**Design and Implementation of Chatbot**

A chatbot is a computer program that replicates and processes human interaction either text-based or voice-based, allowing humans to interact with digital devices as if they were speaking with a real person. These chatbots interpret and process users' words and give an instant pre-set answer.

The main component in developing a chatbot is Natural language Processing (NLP). It provides interaction between human language and computers where it enables chatbots to convert users’ text into structured data to be understood by a machine. To implement this chatbot, NLTK (Natural language toolkit) library is used as it helps to interact with humans as the bot should process the user’s questions. The implementation is done as follows:

Firstly, the bot needs to be trained by loading the training data set by importing the required libraries. Text processing is done by converting the entire text into either lowercase or uppercase because machine learning algorithms need some numerical feature vector in order to perform the task. Secondly, tokenization converts text strings into a list of tokens such as words. Thirdly, removing punctuation. The fourth implementation step involves stemming, this process reduces the words to the root form. The next step includes lemmatization which ensures the root form of the word is correct or not. After the text processing, the text needs to be transformed into a meaning array of vectors. For the user input questions, to get a response from the bot a TD-IDF method is used where the concept of document similarity is implemented by importing Tfidf vectorizer which is used to convert a collection of raw documents into a matrix of TF-IDF features. It computes the significance of the word in a text file and processes the relevant words in the document. The next step is to find the similarity between questions(words) entered by the user and the words in the document*.* This step is performed by importing the cosine similarity module which matches the keywords and generates the output based on the user questions and its relevancy.

A graphical user interface is implemented in this project by importing the tkinter library which has features used to provide user-bot interaction. This is done by creating a chat window and placing all the necessary components in the chat window. This GUI is considered user-friendly where the user can post the questions to the bot and the bot will give accurate responses accordingly.

This chatbot software is executed by loading the training data file where the user requests(questions) are taken as input and if that input matches the question index in the training data set the bot answers the respective question with the cosine similarity approach. This bot can respond to the questions accurately. If the user request doesn’t match with the training data, the bot responds with the most appropriate answer. Overall, from this chatbot software execution, I have gained knowledge of how the real chatbots are implemented and used.