Mental Health Concern Classification Using NLP

Our project aims to develop an end-to-end Natural Language Processing (NLP) solution for the automatic extraction, classification, and analysis of mental health concerns from user input. Leveraging models like RoBERTa, Mistral, and custom Named Entity Recognition (NER) modules, the solution integrates five primary components: **polarity detection**, **keyword extraction (NER)**, **concern classification**, **intensity scoring**, and **timeline-based sentiment shift analysis**.

Solution Design:

1. **Polarity Finder**: This component detects emotional polarity, capturing shifts in user sentiment over time.
2. **Keyword Extractor (NER)**: Utilizing fine-tuned NER models, it extracts mental health-related phrases to highlight user concerns.
3. **Concern Classifier**: Maps extracted keywords to predefined categories, enabling nuanced classification of concerns.
4. **Intensity Scorer**: Assesses the severity of each concern, generating scores on a scale of 1-10.
5. **Timeline Sentiment Analyzer**: Tracks changes in mental health concerns over successive inputs, providing a historical perspective.

Expected Deliverables: Each component in the pipeline is expected to achieve high accuracy in its respective task:

- **Polarity Finder** for sentiment tracking.
- **Extractor** (NER) for reliable keyword identification.
- **Classifier** for precise categorization.
- **Intensity Scorer** for severity ranking.
- **Timeline-Based Sentiment Analyzer** for historical trend visualization.

Evaluation Metrics: Success will be measured based on accuracy in polarity detection, NER extraction, classification precision, intensity scoring, and the effectiveness of timeline analysis in capturing mental health progression. End-to-end performance will also be assessed to ensure pipeline reliability.