

SENTINEXAI - AI POWERED LAW AND INCIDENT PREDICTIONS PLATFORM FOR WOMENS

Introduction

SentinexAI is an AI-powered surveillance platform designed to enhance public safety by analyzing speech patterns from emergency calls to detect potential threats and distress in real time. The system integrates advanced speech emotion recognition (SER), sentiment analysis, and keyword detection to classify emergency calls as either Critical or Safe, enabling rapid intervention by command room personnel.

The primary objective of SentinexAI is to assist law enforcement and emergency response teams by providing timely, emotion-informed insights into the psychological and emotional states of callers. This is particularly valuable in high-stress or unsafe scenarios involving women or vulnerable individuals. Unlike traditional call monitoring systems that rely solely on content or human judgment, SentinexAI brings emotional intelligence to emergency response through machine learning.

By combining real-time audio analysis with a responsive web dashboard, the platform empowers officers to take proactive action, reduce false alarms, and ensure appropriate escalation during critical events. SentinexAI represents a step forward in building intelligent, emotion-aware safety systems that respond to both what is said—and how it is said.

System Overview and Functionality

SentinexAI is a real-time audio analysis system that combines speech emotion recognition, sentiment analysis, and keyword detection to assess emergency situations. The platform operates by analyzing incoming speech signals from emergency calls, identifying emotions such as anger, fear, or sadness, and cross-verifying them with transcribed content to trigger appropriate alerts.

The system architecture consists of five core modules working in an integrated pipeline:

- 1. Speech Emotion Recognition (SER):**

Incoming audio is processed using deep learning models trained on emotional speech datasets. The system uses Mel-frequency cepstral coefficients (MFCCs) as input features and classifies emotions using a convolutional neural network (CNN). Emotions such as Anger, Fear, Sadness, and Neutrality are detected in real-time.

- 2. Speech-to-Text Conversion:**

Using speech recognition libraries, the system converts live audio into text, enabling further analysis for sentiment and contextual understanding.

3. **Sentiment and Keyword Analysis:**

The transcribed text is analyzed using a pretrained sentiment model (DistilBERT) to classify the tone as Positive, Neutral, or Negative. In parallel, key phrases such as “help,” “attack,” or “afraid” are extracted using natural language processing (NLP) techniques to flag potential threats.

4. **Alert Classification Engine:**

Based on the detected emotion, sentiment, and keywords, the system classifies each call as either Critical or Safe. Calls that exhibit strong negative emotion or emergency-related keywords are escalated for immediate attention.

5. **Web-Based Dashboard:**

All alerts and classified data are displayed on a Flask-based web interface. The dashboard highlights critical alerts using color-coded indicators, allowing command room personnel to monitor situations quickly and act accordingly.

Each module in SentinexAI is optimized for real-time operation and is lightweight enough to be deployed locally or integrated into existing emergency call center infrastructure. The seamless flow between audio input, emotion analysis, and alert output ensures that urgent cases are prioritized with minimal delay.

Technology Stack and Architecture

SentinexAI is designed with a modular, real-time architecture that enables efficient detection of emotional distress from audio inputs. The backend is developed in Python, using the Flask framework to serve a responsive and lightweight web interface. The system captures live speech through a microphone or uploaded files and processes the audio using Librosa and SpeechRecognition libraries.

Emotional features are extracted using Mel-Frequency Cepstral Coefficients (MFCCs), which are then passed into a trained Convolutional Neural Network (CNN) to classify emotions such as anger, fear, sadness, and neutrality. This ensures accurate detection of emotional tone in real-time.

In parallel, speech is converted into text to allow further semantic analysis. The transcribed text undergoes sentiment classification using a pre-trained DistilBERT transformer model, and critical keywords are extracted using SpaCy’s natural language processing capabilities.

These multi-modal insights—emotion from voice, sentiment from text, and keyword presence—are combined in a decision logic layer to classify each call as either Critical or Safe. The result is displayed through a clean HTML/CSS dashboard, where critical alerts are visually highlighted for immediate attention. This architecture supports scalable deployment in emergency monitoring environments, offering a smart and proactive solution for real-time public safety interventions.

Conclusion and Future Scope

SentinexAI is a smart, real-time system designed to enhance emergency response by detecting emotions and critical cues from speech and text. By analyzing voice tone, sentiment, and keywords, it accurately classifies calls as Critical or Safe, allowing officers to respond quickly through a simple web dashboard. The system brings emotional intelligence into public safety, improving decision-making and reducing response time.

In the future, SentinexAI can be extended to integrate with live emergency call centers, support regional languages, and include caller location for faster intervention. Enhancements such as video-based emotion detection and adaptive learning from real-world feedback can further improve its accuracy and effectiveness. With continued development, SentinexAI has the potential to become a scalable and impactful tool for modern emergency monitoring systems.