Your Doc

Disease Diagnostic Bot

Group 9 (Team Ultron)

Introduction

- Made a chatbot to identify and diagnose possible disease based on symptoms provided.
- User interactively provides set of symptoms
- After asking follow up questions by the bot, it predicts the possible top 3 diseases with some confidence score
- It shows the nearby hospital location, based on the user’s current location

Related Apps and Methods

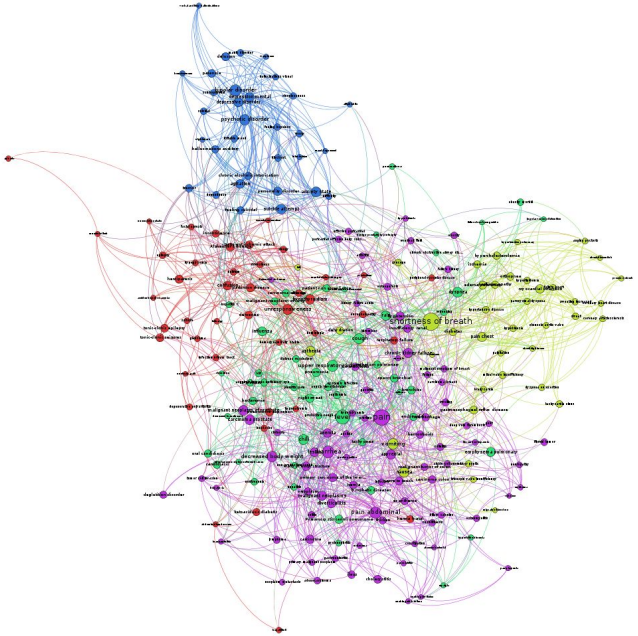
There are many existing methods to identify disease from symptoms:

- Eliza, HealthTap, Your.Md, Florence are already such existing apps which does similar jobs.
- Some used artificial neural network, but their dataset is of only eight possible disease, so they they classify the symptoms into eight possible classes.
- One paper implements random forest classifier and shows that it outperforms SVM, bagging and boosting algorithms. Their dataset is also confined to eight classes of diseases.
- For bot frameworks there are wit.ai, api.ai and ibm watson available in market.

Dataset

knowledge base is automatically generated by methods based on information in discharge summaries(text format) of patients at New York Presbyterian Hospital in 2004.

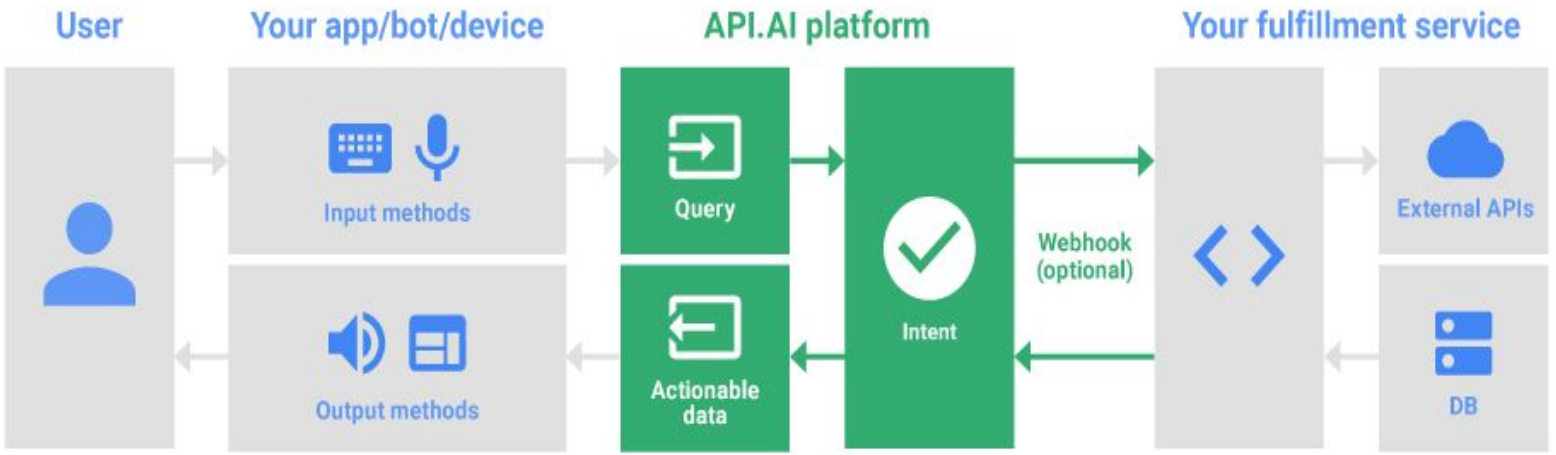
- Number of relations: 2130
- Number of diseases: 148
- Number of Symptoms: 405



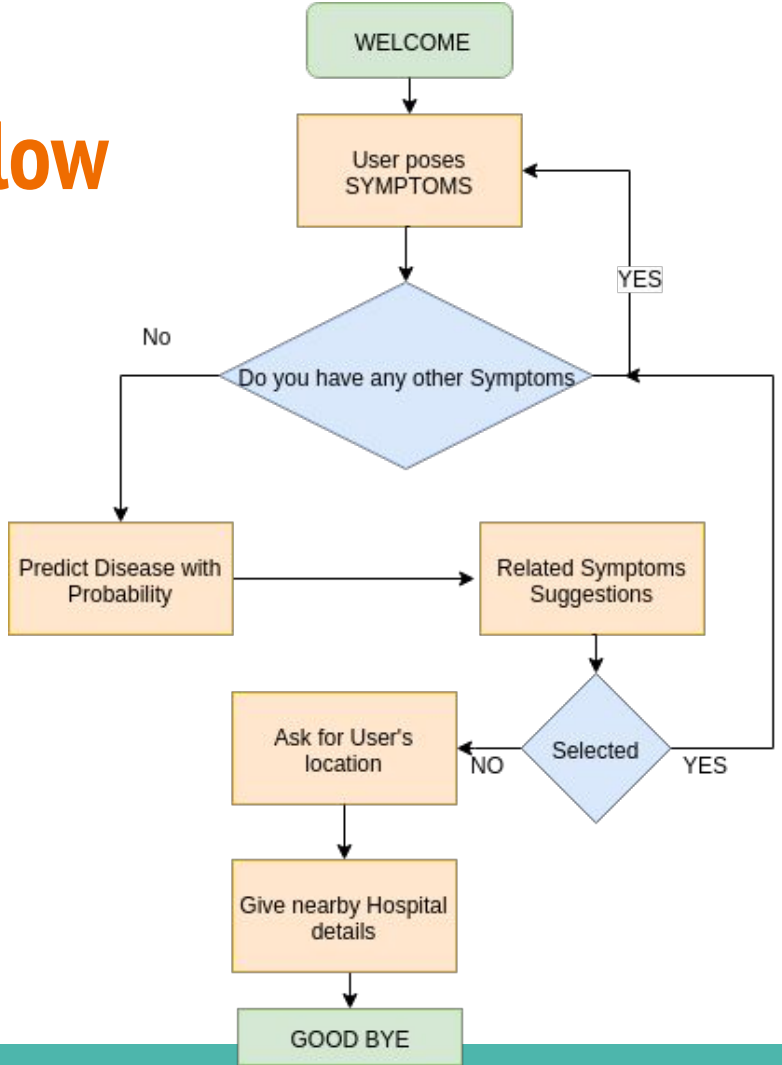
Our Chatbot

- Used api.ai, chatbot framework of google for NLP text processing.
- Integrated our chat bot with facebook messenger application.
- Used Heroku to develop and host out api which act as webhook service.

API.AI


User
Your app/bot/device
API.AI platform
Your fulfillment service
Input methods
Output methods
Query
Actionable data
Intent
Webhook (optional)
External APIs
DB

Conversation Flow



Prediction Model:

Using symptoms as features and disease as corresponding class we explored following two models.

Random Forest:

- Creates number of decision trees , based on different splitting criteria, goodness measure or cutoff probability
- Use majority vote for final output classification.

Multinomial Naive Bayes:

- Implimented MN Naive bayes, probabilistic model to predict the disease given the symptoms.

Special Features

Suggesting related Symptoms:

- Dataset have information about the number of times disease occurring in the medical reports along with symptoms
- Use co-occurrence matrix to predict the related symptoms

Showing nearby Hospitals:

- Takes user location
- Using google map api, shows the nearby hospital regions.

Conclusion

- Bot predicts diseases based on symptoms provided to it, using MN bayes classifier which outperforms Random forest classifier.
- Bot suggests for possible symptoms similar to given by patient
- It gives nearby hospital locations.
- Given more dataset with more information such as weight of symptoms for given disease, our model can predict much better results
- Chatbot cannot replace a doctor-patient relationship

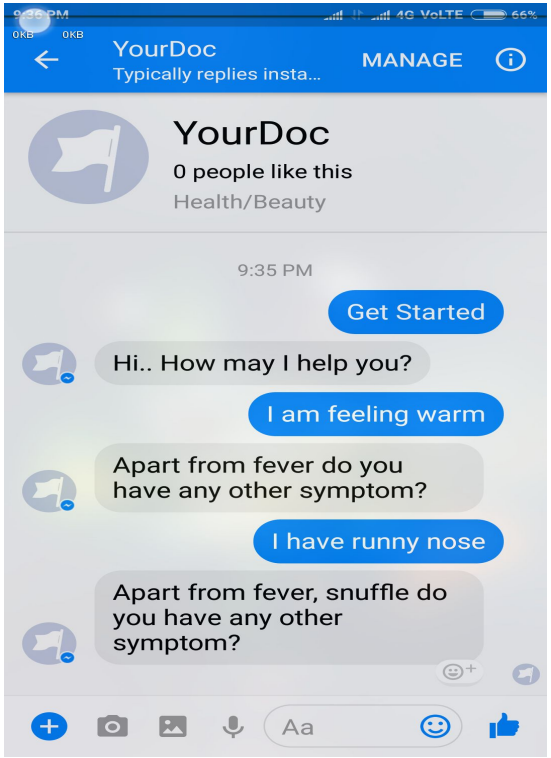
Future Work

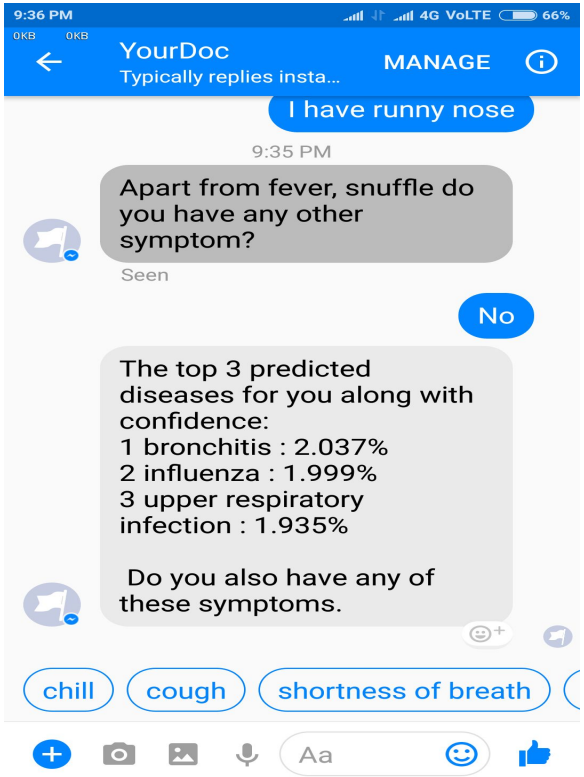
Can use more information of patient such as age, gender, weight, etc. into account while predicting diseases.

Improvement in chatbot can include:

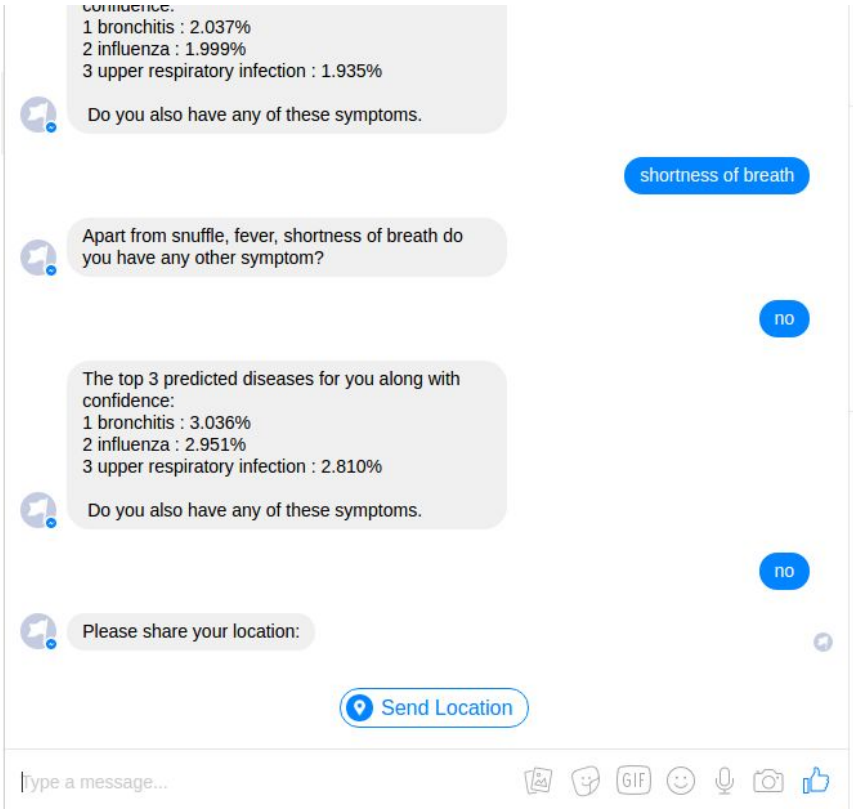
- Online appointment with doctor.
- Ask user for prescription, and give reminders at appropriate times.
- Display information about the medication, patient is using.

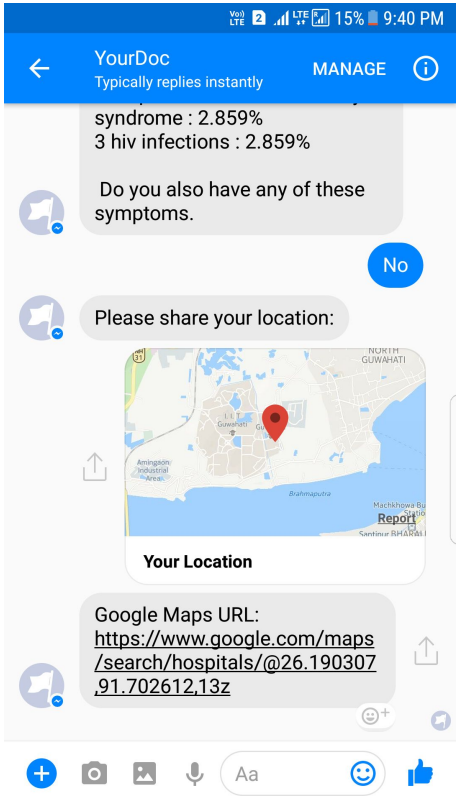
Demo


YourDoc
Typically replies insta...
MANAGE
YourDoc
0 people like this
Health/Beauty
9:35 PM
Get Started
Hi.. How may I help you?
I am feeling warm
Apart from fever do you have any other symptom?
I have runny nose
Apart from fever, snuffle do you have any other symptom?
Aa

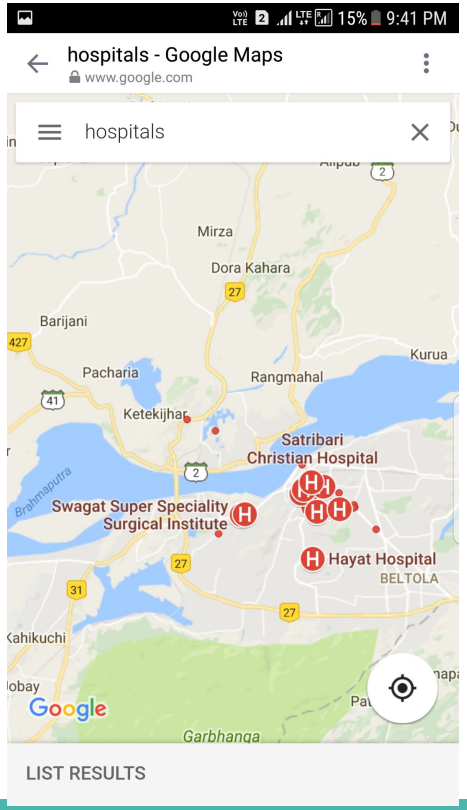

9:36 PM
YourDoc
Typically replies insta...
MANAGE
I have runny nose
9:35 PM
Apart from fever, snuffle do you have any other symptom?
Seen
No
The top 3 predicted diseases for you along with confidence:
1 bronchitis : 2.037%
2 influenza : 1.999%
3 upper respiratory infection : 1.935%
Do you also have any of these symptoms.
chill
cough
shortness of breath
Aa

Continued..


1 bronchitis : 2.037%
2 influenza : 1.999%
3 upper respiratory infection : 1.935%
Do you also have any of these symptoms.
shortness of breath
Apart from snuffle, fever, shortness of breath do you have any other symptom?
no
The top 3 predicted diseases for you along with confidence:
1 bronchitis : 3.036%
2 influenza : 2.951%
3 upper respiratory infection : 2.810%
Do you also have any of these symptoms.
no
Please share your location:
Send Location
Type a message...


15% 9:40 PM
YourDoc
Typically replies instantly
MANAGE
syndrome : 2.859%
3 hiv infections : 2.859%
Do you also have any of these symptoms.
No
Please share your location:
Report
Your Location
Google Maps URL:
https://www.google.com/maps/search/hospitals/@26.190307,91.702612,13z
Aa

Continued


15% 9:41 PM
hospitals - Google Maps
www.google.com
hospitals
Mirza
Dora Kahara
Barijani
Pacharia
Rangmahal
Kurua
Ketekijhar
Satribari
Christian Hospital
Swagat Super Speciality
Surgical Institute
Hayat Hospital
BELTOLA
Kahikuchi
Google
Garbhanga
LIST RESULTS

Thanks