AI powered mental health Assistant

Major concern

* 9-12+ teenagers } Academics main reason for suicidal thought
  Due to social media
  Family Problems
  Skin and Body health
  Loneliness, Raging (IDK)?
  Feeling of being left out
  Friend circle
  Trying to fit in
  Financial problems.

* Adult's } Finance, Family } stress etc.....

* Middle/old Age } Loneliness etc.

The thing is they can afford therapy

Expensive.

They cannot afford therapy ☹

* Are afraid to express their emotions to their family.
* They don't have enough money to fix their problems

Due to social media

They get FOMO

Feeling of missing out.

So for the concept of therapy could not work for teenagers → especially if they don't have strong financial background. ☹

Why did we choose this topic??

Personally I have used chatGPT a lot to express my emotions and seek comfort (WOW!)

* What are their needs?

Maybe a companion

⇒ Who could listen to them and make things easier.

* But still GPT gave general answers and not as like something a therapist would have said!!

* Main goal is to create chatbot with personalized recommendations.

* If it would be a serious issue then conned to a therapist

Wait... How AI will help in Mental Health?
What do you exactly mean?

Well... ✱ creating a companion ✱ → we have AI Assistant
As we have several AI models playing different roles.

✱ Our vision ✱ It to look forward in the future where extreme stress rate (especially teenage) would gradually decrease.

✱ Dataset ✱ From Kaggle. 50,000 → datasets. ✱ For Emotion/ Sentiment Analysis.

✱ Situation
✱ Task
✱ Action
✱ Result

✱ limitation or Challenges → coping up with large datasets.

✱ Future scope → More personalized recommendation and Improved chatbot.

✱ Main ML Algorithm used to train the model.

1. Emotion / sentiment Analysis:
→ ✱ Logistic Regression ✱ classification of emotion
(Identifying Emotion) → happy, sad / angry etc.
✱ Positive ✱ Negative ✱ Neutral. → Sentiments

Since the dataset is huge, the main algorithm used
BERT
Bidirectional Encoder Representation of Transformers.
✱ It is smart assistant that reads the text both forward and backward to understand the context better.

Recognized diverse expression and slang.

↳ Ex: "I am feeling blue" → sad feeling.

Because of the context BERT will understand it.

Since it used the attention mechanism.

(to weigh the importance of each word in sentence).

I am feeling blue!

⇒ ① convert to lower case and remove all puntuation characters and numbers.

i am feeling blue.

② word-level tokenization

["i", "am", "feeling", "blue"]

③. Subword-level tokenization using BERT

["i", "am", "feeling", "bl", "#ue"]

④. Character-level tokenization.

["i", " ", "a", "m", " ", "f", "e", "e", "l", "i", "n", "g", " ", "b", "l", "u", "e"].

We can also remove stop words like I, am, the, in... But in BERT they are not usually removed since there might be chances of changing incontext.

Hence lemmatization and stemming like feeling → feel. do not take place.

⇒ In code: from transformers import BertTokenizer

tokenizer() : This function shall give input_id for each word (which are already present in vocabulary document) and attention_mask. → ignoring the repeated words.

* Ex Token(BERT):

['[CLS]', 'i', 'am', 'feeling', 'blue', '[SEP]']

[CLS] → classification used in the beginning of sentence

[SEP] → seperator used in the end of a sentence)

← Special tokens in BERT

* ['[CLS]', 'i', 'am', 'feeling', 'blue', '[SEP]']

i/p-id = [101, 1045, 2572, 3110, 2630, 102]

Attention mask = [1, 1, 1, 1, 1, 1]. token type ID = [0, 0, 0, 0, 0, 0]

then feeding the input into BERT

12 transformer layer. for bert-base. ← Embeddings representation

* Sentiment detection pipeline.

① Load the pretrained model.

↳ bert-based-uncased ← library from Hugging face.

(since the model is already pretrained it is necessary to fine-tune for sentiment classification)

BERT is language understanding to specific task.

↳ sentiment detection.

* The O/p of Pre-trained BERT is a dense layer for predicting masked tokens.

* It shall replace old dense layer to new one for classification of sentiment.

fully connected layer in neural network like

logits = Dense(num_classes)(BERT_OUTPUT) ← no. of classes 3 +ve, -ve, neutral

predictions = softmax(logits) ← obtained

O/P probabilities → classification head O/P logits (raw scores) for each class

→ Apply softmax fn to convert logits into probabilities.

→ classify the sentiment → select class with highest probability as the predicted sentiment.

$$\text{Softmax}(z_i) = \frac{e^{z_i}}{\sum_{j=1}^{K} e^{z_j}}$$

vector of logits

Ex: I love programming

① preprocess

Tokens = ['[CLS]', 'i', 'love', 'programming', '[SEP]']

I/P_Id = [101, 1045, 2293, 4734, 102]

Attention mask = [1, 1, 1, 1, 1]

② Fine tune → model O/P logits = [1.5, -0.7] → +ve & -ve

③ Apply softmax → [0.8, 0.2] → higher for +ve = 80% of positive sentiment.

④ Calculate the performance metrics → Accuracy, F1-score

* Apart from generic chatbots our main goal is to provide personalized, actionable support tailored specifically for mental health and personality based experience.

① Personality centric features. MBTI type.

Ex: Introvert → might receive more reflection and supportive response.

Extrovert → might get proactive encouragement to socialize.

② Age appropriate guidance

Age specific content:

Ex: younger users "Try a fun journaling exercise today!"

For adults: "Take a 5 min meditation break during work".

③ Mood tracking and visualization.

* Daily mood tracker: Allow users to log their mood daily.
* Visualize trends: graph which changes over time.
* combine mood data with MBTI type to give feedback:

"INTJ tend to experience stress under rigid routines. Try adding a bit of spontaneity to your day!".

* Sentiment over time: "you have felt stressed three times a week lets work on that!".

④ Mental health interventions:

* Guided coping strategies:
  - Breathing exercises, graditude journaling, etc.
  - And inorder to get Interactive personalized growth.
    - having a reward system:
      1. Journaling prompts.
      2. Daily Affirmation: Possibly making based on MBTI
      3. Fun challenges.
    - Even provide custom resources/ recommendations for blogs, books, videos, prodcast based on personality and age.
      - Activity Recommendation

* If there is a crisis mode 3 Immediately connect, suggest professional help/ helpline contacts

Future scope 3 * Provide more engagement and interaction

* Emotion detection 3 voice.

* Potential integrations with VR for immersive mental health exercise/ professional therapy network.