1.2 THERAPY PROGRESS TRACKER USING SENTIMENT ANALYSIS

The objective of the project is to provide a tool for tracking therapy progress by combining **GAD-7** and **PHQ-9** scores with sentiment analysis.

1.3 THERAPY PROGRESS TRACKER IMPLEMENTATION

GAD-7 and PHQ-9 are widely used clinical instruments for assessing anxiety and depression, respectively. By integrating these scores with sentiment analysis of session notes, we provide a holistic view of emotional trends over therapy sessions. The application is implemented using **Streamlit** for the user interface and **Hugging Face's DistilBERT-based sentiment analysis pipeline** for natural language processing.

1.4 IMPLEMENTATION PROCESS BREAKDOWN AND JUSTIFICATION

By utilizing GAD-7 (Generalized Anxiety Disorder-7): A 7-item scale assessing the severity of generalized anxiety disorder. Scores range from 0 to 21

PHQ-9 (Patient Health Questionnaire-9): A 9-item scale assessment of depression severity. Scores range from 0 to 27. Which are clinical tools for Mental Health assessment, Sentiment analysis can identify emotional trends in patient-reported data, which can complement clinical scores to provide deeper insights into mental health. Combining sentiment trends with GAD-7 and PHQ-9 scores helps therapists tailor interventions to better address patient needs. It can be applied across large datasets in group therapy or research settings. Pre-trained models like DistilBERT fine-tuned on datasets such as SST-2 are well-suited for classifying text into positive or negative sentiment categories. Hugging Face's DistilBERT-based SST-2 model was selected due to its lightweight nature and robust performance in sentiment classification tasks.

1.5 RESEARCH METHODOLOGY

The therapy progress tracker application is designed in such a way that the User provides GAD-7 and PHQ-9 scores along with session notes for two therapy sessions. Session notes are analyzed using a fine-tuned DistilBERT model, producing a sentiment label (e.g., "POSITIVE" or "NEGATIVE") and a confidence score. The application combines GAD-7 and PHQ-9 scores with sentiment analysis results to generate a comprehensive progress report.

1.6 Technology and tools used in Implementation

1. Hugging Face Transformers: For pre-trained DistilBERT-based sentiment analysis.
2. Streamlit: For building an interactive web interface.
3. Python: For data processing and integration.

2.1 SYSTEM DESIGN AND ANALYSIS

The system consists of a User interface, AI model and an Inference estimator at the Backend. Listed below is the code structure for the therapy progress tracker application

1. **Sentiment Analysis**: A function leveraging Hugging Face's pipeline to analyze text and return sentiment labels and scores.
2. **Progress Tracker**: A function to combine GAD-7/PHQ-9 scores with sentiment analysis results for each session.
3. **Streamlit UI**: Components for user input (sliders and text areas) and displaying results (markdown and tables).

2.2 STEPS IN IMPLEMENTATION

1. Loading the Model

```
# Load the sentiment analysis model
sentiment_model = pipeline("sentiment-analysis", model="distilbert-base-uncased-finetuned-sst-2-english")
```

2. Defining the Inference estimator function

```
# Function to analyze sentiment of input and return the sentiment label and score
def calculate_sentiment(text):
    result = sentiment_model(text)
    return result[0]['label'], result[0]['score']
```

Figure 1.2 Sentiment Analysis Function

3. **Defining the Progress Tracker Function**

   This function Combines GAD-7, PHQ-9 scores with sentiment insights for multiple sessions.

4. **Designing** the **user interface using Streamlit:**

   a. The Sliders and text areas for input.

   b. Buttons to trigger analysis and display results.

5. Execution **by** running the Streamlit application locally for real-time interaction and analysis.

3.1 CONCLUSION

This project demonstrates how AI and sentiment analysis can augment traditional clinical tools to track therapy progress effectively. By providing an interactive and insightful interface, the application empowers therapists and patients to visualize and understand emotional trends, enabling better therapeutic outcomes. Future improvements will include adding support for saving

session data and generating longitudinal reports, additional scales or indicators (e.g., sleep quality, medication adherence) for comprehensive tracking and Fine-tune DistilBERT on therapy-specific datasets for more domain-relevant sentiment analysis.