First Evaluation

ToCareBOTYou

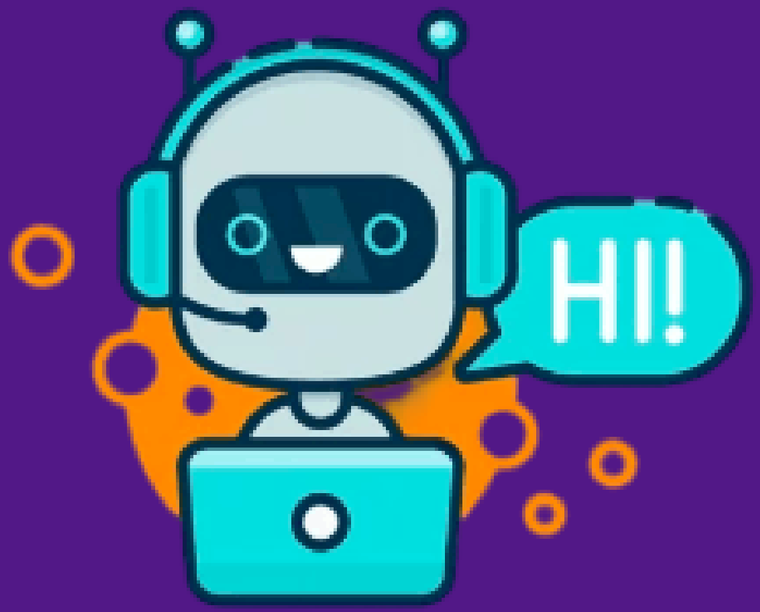
Efforts by:
Team WHACK

ToCareBOTYou

A Web Application that aims to provide a platform for people to deal with their mental health. We help people track their mood and mental status and help them with their progress towards attaining mental peace.

What problem do we solve?

- Help deal with growing stress during the current COVID-19 pandemic
- Provide variety of solutions personalized to the user through a friendly conversational UI to track their mental wellbeing
- Track behavioural patterns and recommend steps to improve mood
- Leverage data collected by thousands of users, applying NLP techniques present today to understand the problem a user faces
- Help navigate them towards a feasible and helpful solution



Feasibility Study

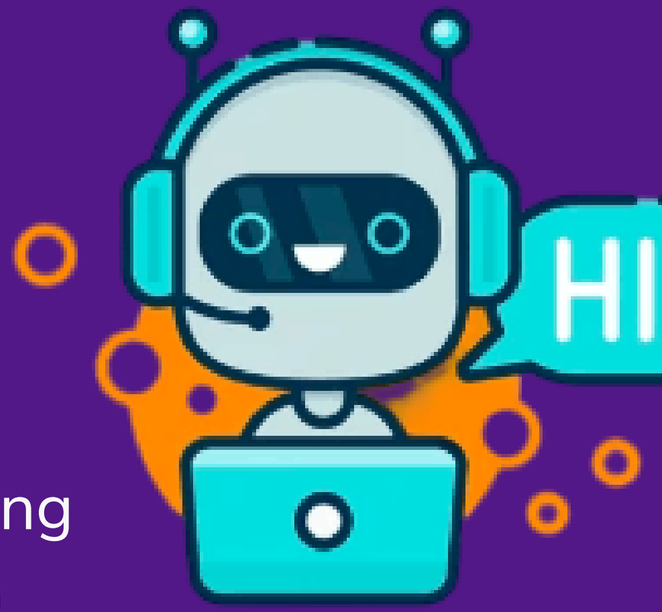
Our aim is to build a personalized user friendly website that also makes use of ML and deep learning algorithms for its various components and modules.

- The tech stack needed for this project are feasibly available and easy to use.
- The datasets that are being used in for the Machine Learning tasks are open source and publicly available.
- The time needed for the implementation is well within the time frame given to us.

Hence, this project is feasible.

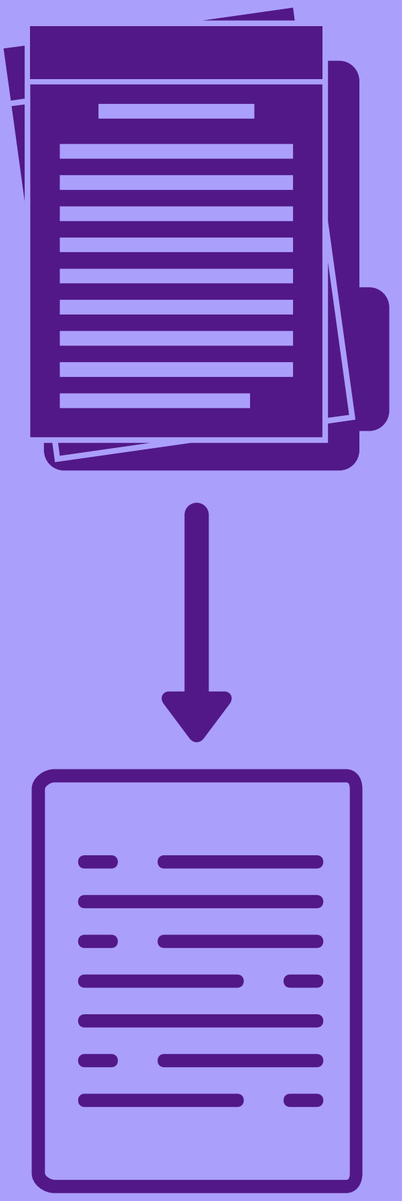
Components

- Smart Mental Health Chatbot:
  - Allows conversational natural language input from user and responds with the most appropriate response by various real psychologists
- Journal entry:
  - Users can write journals about their day in detail for a particular day
- Weekly mood tracks:
  - Highlights of the journal will be saved day wise by creating summary of the user's journal entry (text summarization)
  - Determine the mood of the day based on sentiment analysis
- Relax Page:
  - Music videos of different genres.

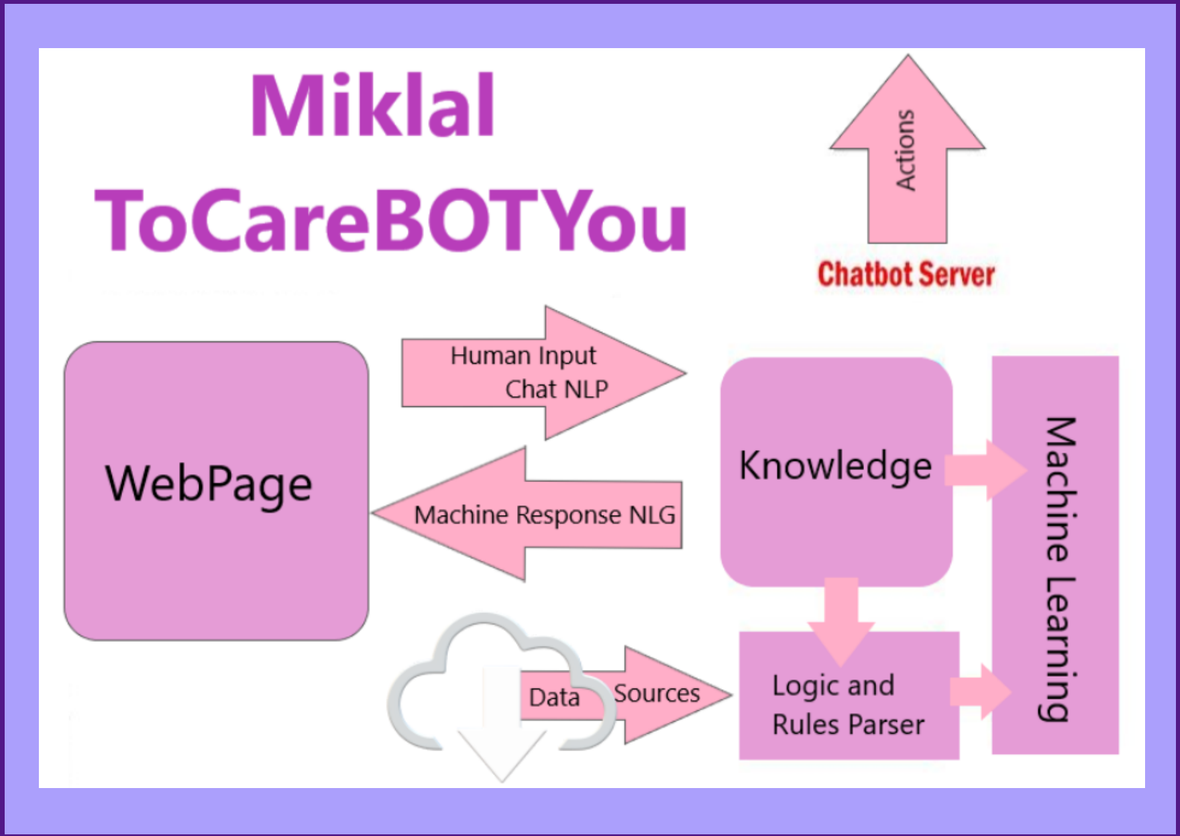


Text Summarization Module

- We are using the Text Summarization module for the following :
  - To highlight the main points from the user's journal
  - To extract the sentiment of the user while writing the journal.
- For Building our Text Summarization model we have used the pre-trained T5 model that is based on the transformer architecture.
- It uses an abstractive summarisation approach and hence the summaries generated contain new sentences and are more accurate and readable.



Our First Approach - Chatbot



1) Multi-classification task

- Using an LSTM model architecture which uses sequence-to-sequence learning
- Context extraction of semantic meaning through position of word in text (through feedback loops) not just keyword features (bag of words approach)

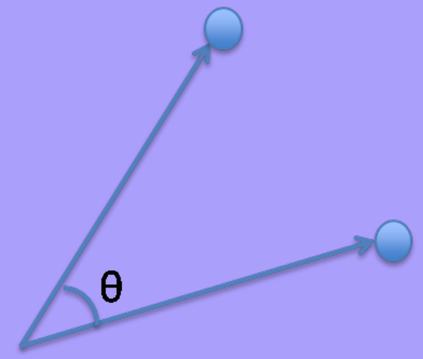
- Divided into sub-topics such as Depression, Anxiety, Workplace, Family conflict
- Dataset source: Counsel Chat (responses from verified Psychologists)
- Dataset size: 818 unique questions and 2128 responses
- Tech Stack: Tensorflow, NLTK, HTML, CSS, Flask

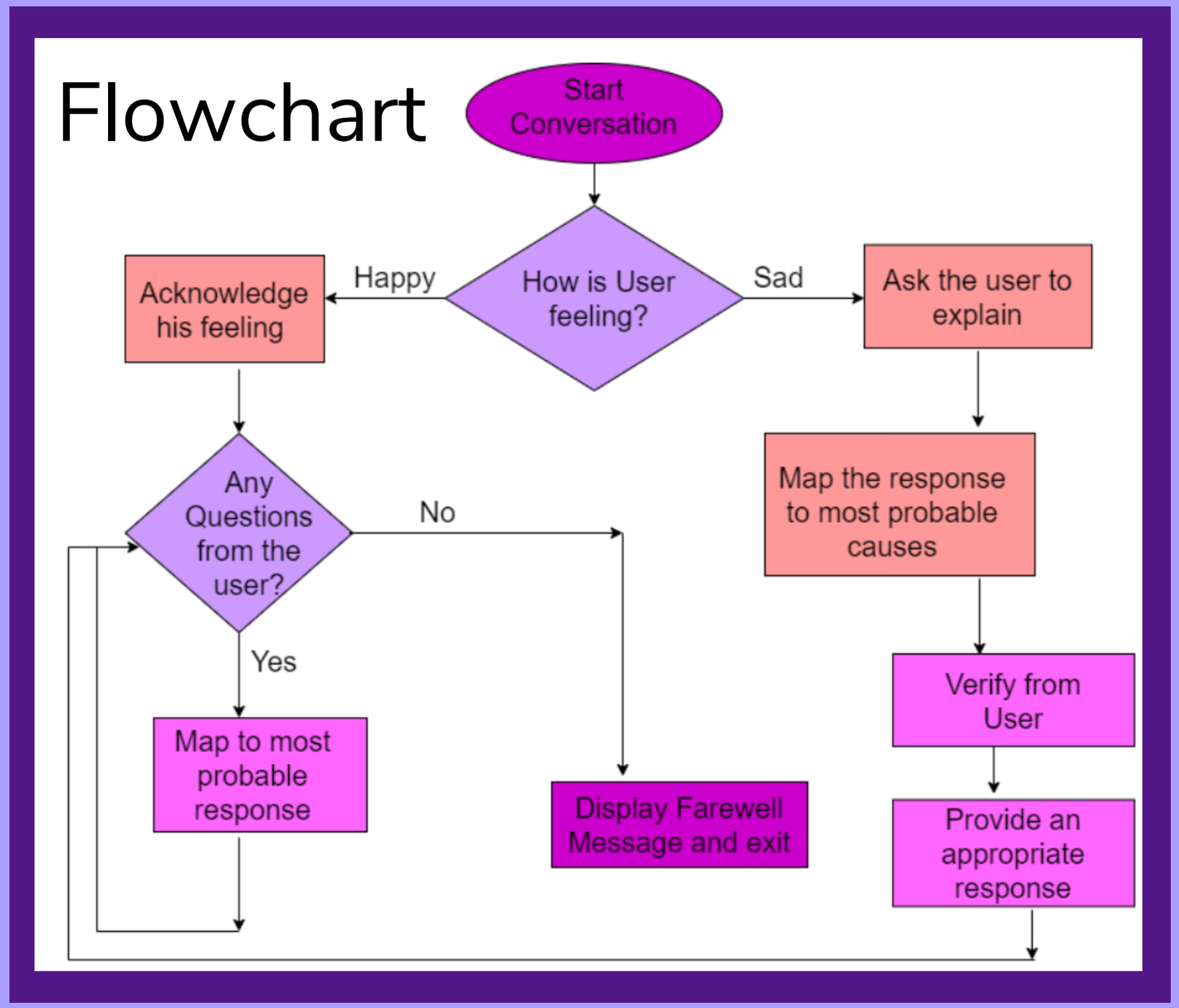
Our Second Approach

2) Cosine Similarity using Pre-trained embeddings

- Using pre-trained BERT (Bidirectional Encoder Representations from Transformers) by Google AI
- Embeddings trained on BookCorpus and English Wikipedia
- Transformer models capture contextual understanding
- More effective modeling of long term dependencies as compared to sequential models
- Architecture: bert-base-uncased L-12 H-768 A-12

$$sim(A, B) = \cos(\theta) = \frac{A \cdot B}{\|A\|\|B\|}$$





SEMANTIC UNDERSTANDING OF CHATBOT

Understanding intent

- Sentiment (Happy/Sad)
- Greeting/Farewell

Mapping Response

- Check cosine similarity of user query embeddings with the embeddings of existing questions
- Check cosine similarity with answers
- Choose the response with highest confidence level

Implementation - Functionalities

Frontend: HTML,CSS,Bootstrap, JavaScript

Backend: Flask, bert-as-service

- Greetings
- Sentiment detection: happy/sad
  - Polarity > 0.7 (Happiness)
- Encoding of User query
- Extraction of right response
  - Lack of sufficient information
    - Elaborate more
  - Confidence Level > 0.7
    - Return response
- Goodbyes

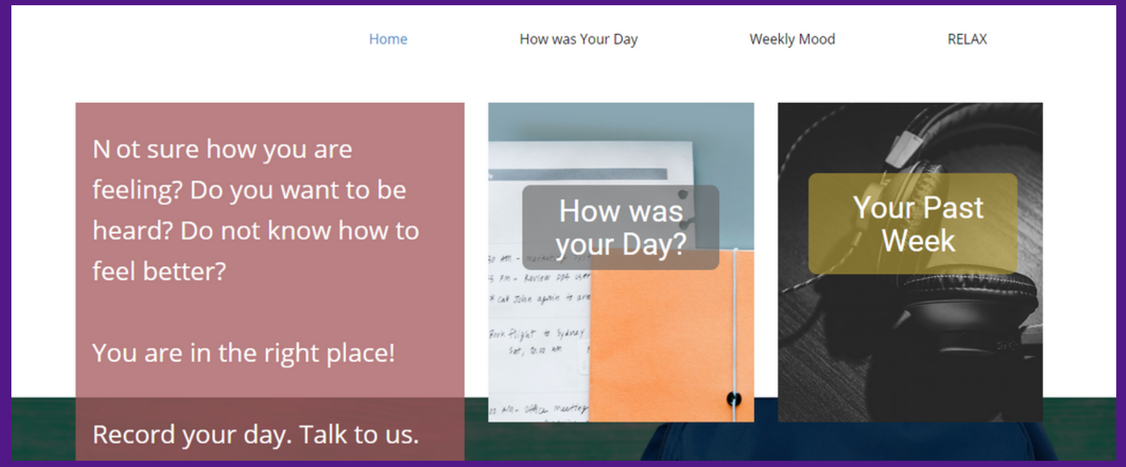
```
#check sentiment
blob = TextBlob(userText, analyzer=PatternAnalyzer())
polarity = blob.sentiment.polarity
```

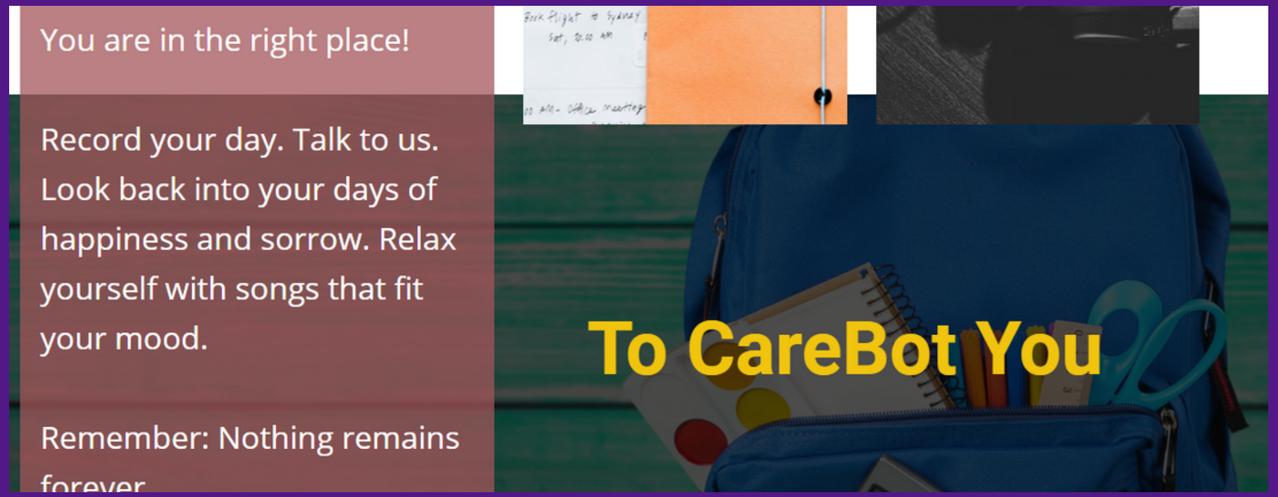
```
elif polarity>0.7:
    return "That's great! Do you still have any questions for me?"
```

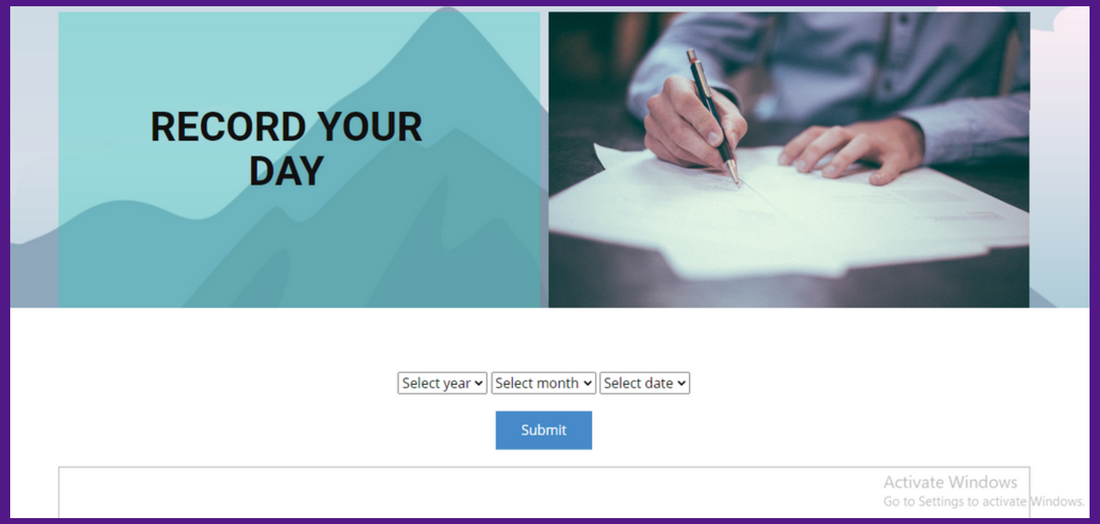
```
if max_a_sim<0.70:
    return "Could you please elaborate your situation more? I don't really understand."
```

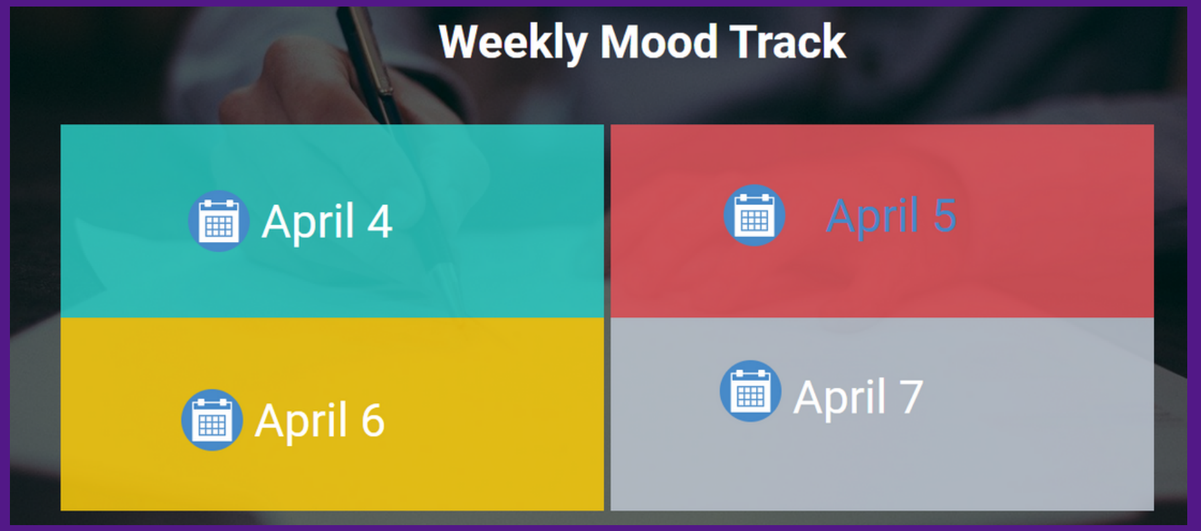
```
def retrieveAndPrintFAQAnswer(question_embedding,sentence_embeddings,FAQdf): #USE BOTH QUESTION
    max_sim=-1
    index_sim=-1
    valid_ans = []
    for index,faq_embedding in enumerate(sentence_embeddings):
        #sim=cosine_similarity(embedding.reshape(1, -1),question_embedding.reshape(1, -1))[0][0
        sim=cosine_similarity(faq_embedding,question_embedding)[0][0]
        #print(index, sim, sentences[index])
        if sim>=max_sim:
            max_sim=sim
            index_sim=index
            valid_ans.append(index_sim) #get all possible valid answers with same confidence
```

Front End:


Home
How was Your Day
Weekly Mood
RELAX
N ot sure how you are feeling? Do you want to be heard? Do not know how to feel better?
You are in the right place!
Record your day. Talk to us.
How was your Day?
Your Past Week


You are in the right place!
Record your day. Talk to us. Look back into your days of happiness and sorrow. Relax yourself with songs that fit your mood.
Remember: Nothing remains forever
To CareBot You


RECORD YOUR DAY
Select year
Select month
Select date
Submit
Activate Windows
Go to Settings to activate Windows.


Weekly Mood Track
April 4
April 5
April 6
April 7

Business Prospects

- During COVID-19 pandemic, people are really stressed out. Hence we provide a user-friendly journal entry tool where users can add journal entry for any day. The users can also look back at these journals in the weekly mood track.
- Provides summarized journal entries on weekly mental health status of patient to therapists. The therapists can get a quick idea bu going through the journal entry highlights and the sentiment.
- Most chatbots are usually rule based, but our chatbot is a conversational one that can interepret the free language tone used by the user to extract his sentiment and provide necessary suggestions on further improvement.