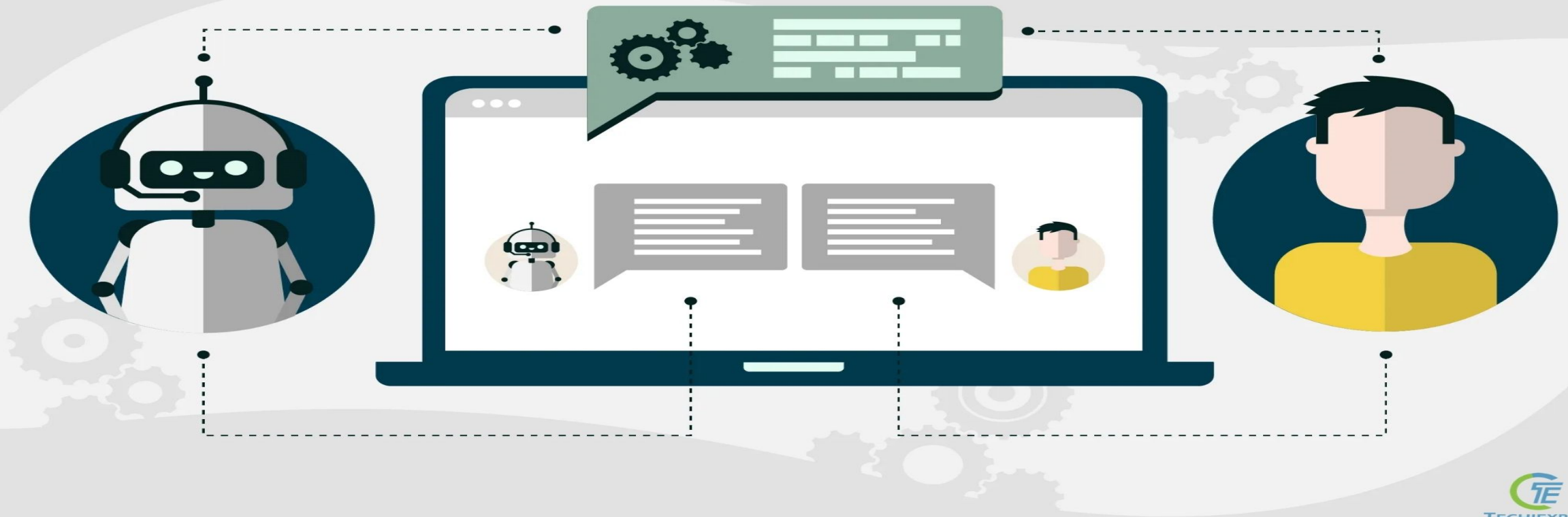


TITLE

Health Care Chatbot using Deep Learning and NLP





Group Number : 18

Group Members :

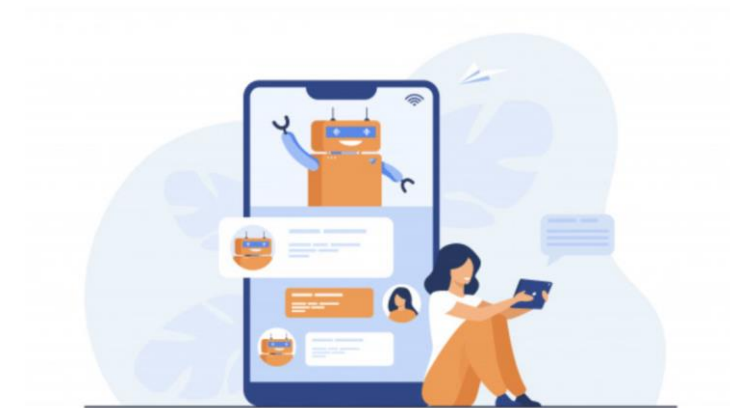
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What are chatbots ?

- A chatbot is a computer program that takes the place of a natural human conversation online.
- A chatbot is an artificial intelligence (AI) program that can simulate a conversation (or a chat) with a user in natural language through messaging applications, websites, mobile applications or by phone.



Need For Chatbot ?

- **Save Human Resources for Qualitative Tasks**
- **Automated Customer Support For Similar Queries**
- **Accelerate Operations**
- **Chatbot- Easy-to-use**
- **Cost-effective and Time-efficient**
- **Improves Work With Minimum Effort**



Types of Chatbot? And which one is our ?

1. **Rule-Based Chatbots** – They follow a set of pre-defined rules or flows to respond to queries of a user. Most simple applications contain rule-based chatbots, which respond to questions based on the preset rules.
2. **AI Chatbots** – AI chatbots are more advanced and based on machine learning. AI chatbot uses natural language processing services to understand the meaning behind the questions posed.

AND WE HAVE CREATED AN “AI CHAT BOT”

Objective :

- ❖ Chat bots are mainly used to provide customer support.
- ❖ Can Schedule meetings, Broadcast newsletters, auto-sequences
- ❖ Chat bots are very intelligent. You train them once and they will communicate with your target audience in their language.



What is AI,ML and Deep Learning ?

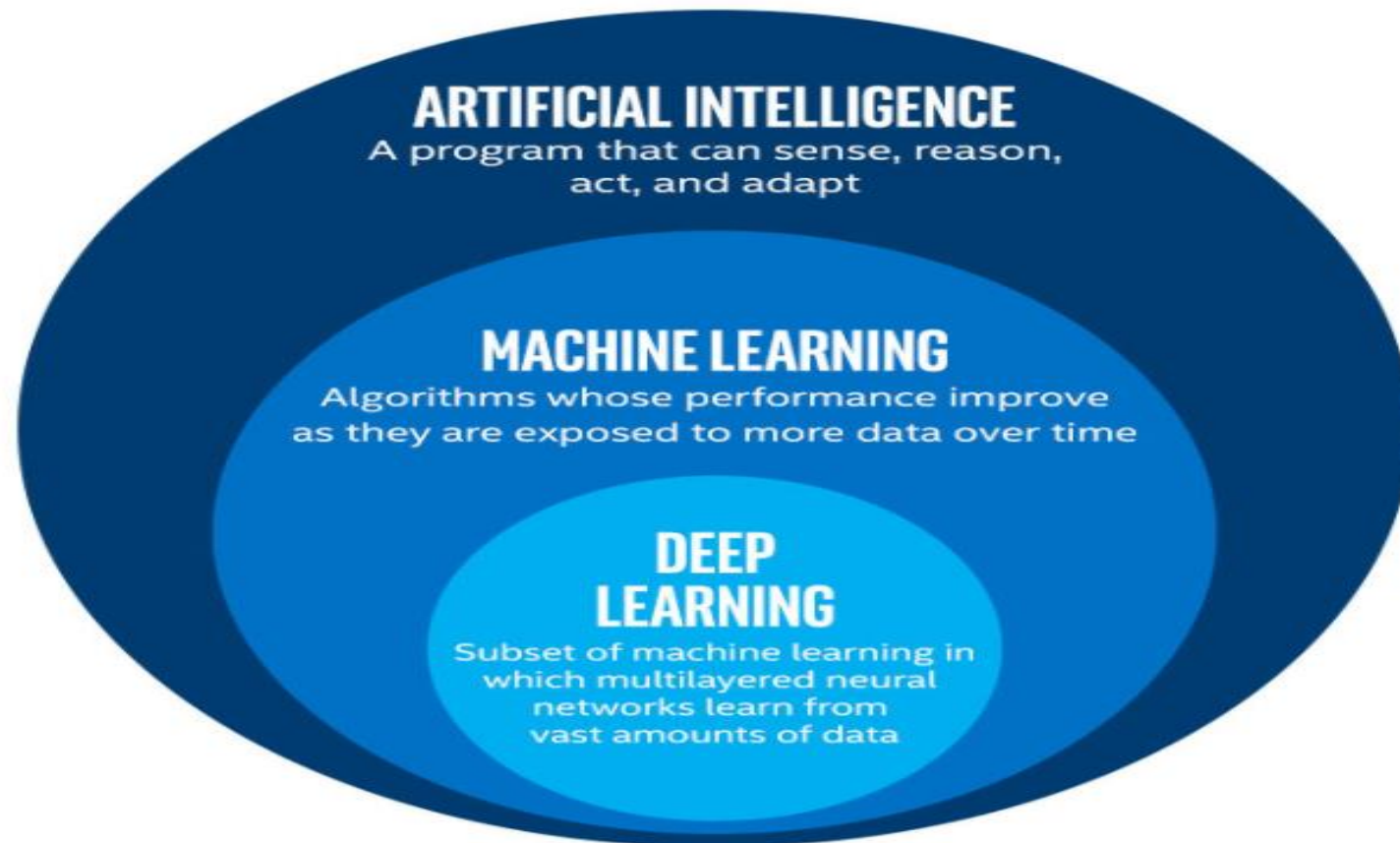


Fig.1



What is Deep Learning ?

- Deep learning is a technique that teaches computers to do what comes naturally to humans: learn by example. Deep learning is a key technology behind driverless cars, enabling them to recognize a stop sign. It is the key to voice control in consumer devices like phones, tablets, TVs, and hands-free speakers.
- Deep learning is getting lots of attention lately and for good reason. It's achieving results that were not possible before.
- Deep learning is basically a computer model which learn to perform task.
- Deep learning is basically an upgraded version of Machine learning and has some advanced features than machine learning.

What is NLP ?

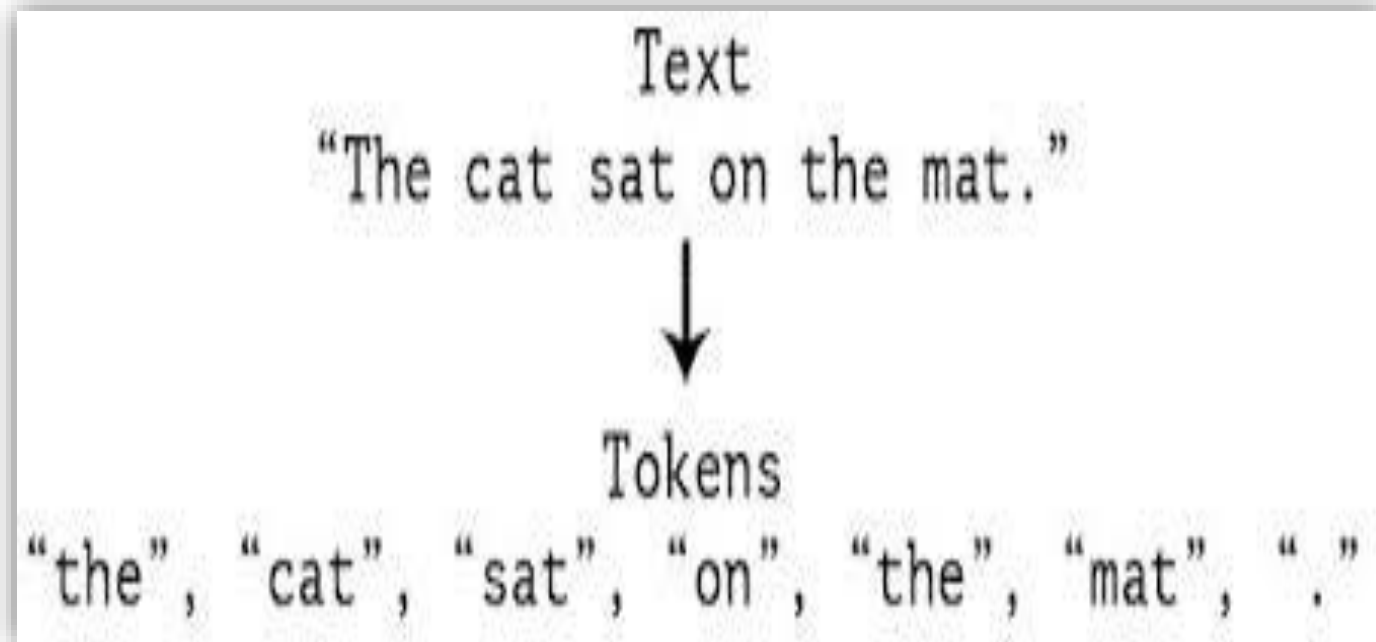
- NLP is basically Natural Language Processing.
- The field of study that focuses on the interactions between human language and computers is called Natural Language Processing
- NLP is used to analyze text, allowing machines to understand what human's had text.
- NLP are based on Machine Learning and especially statistical learning which uses a general learning algorithm.
- So using Deep learning we are going to solve basic NLP tasks.
- The basics concepts of NLP we will use are Stemming, tokenization, Training Data.



Tokenization :

- Breaking down a big string or sentence of data into words is known as Tokenization.
- It splits a piece of text into individual words based on a certain delimiter. Depending upon delimiters, different word-level tokens are formed.
- In our project the delimiter used is Space Separated Value.

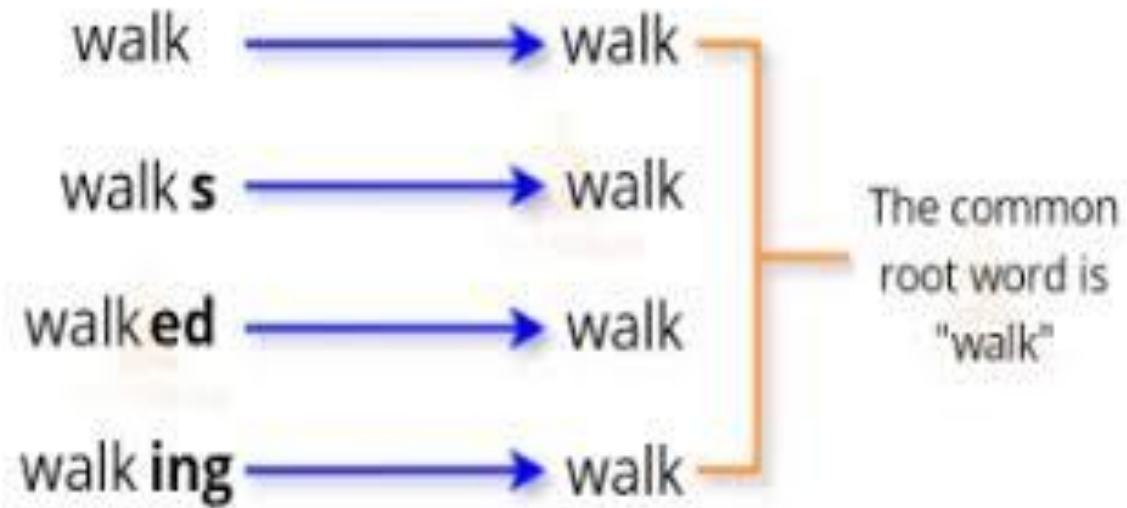
Tokenization :



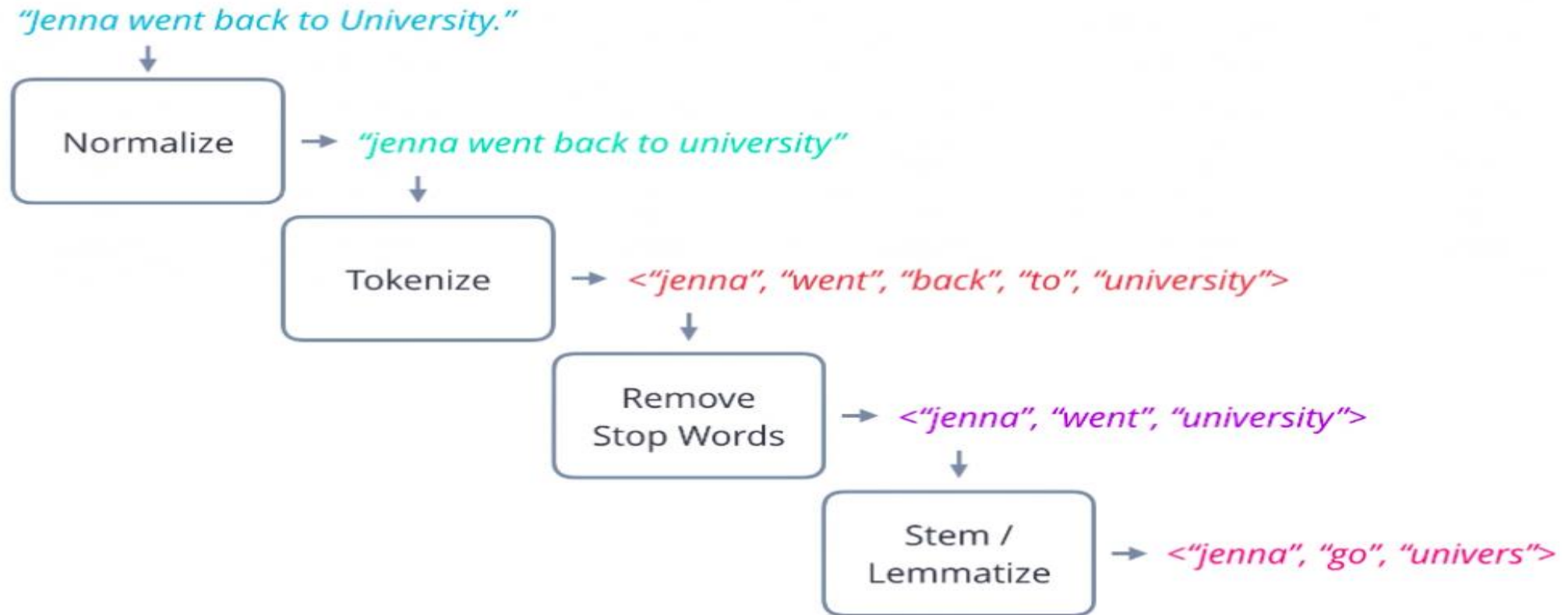
Stemming :

- Stemming is used to generate the root form of the word by chopping the rest part of the words. And also helps in lower casing the words.
- We used Porter Stemmer Algorithm in our project.

Stemming :



Example:-



Bag of Words :

Training Data

bag of words

all words

["Hi", "How", "are", "you", "bye", "see", "later"]

"Hi"	→	[1, 0, 0, 0, 0, 0, 0]	0 (greeting)
"How are you?"	→	[0, 1, 1, 1, 0, 0, 0]	
"Bye"	→	[0, 0, 0, 0, 1, 0, 0]	1 (goodbye)
"See you later"	→	[0, 0, 0, 1, 0, 1, 1]	

x

Feed Forward Neural Net :

- A feedforward neural network is an artificial neural network wherein connections between the nodes do not form a cycle.
- The feedforward neural network was the first and simplest type of artificial neural network devised. In this network, the information moves in only one direction forward from the input nodes, through the hidden nodes and to the output nodes.
- We trained our model using feed forward neural network.

Neural Net :

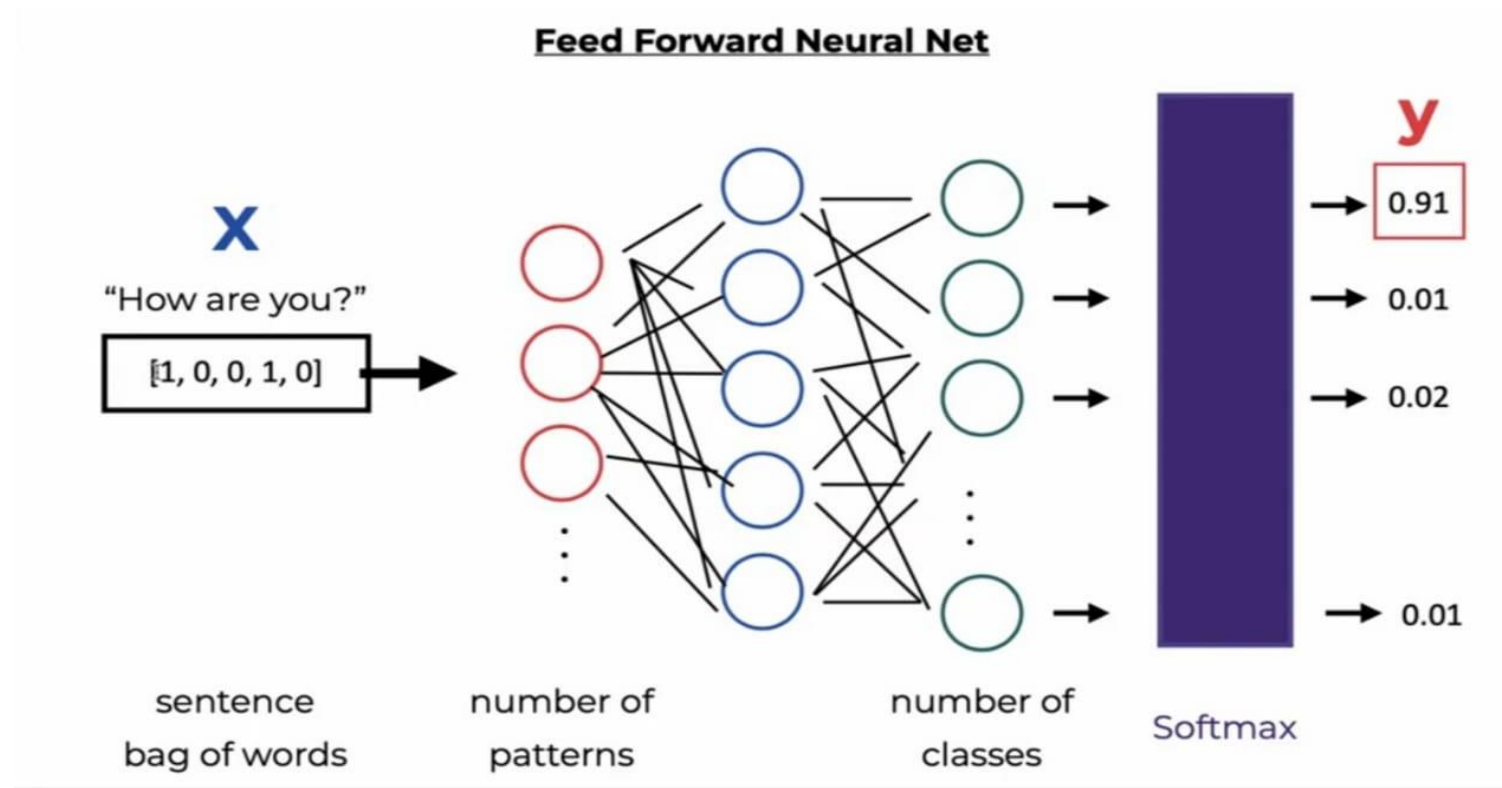


Fig.7

Training of data :

- In training of data we train our dataset(.json file) which consist of intent and in that intent there are multiple tag which has various patterns and responses.
- Tokenization, Stemming and Bag of word are applied on the patterns and tags. And both are stored in an array.
- The data of patterns and tag is passed on to the Neural net.
- After that for loop of epoch is applied to it which helps in computing the loss.
- After the completion of training the trained data is stored in a file.

Training of data :

```
Console 1/A x

In [2]: runfile('C:/Users/KARAN/anaconda3/envs/Healthbot/CODES/app.py', wdir='C:/Users/KARAN/anaconda3/envs/Healthbot/CODES')

In [3]: runfile('C:/Users/KARAN/anaconda3/envs/Healthbot/CODES/train.py', wdir='C:/Users/KARAN/anaconda3/envs/Healthbot/CODES')
763 patterns
213 tags: ['Abdominal aortic aneurysm', 'Abdominal aortic aneurysm_MED', 'Acne', 'Acne_MED', 'Allergies', 'Allergies_MED', 'Anxiety', 'Anxiety_MED', 'Asthma', 'Asthma_MED', 'Bladder cancer', 'Bladder cancer_MED', 'Blood Poisoning', 'Blood Poisoning_MED', 'Brain tumours', 'Brain tumours_MED', 'Chest pain', 'Chest pain_MED', 'Chickenpox', 'Chickenpox_MED', 'Chronic fatigue syndrome (CFS)', 'Chronic fatigue syndrome (CFS)_MED', 'Chronic kidney', 'Chronic kidney_MED', 'Chronic pancreatitis', 'Chronic pancreatitis_MED', 'Coma', 'Coma_MED', 'Common cold', 'Common cold_MED', 'Constipation', 'Constipation_MED', 'Coronavirus', 'Coronavirus_MED', 'Crohn's disease', 'Crohn's disease_MED', 'Croup', 'Croup_MED', 'Cystic fibrosis', 'Cystic fibrosis_MED', 'Deafblindness', 'Deafblindness_MED', 'Dehydration', 'Dehydration_MED', 'Depression', 'Depression_MED', 'Dermatitis herpetiformis', 'Dermatitis herpetiformis_MED', 'Diabetes', 'Diabetes_MED', 'Discoid eczema', 'Discoid eczema_MED', 'Dystonia', 'Dystonia_MED', 'Earache', 'Earache_MED', 'Ebola virus disease', 'Ebola virus disease_MED', 'Ectopic pregnancy', 'Ectopic pregnancy_MED', 'Endometriosis', 'Endometriosis_MED', 'Epilepsy', 'Epilepsy_MED', 'Erectile dysfunction (impotence)', 'Erectile dysfunction (impotence)_MED', 'Escherichia coli (E. coli) 0157', 'Escherichia coli (E. coli) 0157_MED', 'Ewing sarcoma', 'Ewing sarcoma_MED', 'Eye cancer', 'Eye cancer_MED', 'Febrile seizures', 'Febrile seizures_MED', 'Fever in children', 'Fever in children_MED', 'Fibroids', 'Fibroids_MED', 'Flatulence', 'Flatulence_MED', 'Flu', 'Flu_MED', 'Fungal nail infection', 'Fungal nail infection_MED', 'Gallbladder cancer', 'Gallbladder cancer_MED', 'Gallstones', 'Gallstones_MED', 'Ganglion cyst', 'Ganglion cyst_MED', 'Glandular fever', 'Glandular fever_MED', 'Gum disease', 'Gum disease_MED', 'HIV', 'HIV_MED', 'Haemorrhoids (piles)', 'Haemorrhoids (piles)_MED', 'Hand, foot and mouth disease', 'Hand, foot and mouth disease_MED', 'Hearing loss', 'Hearing loss_MED', 'Hypoglycaemia (low blood sugar)', 'Hypoglycaemia (low blood sugar)_MED', 'Itching', 'Itching_MED', 'Jaundice', 'Jaundice_MED', 'Malaria', 'Malaria_MED', 'Mouth cancer', 'Mouth cancer_MED', 'Mouth ulcers', 'Mouth ulcers_MED', 'Nasal and sinus cancer', 'Nasal and sinus cancer_MED', 'Neuroendocrine tumours', 'Neuroendocrine tumours_MED', 'Non-alcoholic fatty liver disease (NAFLD)', 'Non-alcoholic fatty liver disease (NAFLD)_MED', 'Obsessive compulsive disorder (OCD)', 'Obsessive compulsive disorder (OCD)_MED', 'Oesophageal cancer', 'Oesophageal cancer_MED', 'Otitis externa', 'Otitis externa_MED', 'Ovarian cyst', 'Ovarian cyst_MED', 'Pancreatic cancer', 'Pancreatic cancer_MED', 'Panic disorder', 'Panic disorder_MED', 'Penile cancer', 'Penile cancer_MED', 'Pneumonia', 'Pneumonia_MED', 'Pressure ulcers', 'Pressure ulcers_MED', 'Prostate cancer', 'Prostate cancer_MED', 'Psoriatic arthritis', 'Psoriatic arthritis_MED', 'Psychosis', 'Psychosis_MED', 'Reactive arthritis', 'Reactive arthritis_MED', 'Restless legs syndrome', 'Restless legs syndrome_MED', 'Retinoblastoma', 'Retinoblastoma: Children', 'Retinoblastoma_MED', 'Rhabdomyosarcoma', 'Rhabdomyosarcoma_MED', 'Scabies', 'Scabies_MED', 'Scarlet fever', 'Scarlet fever_MED', 'Schizophrenia', 'Schizophrenia_MED', 'Skin cancer (melanoma)', 'Skin cancer_MED', 'Skin rashes', 'Skin rashes_MED', 'Sore throat', 'Sore throat_MED', 'Stomach ache and abdominal pain', 'Stomach ache and abdominal pain_MED', 'Stomach ulcer', 'Stomach ulcer_MED', 'Swollen Gland', 'Swollen Gland_MED', 'Testicular lumps', 'Testicular lumps_MED', 'Thigh Problem', 'Thigh Problem_MED', 'Tinnitus', 'Tinnitus_MED', 'Toothache', 'Toothache_MED', 'Uninary', 'Uninary_MED', 'Vertigo', 'Vertigo_MED', 'Vitamin B12', 'Vitamin B12_MED', 'Vomiting in adults', 'Vomiting in adults_MED', 'Vulval cancer', 'Vulval cancer_MED', 'Warts and verrucas', 'Warts and verrucas_MED', 'Whooping cough', 'Whooping cough_MED', 'Wilms Tumour', 'Wilms Tumour_MED', 'Yellow Fever', 'Yellow Fever_MED', 'brain migraine', 'brain migraine_MED', 'cancer', 'chronic', 'cyst', 'diseases', 'fever', 'goodbye', 'greeting', 'medicine', 'ok', 'symptoms', 'thanks', 'tumor', 'ulcer', 'virus']
208 unique stemmed words: ['s', '(', ')', ',', ':', 'a', 'abdomin', 'ach', 'acn', 'adult', 'aer', 'allergi', 'and', 'aneurysm', 'ani', 'anxieti', 'anyon', 'aortic', 'are', 'arthriti', 'asthma', 'b12', 'bladder', 'blind', 'blood', 'brain', 'bye', 'can', 'cancer', 'cf', 'chest', 'chickenpox', 'children', 'chronic', 'cold', 'coli', 'coma', 'common', 'compuls', 'constip', 'corona', 'coronaviru', 'cough', 'covid19', 'crohn', 'croup', 'cyst', 'cystic', 'day', 'deaf', 'deafblind', 'dehydr', 'depress', 'dermat', 'diabet', 'discoid', 'diseas', 'disord', 'dysfunct', 'dystonia', 'e', 'earach', 'earli', 'ebola', 'ectop', 'eczema', 'endometriosi', 'epilepsi', 'erectil', 'escherichia', 'ewe', 'externa', 'eye', 'fatigu', 'fatti', 'febril', 'fever', 'fibroid', 'fibrosi', 'flatul', 'flu', 'foot', 'for', 'forchest', 'forcommon', 'forfibroid', 'fungal', 'gallbladd', 'gallston', 'ganglion', 'gland', 'glandular', 'good', 'goodby', 'gum', 'haemorrhoid', 'hand', 'hear', 'hello', 'help', 'herpetiformi', 'hey', 'hi', 'hiv', 'how', 'hypoglycaemia', 'impot', 'in', 'ind=fect', 'infect', 'is', 'itch', 'jaundic', 'kidney', 'later', 'leg', 'liver', 'loss', 'lot', 'low', 'lump', 'malaria', 'medicin', 'melanoma', 'migrain', 'mouth', 'nafid', 'nail', 'nasal', 'neuroendocrin', 'non-alcohol', 'o157', 'obsess', 'ocd', 'oesophag', 'of', 'ok', 'okay', 'otiti', 'ovarian', 'pain', 'pancreat', 'panic', 'penil', 'pile', 'pneumonia', 'poison', 'postnat', 'pregnanc', 'pressur', 'psoriat', 'psychosi', 'rash', 'rea', 'reactiv', 'restless', 'retinoblastoma', 'rhabdomyosarcoma', 'sarcoma', 'scabi', 'scarlet', 'schizophrenia', 'see', 'seizur', 'sepsi', 'sinu', 'skin', 'sore', 'stomach', 'sugar', 'suggest', 'swollen', 'symptmo', 'symptom', 'symtom', 'syndrom', 'teenag', 'testicular', 'thank', 'that', 'the', 'there', 'thigh', 'thing', 'throat', 'tinnitu', 'tooth', 'toothach', 'tumor', 'tumour', 'u', 'ulcer', 'uninari', 'verruca', 'vertigo', 'viru', 'vitamin', 'vomit', 'vulval', 'wart', 'what', 'whoop', 'wilm', 'yellow', 'you', 'young']
208 213
```

Training of data :

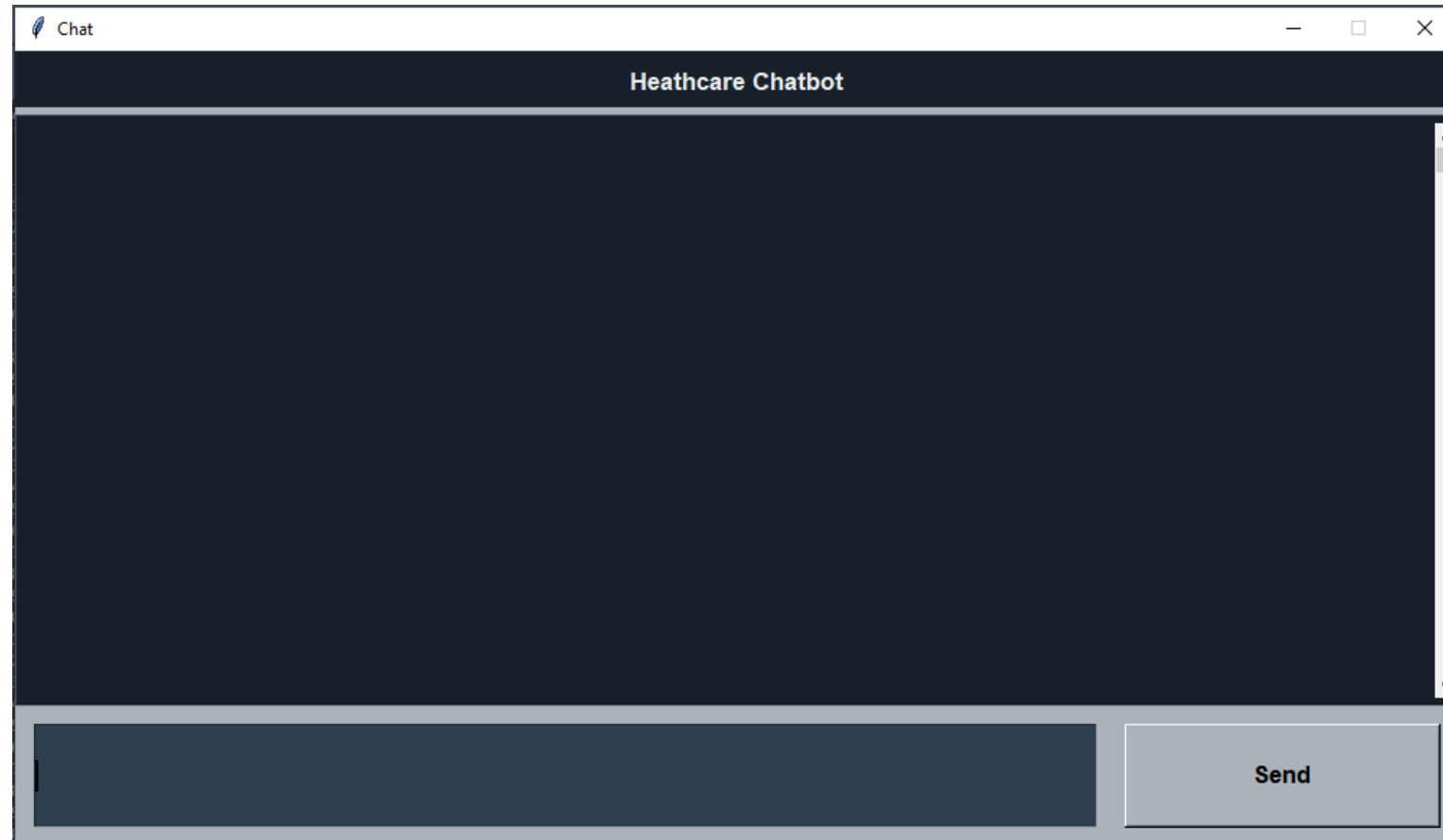
```
Console 1/A x
'syndrom', 'teenag', 'testicular', 'thank', 'that',
'toothach', 'tumor', 'tumour', 'u', 'ulcer', 'uni',
'wart', 'what', 'whoop', 'wilm', 'yellow', 'you',
208 213
Epoch [100/1000], Loss: 0.0200
Epoch [200/1000], Loss: 0.0016
Epoch [300/1000], Loss: 0.0000
Epoch [400/1000], Loss: 0.0000
Epoch [500/1000], Loss: 0.0000
Epoch [600/1000], Loss: 0.0000
Epoch [700/1000], Loss: 0.0072
Epoch [800/1000], Loss: 0.0000
Epoch [900/1000], Loss: 0.0000
Epoch [1000/1000], Loss: 0.0000
final loss: 0.0000
training complete. file saved to data.pth

In [9]:
```

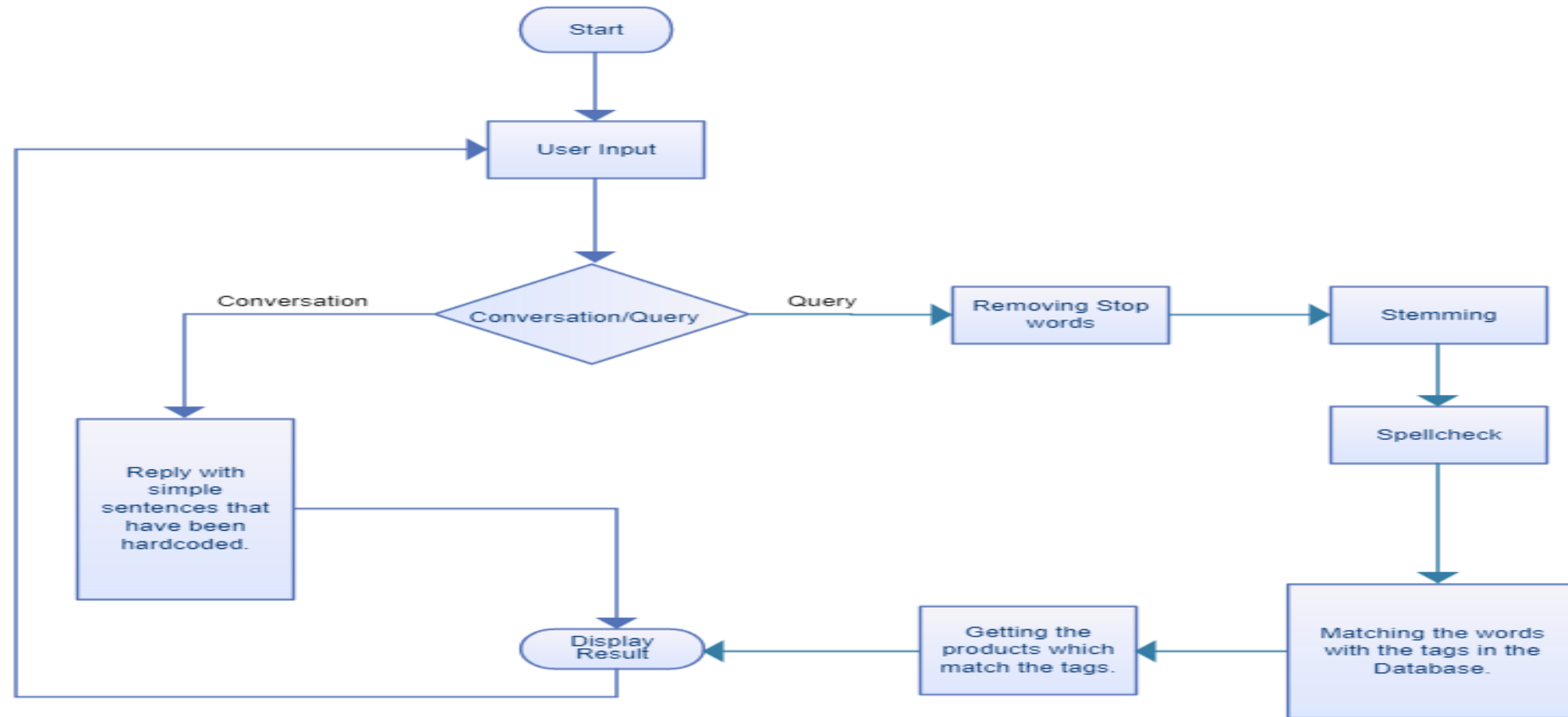
Tkinter :

- Tkinter is the standard GUI library for Python.
- Python when combined with Tkinter provides a fast and easy way to create GUI applications. Tkinter provides a powerful object-oriented interface to the Tkinter GUI toolkit.
- Tkinter provides various controls, such as buttons, labels and text boxes used in a GUI application. These controls are commonly called widgets.
- The GUI of Health care chatbot was created using tkinter.

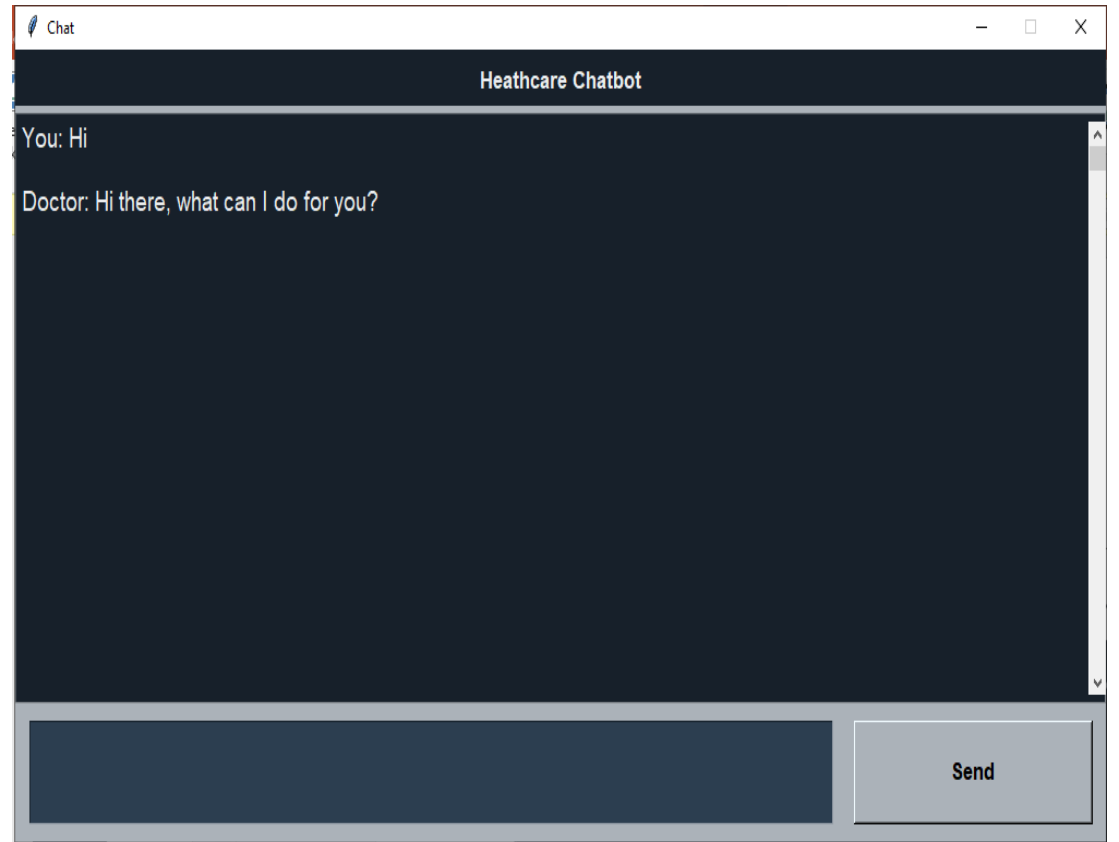
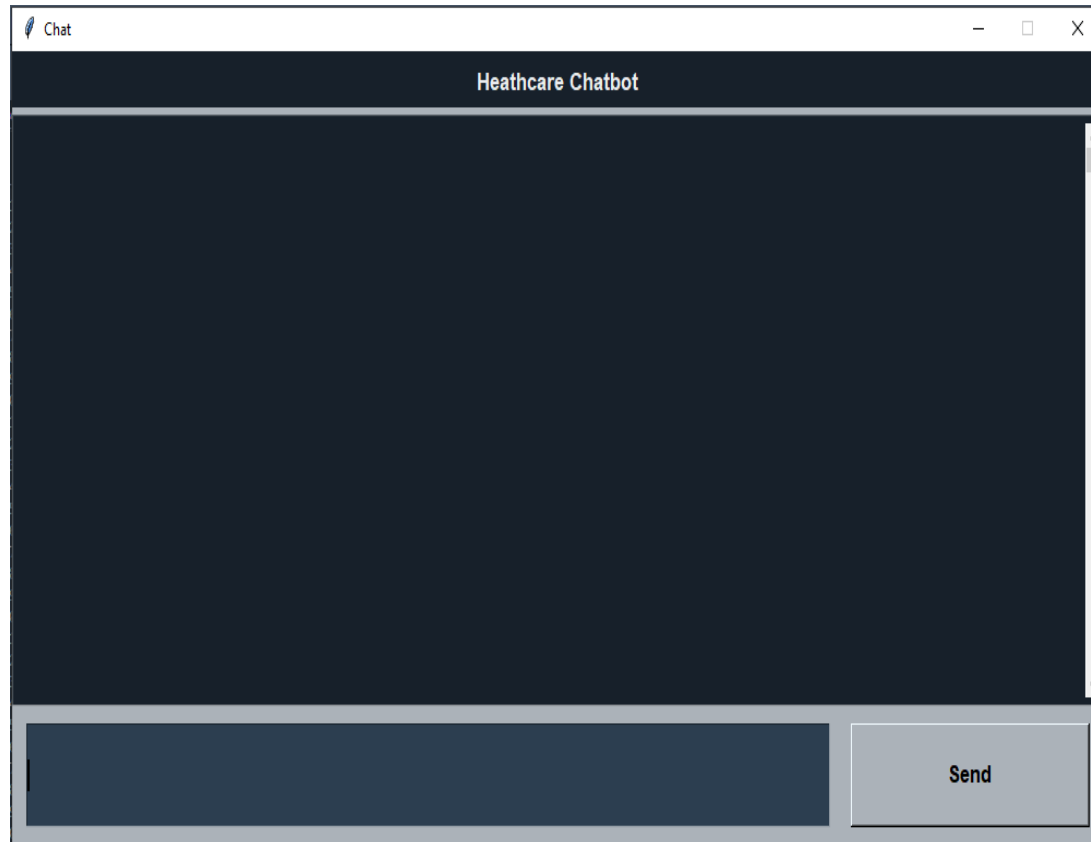
GUI :

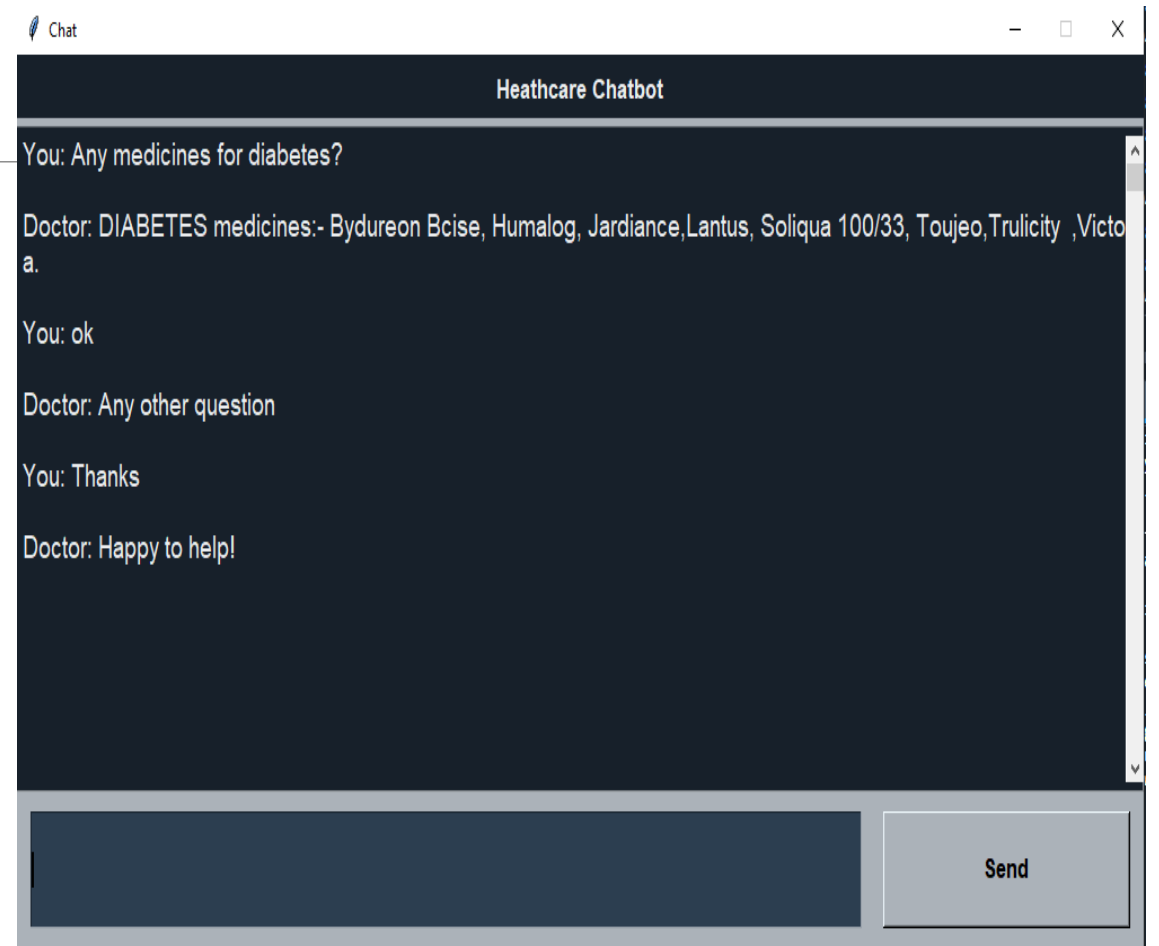
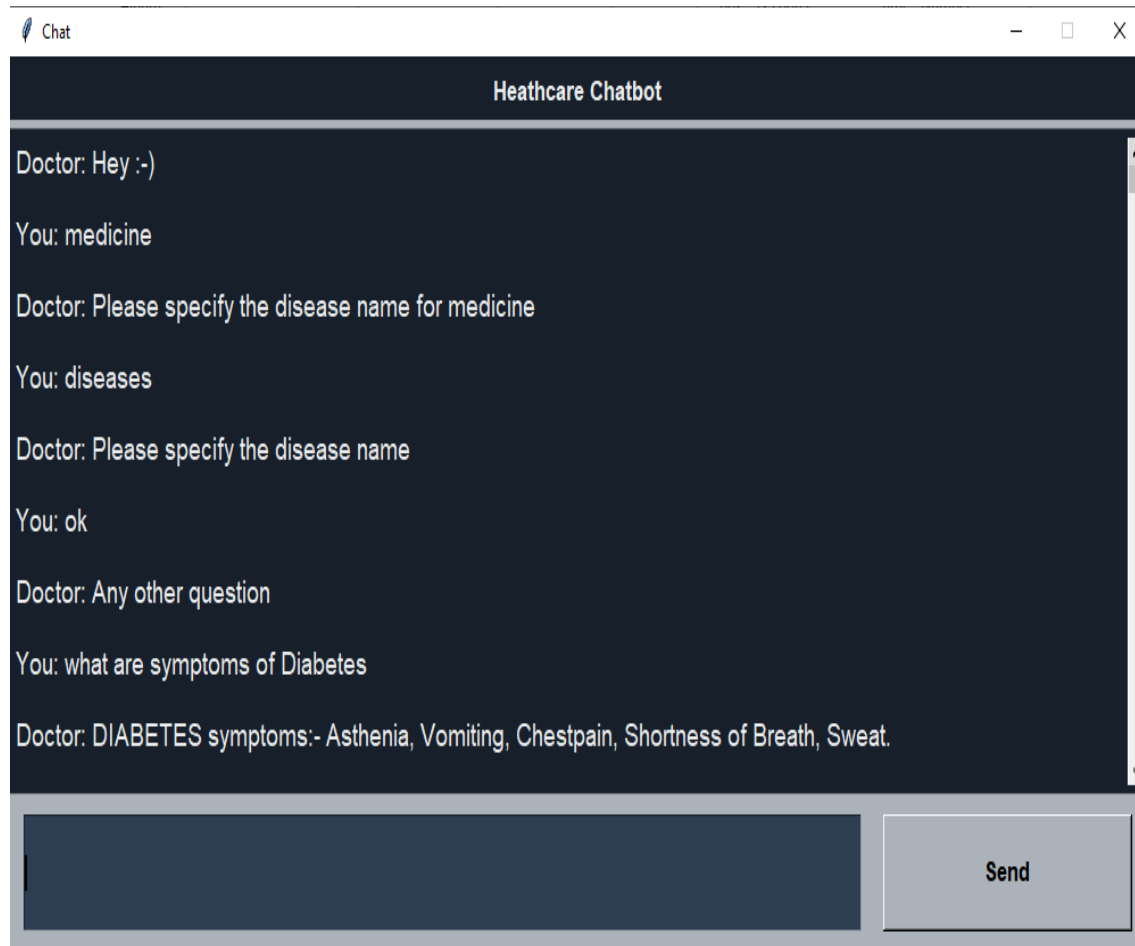


Flow Chart :



Working of chatbot:





Literature Survey & Paper Review :

No.	Paper Title	Authors	Descriptions
1	A Smart Chatbot Architecture based NLP and Machine learning for health care assistance.	Soufyane Ayanouz, Mohammed Benhmed, Boudhir Anouar Abdelhakim	Explain importance of chatbot and how we improve it using NLP and ML according to the scientific community, chatbots are user-friendly and any person who has an awareness of typing in their language on the desktop version and in the mobile application can use these chatbots very easily
2	An Intelligent Chat-bot using Natural Language Processing	Rishabh Shah, Siddhant Lahoti, Prof. Lavanya. K	Experiment with small dataset with some dynamic variables and different algorithm , Different algorithms have been used and with technology evolving the retrieval process including the triggering part is getting faster.
3	BANK CHAT BOT – An Intelligent Assistant System Using NLP and Machine Learning	Chaitrali S. Kulkarni, Amruta U. Bhavsar, Savita R. Pingale, Prof. Satish S. Kumbhar	They have entered queries which are similar to the questions asked while creating bank accounts . The analysis of the result is as 87% correct answer and 13% incorrect answer

No.	Papers	Authors	Description
4	Chatbot using NLP and Deep Learning	Ravi Khevaria	Training the dataset now the chatbot is tested by running various commands in the terminal. After training the model now the chatbot is ready to be tested. The output generated by the chatbot has moderate relevancy
5	Implementation of a Chatbot System using AI and NLP	Tarun Lalwani,Shashank Bhalotia, Ashish Pal,Shreya Bisen, Vasundhara Rathod	The purpose of a chatbot system is to simulate a human conversation. Its architecture integrates a language model and computational algorithm to emulate information online communication between a human and a computer using natural language

Scope :



Creating chatbot using deep learning and nlp have great scope in future because both of them are well known technology in the AI world and using them we can improve the link between computers and human much better.



Conclusion :

The main objectives of the project is to develop an chatbot using DL and NLP that will answer to user about diseases , symptoms and medicine. Basically in this we have used basic concept's of both NLP(Natural Language Processing) and DL(Deep Learning). First we used an raw data, basically a group of sentences and after cleaning the data we apply our DL models (Feed Forward Neural Net) which will provides the expected results, and using the GUI we will interact with the Chatbot . So in this way we are going to accomplished the chatbot which uses deep learning and NPL.

Reference :

<https://chatbotsmagazine.com/contextual-chat-bots-with-tensorflow-4391749d0077>

<https://sloboda-studio.com/blog/how-to-use-nlp-for-building-a-chatbot/>

<https://www.google.com/>

<https://www.nhsinform.scot/illnesses-and-conditions/a-to-z>

<https://www.nltk.org/>

<https://towardsdatascience.com/top-deep-learning-articles-of-2020-2b9a8c869875>