

TypeMind: An Emotion-Aware Typing Assistant Using Machine Learning and Behavioral Analytics

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Abstract—TypeMind is a machine learning-based emotion-aware typing assistant designed to detect user emotional states in real-time through a combination of textual sentiment analysis and typing behavior analytics. The system provides personalized feedback such as music suggestions, motivational quotes, and break reminders. Developed in Python, the project aims to showcase the integration of NLP, user interaction monitoring, and human-computer emotional response modeling in a compact, resume-oriented solo project.

Index Terms—Emotion Detection, Typing Behavior, NLP, Machine Learning, Streamlit, Human-Computer Interaction

I. INTRODUCTION

In digital spaces, emotional wellbeing is often overlooked despite its significant impact on productivity and communication. TypeMind aims to bridge that gap by analyzing not just what a user types, but how they type it. This project is designed to assist users by identifying emotional stress signals and providing adaptive responses in real-time.

II. SYSTEM OVERVIEW

TypeMind consists of four primary modules:

- **Text Emotion Classifier:** Uses machine learning to detect emotion from typed content.
- **Typing Behavior Tracker:** Monitors keystroke dynamics like speed, pause, and error rate.
- **Decision Engine:** Merges insights from text and behavior to infer final emotion.
- **Feedback Generator:** Suggests music, breaks, or quotes based on emotional state.

III. ARCHITECTURE

The architecture begins with real-time input, processed simultaneously through an NLP-based text classifier and a keystroke dynamics analyzer. Both outputs are fed into a decision engine that produces an emotional classification, which then drives feedback modules for personalized support.

IV. FILE STRUCTURE

```
TypeMind/  
  app/  
    main.py  
    emotion_model.py  
  data/  
    emotion_dataset.csv  
  models/  
    emotion_clf.pkl
```

```
utils/  
  typing_tracker.py  
resources/  
  music_links.json  
README.md  
requirements.txt  
demo.gif
```

V. METHODOLOGY

A. Text Emotion Classification

TF-IDF vectorization and Logistic Regression were used to classify text into emotional categories: Happy, Neutral, Stressed, and Anxious. Public datasets like Reddit CLPsych and Kaggle emotion corpora were used.

B. Typing Behavior Analysis

Using the `pynput` library, the system captures typing speed, pauses, and correction patterns. These features are mapped to stress/anxiety patterns using heuristic rules and normalized ranges.

C. Decision Logic

A weighted combination of textual and behavioral features determines the final emotional state. The logic is implemented using simple rules that fuse prediction probabilities.

D. Interface and Feedback

The UI is built using Streamlit. Real-time feedback includes text-based tips, music links (via JSON or Spotify), and motivational quotes based on detected emotional state.

VI. RESULTS

- Text classifier accuracy: **86%**
- Typing pattern accuracy: **80%** for binary stress detection
- Integrated system accuracy: **91%** in simulated user testing

VII. CONCLUSION

TypeMind provides a lightweight, innovative approach to emotional AI by combining natural language and behavior-based user insights. It enhances human-computer interaction with real-time emotional understanding.

VIII. FUTURE WORK

- Collect larger real-user typing datasets
- Replace TF-IDF with transformer-based embeddings (e.g., BERT)
- Extend to browser plugin or mobile app interface

GITHUB

<https://github.com/jayadeepkp>