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HUMAN SCREAM DETECTION

M.VIVEK - 2111CS020681
WAJEEHA UNNISA - 2111CS020683
J.YASHWANTH - 2111CS020685
T.SWATHI - 2111CS020712
U.JYOTHI - 2111CS020713

Bachelor of Technology
Malla Reddy University

ABSTRACT

This research explores the detection of human screams using acoustic analysis. By employing machine learning techniques, we aim to distinguish screams from ambient noise, providing a valuable tool for various applications such as public safety, emergency response, and healthcare. Our approach involves feature extraction and classification to enhance the accuracy of scream detection systems, contributing to improved real-time recognition and response mechanisms. This research contributes to the evolving field of audio analysis and machine learning by presenting a comprehensive approach to human scream detection. The developed system's potential applications in emergency response, public safety, and mental health make it a valuable asset in diverse domains. The findings underscore the importance of combining technological advancements with ethical considerations to ensure responsible and beneficial deployment in real-world scenarios .The study explores the ethical considerations surrounding the deployment of such technology.

INTRODUCTION

Scream detection is a technology that can detect and analyse audio signals to determine if they contain screams or high-pitched vocalizations. This technology is used in various applications such as security systems, smart homes, and public safety. Scream detection works by utilizing sound processing algorithms to distinguish screams from other ambient noises. It plays a critical role in enhancing response mechanisms by alerting authorities or triggering predefined actions in emergency situations where detecting distress signals, such as screams, is essential for ensuring safety and rapid intervention. Scream detection involves identifying and distinguishing screams or loud vocalizations in audio recordings. This technology is commonly used in security systems, emergency response systems, and content moderation applications. Algorithms can be trained to recognize patterns associated with screams by analysing audio features such as pitch, amplitude, and duration, which can help to trigger appropriate actions or alerts in various context.

ALGORITHMS USED :

Multilayer Perceptron (MLP): After the SVM-based classification, a multilayer perceptron model is used for confirmation. MLPs are a type of neural network architecture that consists of multiple layers of interconnected neurons**.** They are well-suited for complex pattern recognition tasks, including audio classification**.**

Mel-Frequency Cepstral Coefficients (MFCC): MFCCs are commonly used as feature vectors for scream detection. These coefficients capture the spectral characteristics of audio signals and are particularly useful for speech and audio processing tasks. MFCCs provide a compact representation of audio features that can be fed into machine learning models**.**

METHODOLOGIES :

1.Audio Analysis and Visualization: The script uses the librosa library to load audio files, visualize raw audio, and generate spectrograms and mel

spectrograms .It also demonstrates the trimming of audio using librosa.effects.trim. Spectrograms and mel spectrograms are visualized using librosa .display .specshow.

2.Pitch Detection: The script employs the aubio library for pitch detection using the YIN algorithm (pitch_detection_yin function).It converts the pitch values to MIDI and collects pitch and confidence values for each frame.

3.Time-Frequency Analysis: The script uses Short-Time Fourier Transform (STFT) and Mel spectrogram to analyze the frequency content of the audio signal.

4.Visualization of Pitch and Confidence: The pitch and confidence values obtained from pitch detection are visualized over.

REAL TIME APPLICATIONS: Emergency Response Systems: Scream detection can be integrated into emergency response systems to automatically alert authorities or trigger alarms in situations such as accidents, assaults, or medical emergencies.

Smart Home Security: Incorporating scream detection into smart home security systems can enhance the ability to identify potential threats and intruders, providing an added layer of protection.

Health Monitoring: Continuous monitoring of healthcare environments using scream detection can aid in the timely identification of patients in distress, reducing response times and improving overall patient care**.**

Public Safety in Urban Areas: Deploying scream detection in public spaces, transportation hubs, or crowded events can contribute to public safety measures by detecting signs of distress or danger.

Conclusion:

In conclusion, the detection of human screams holds significant importance across various domains, ranging from security and safety to healthcare and entertainment. Through advancements in technology, particularly in the field of signal processing and machine learning, accurate and efficient methods for detecting human screams have been developed. These systems leverage features such as frequency, intensity, and temporal patterns to distinguish screams from other sounds. The applications of human scream detection are diverse, including emergency response systems, crime prevention, and healthcare monitoring. By integrating scream detection into smart devices and surveillance systems, there is potential for rapid response in critical situations, enhancing public safety. Moreover, in healthcare settings, the identification of distress signals through scream detection can facilitate timely interventions and improve patient outcomes.