarity_scores.flatten()
    index = index_sort(flatten)
    index = index[1:]
    response_flag=0
```

# Chronic kidney disease

## Overview

Chronic kidney disease, also called chronic kidney failure, describes the gradual loss c excreted in your urine. When chronic kidney disease reaches an advanced stage, dan₁

In the early stages of chronic kidney disease, you may have few signs or symptoms. C impaired.

Treatment for chronic kidney disease focuses on slowing the progression of the kidney stage kidney failure, which is fatal without artificial filtering (dialysis) or a kidney transpl

Chronic kidney disease care at Mayo Clinic

## Symptoms

Signs and symptoms of chronic kidney disease develop over time if kidney damage progresses s

- Nausea
- Vomiting
- Loss of appetite
- Fatigue and weakness
- Sleep problems
- Changes in how much you urinate
- Decreased mental sharpness
- Muscle twitches and cramps
- Swelling of feet and ankles
- Persistent itching
- Chest pain, if fluid builds up around the lining of the heart
- Shortness of breath, if fluid builds up in the lungs
- High blood pressure (hypertension) that's difficult to control

Signs and symptoms of kidney disease are often nonspecific, meaning they can also be caused I for lost function, signs and symptoms may not appear until irreversible damage has occurred.

Dataset-Article

# The Three Documents and Similarity Metrics
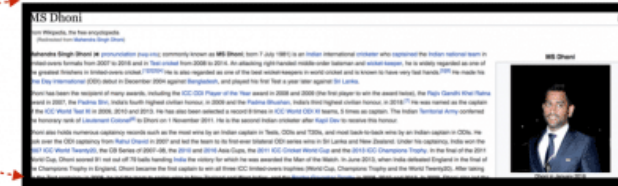


Considering only the 3 words from the above documents: 'sachin', 'dhoni', 'cricket'

**Doc Sachin: Wiki page on Sachin Tendulkar**

| | |
|---|---|
| Dhoni | - 10 |
| Cricket | - 50 |
| Sachin | - 200 |

**Doc Dhoni: Wiki page on Dhoni**

| | |
|---|---|
| Dhoni | - 400 |
| Cricket | - 100 |
| Sachin | - 20 |

**Doc Dhoni_Small: Subsection of wiki on Dhoni**

| | |
|---|---|
| Dhoni | - 10 |
| Cricket | - 5 |
| Sachin | - 1 |

## Document - Term Matrix (Word Counts)

| Word Counts | "Dhoni" | "Cricket" | "Sachin" |
|---|---|---|---|
| Doc Sachin | 10 | 50 | 200 |
| Doc Dhoni | 400 | 100 | 20 |
| Doc Dhoni_Small | 10 | 5 | 1 |

## Similarity Metrics

| Similarity or Distance Metrics | Total Common Words | Euclidean distance | Cosine Similarity |
|---|---|---|---|
| Doc Sachin & Doc Dhoni | 10 + 50 + 10 = **70** | 432.4 | 0.15 |
| Doc Dhoni & Doc Dhoni_Small | 20 + 10 + 7 = **37** | 204.0 | 0.23 |
| Doc Sachin & Doc Dhoni_Small | 10 + 10 + 7 = **27** | 401.85 | 0.77 |

# Result

Doc Bot: I am DOCTOR BOT or Doc Bot for short. I will answer your queries about Chronic Kidney Disease. If yo
pe Bye!
hi
Doc Bot: howdy
what is chronic kidney disease and what are the risk factors ?
Doc Bot:  Diseases and conditions that cause chronic kidney disease include:

Type 1 or type 2 diabetes

High blood pressure

Glomerulonephritis (gloe-mer-u-low-nuh-FRY-tis), an inflammation of the kidney's filtering units (glomeruli)

Interstitial nephritis (in-tur-STISH-ul nuh-FRY-tis), an inflammation of the kidney's tubules and surrounding

Polycystic kidney disease

Prolonged obstruction of the urinary tract, from conditions such as enlarged prostate, kidney stones and some

Vesicoureteral (ves-ih-koe-yoo-REE-tur-ul) reflux, a condition that causes urine to back up into your kidneys

Recurrent kidney infection, also called pyelonephritis (pie-uh-low-nuh-FRY-tis)

Risk factors

Factors that may increase your risk of chronic kidney disease include:

Diabetes

High blood pressure

Heart and blood vessel (cardiovascular) disease

Smoking

Obesity

Being African-American, Native American or Asian-American

Family history of kidney disease

Abnormal kidney structure

---

what are the signs and symptoms of chronic kidney disease
Doc Bot:  Chronic kidney disease care at Mayo Clinic

How kidneys work

Symptoms

Signs and symptoms of chronic kidney disease develop over time if kidney damage progresses slo
disease may include:

Nausea

Vomiting

Loss of appetite

Fatigue and weakness

Sleep problems

Changes in how much you urinate

Decreased mental sharpness

Muscle twitches and cramps
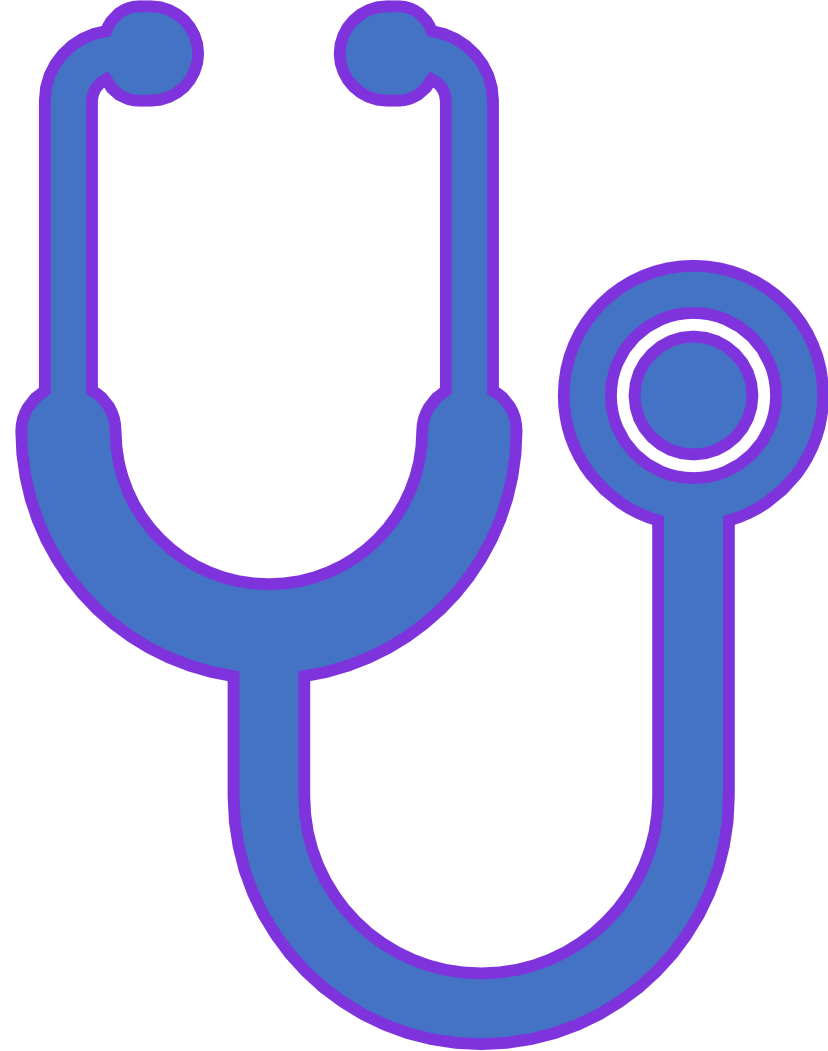
Swelling of feet and ankles

Persistent itching

Chest pain, if fluid builds up around the lining of the heart

# Problem Statement 3

To provide contact information of doctors who treat the relevant disease or condition.

# Introduction



- We must find out Expert Doctors for those particular diseases and their clinics or hospitals address links.

- We 1st found out the dummy data set for this and then worked upon it.

- We had to link it with the other 2 datasets and then give the appropriate results.

# Flowchart

Import the Symptom_severity dataset

Then calculate the Symptom_severity with the formula using number of days from which he is having that problem

Accordingly advice the patient that he need to consult or not

If he need to consult bot will provide him the information about the doctor to be approached

# Dataset

| | |
|---|---|
| itching | 1 |
| skin_rash | 3 |
| nodal_skin_eruptions | 4 |
| continuous_sneezing | 4 |
| shivering | 5 |
| chills | 3 |
| joint_pain | 3 |
| stomach_pain | 5 |
| acidity | 3 |
| ulcers_on_tongue | 4 |
| muscle_wasting | 3 |
| vomiting | 5 |
| burning_micturition | 6 |
| spotting_urination | 6 |
| fatigue | 4 |
| weight_gain | 3 |
| anxiety | 4 |
| cold_hands_and_feets | 5 |
| mood_swings | 3 |
| weight_loss | 3 |
| restlessness | 5 |
| lethargy | 2 |
| patches_in_throat | 6 |
| irregular_sugar_level | 5 |
| cough | 4 |

# Dimensionality reduction

The number of input variables or features for a dataset is referred to as its dimensionality.

Dimensionality reduction refers to techniques that reduce the number of input variables in a dataset.

Now in this part of project we want just diseases column to be copied in new Data Frame, so reduction is done in the way that just diseases column gets copied.

diseases = dimensionality_reduction.index

# Working
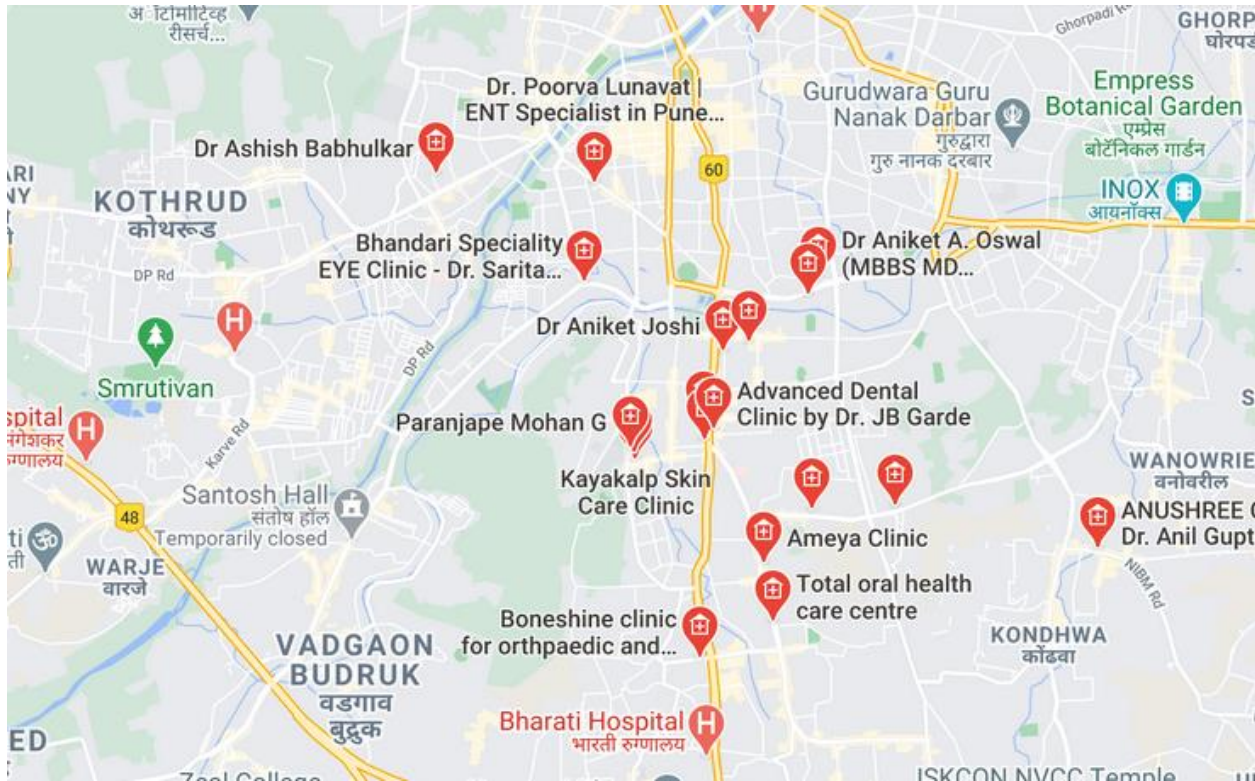


- First we read the dataset

- We create a new blank data frame.

- We extract the diseases column from the other dataset and put it in the new blank dataset.

- Then from the previous dataset consisting Doctors' name and Addresses we need to copy that into newly formed.

- So that the disease found in previous step of program can be linked with Doctors' name and Addresses links.

- Then at the last we print the name of the disease, confidence level, Doctor's name for consultation and his clinics or Hospital's address.
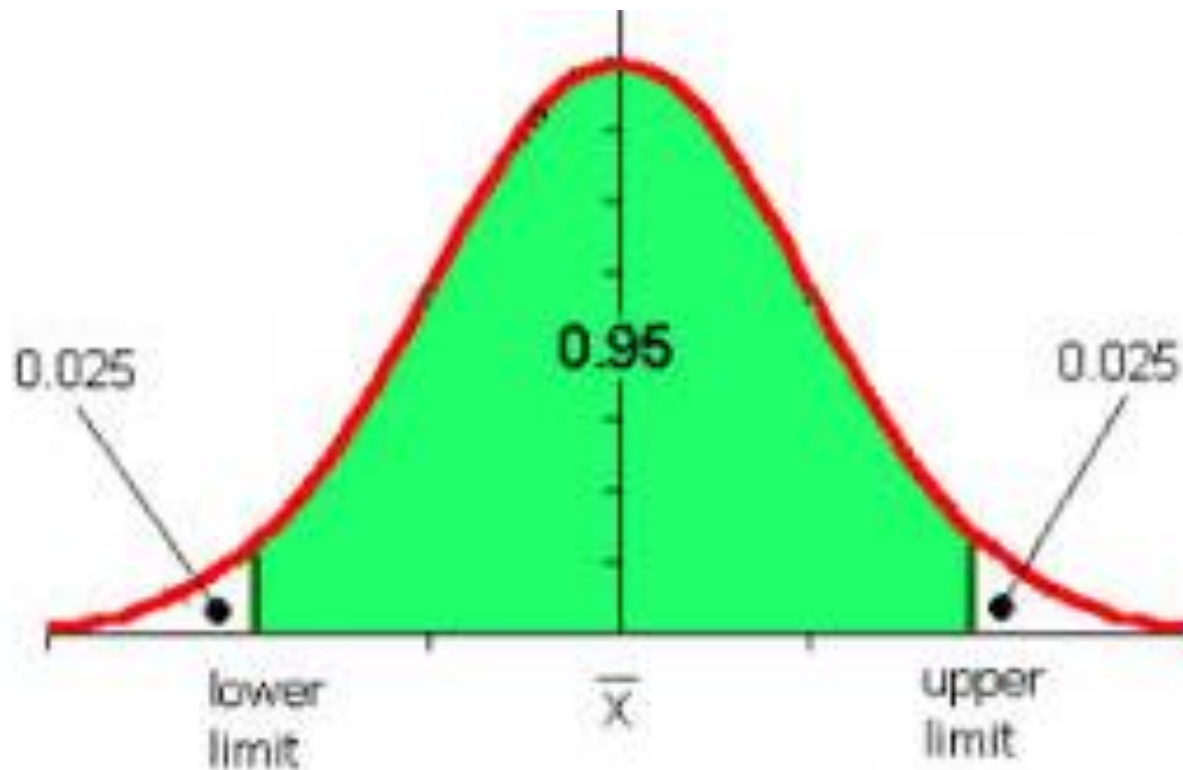
# Result



The model suggests:

Consult ['Dr. Neha Sood']

Visit ['https://www.practo.com/delhi/doctor/dr-neha-sood-ear-nose-throat

Process finished with exit code 0

# Confidence Level



- What does the Confidence level tells us, it tells us about how much the percentage or chances of person is having that particular disease.

- Higher the confidence level, higher are the symptoms found for that disease in the body, means more chances of having that disease.

- And Confidence level also tells the accuracy of the program.

- We have used a simple formula to calculate confidence level, i.e **[No. of symptoms present/ Total no. of symptoms given].**

# Future Scope
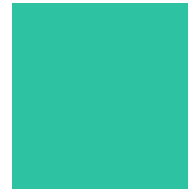
**Customer Service/Administration With an AI Chatbot**

**Patient Engagement**

**Mental Health**

**Research / Treatment**

**Claims and Billing**

# Thank You!