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Speech Emotion Recognition

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Abstract: This abstract provides a concise overview of the problem, research method, and design in the context of speech emotion recognition using the Librosa library and MLP classifier.

The problem addressed in this research is the accurate recognition and classification of emotions conveyed through speech signals. The research method involves utilizing the Librosa library for feature extraction and the MLP classifier for emotion classification. The design of the study involves applying pre-processing steps and data augmentation techniques to enhance the quality and diversity of the training data.

The objective of the research is to develop a precise and accurate speech emotion recognition system. By leveraging the Librosa library and MLP classifier, the study aims to improve the understanding and analysis of human emotions from speech signals.

The findings contribute to the advancement of speech emotion recognition and have practical implications in affective computing, in achieving precise and accurate speech emotion recognition using the Librosa library and MLP classifier. The motivation behind this project stems from the need for robust and efficient emotion recognition systems. Despite advancements in the field, challenges remain in handling variations in speech patterns and mitigating the impact of background noise. The proposed system leverages the Librosa library for feature extraction, capturing essential acoustic cues, and employs the MLP classifier for effective emotion classification.

I.INTRODUCTION

Speech emotion recognition has gained significant attention due to its wide-ranging applications in affective computing, human-computer interaction, and psychological research. Accurately detecting and

classifying emotions from speech signals is crucial for understanding human behavior, improving user experiences, and developing personalized systems. This research focuses on addressing the challengesused in speech emotion recognition. The research gap lies in the need for a more precise and accurate system that can handle variations in speech patterns and noisy environments. This research aims to fill this gap by proposing a comprehensive approach using the Librosa library and MLP classifier.

The subsequent sections of this paper detail the methodology employed, experimental results, and in-depth discussions. The findings of this research contribute to the advancement of speech emotion recognition, enabling improved understanding and analysis of human emotions from speech signals. The practical applications range from personalized systems to mental health diagnosis and therapy, enhancing various aspects of human-computer interaction.

can be taken as input to the machine knowledge model which will prognosticate the person's personality." Addicts' personality traits can be studied in tenures of standard-issue-conclusion- conclusion monumental five personality traits outlined as plainspokenness to experience, meticulousness, affability, and Neuroticism.". The word persona comes from the " Latin word Persona ", which refers to a dramatic mask worn bya person.

II. LITERATURE REVIEW

The literature review provides an overview of previous research on speech emotion recognition, emphasizing strengths, limitations, key findings, and methodologies used. It also identifies gaps in the literature and highlights how the proposed project addresses those gaps.

Previous research in speech emotion recognition has explored various methodologies and techniques to accurately detect and classify emotions from speech signals. Acoustic feature extraction plays a vital role in this process, with the Librosa library widely employed for extracting relevant features such as pitch, energy, and MFCCs. These features capture essential acoustic cues related to emotional expression in speech.

Machine learning models, including the MLP classifier and SVM have been successfully applied in emotion classification. The MLP classifier, known for its ability to learn complex patterns, has demonstrated promising results. Performance evaluation metrics such as accuracy, precision, recall, and F1 score have been used to assess the effectiveness of these approaches, with many studies reporting high accuracy rates.

III.PROBLEM STATEMENT

This research paper focuses on the problem of speech emotion recognition using the Librosa library and MLP classifier. The objective is to develop a system that can accurately detect and classify emotions conveyed through speech signals.

The project utilizes data consisting of speech recordings with diverse emotional expressions. The challenge lies in effectively extracting relevant acoustic features using the Librosa library and leveraging the MLP classifier for precise emotion classification.

The research questions guiding this project are:

- How can the Librosa library be utilized to extract acoustic features that capture emotional cues from speech signals?
- How can the MLP classifier be trained to accurately classify emotions based on the extracted features?

The hypotheses for this project are:

- The Librosa library can effectively extract acoustic features such as pitch, energy, and MFCCs that capture emotional information from speech signals.
- The MLP classifier, with appropriate training and optimization, can accurately classify emotions based on the extracted features.

To address the problem, the project will develop a comprehensive methodology that combines the capabilities of the Librosa library and MLP classifier. The methodology will involve feature extraction from speech signals, training the MLP classifier, and applying preprocessing and data augmentation techniques. The research paper aims to contribute to the field of speech emotion recognition by proposing an effective approach that can accurately recognize and classify emotions from speech signals.

IV.METHODOLOGY

1.Dataset collection:
Gather a diverse dataset of speech recordings that cover a wide range of emotional states. This dataset should ideally include labeled samples indicating the corresponding emotions.

2.Preprocessing:
Clean the speech recordings by removing noise, artifacts, and irrelevant information. Preprocessing may involve techniques such as noise reduction, filtering, and normalization.

3.Feature extraction:
Extract relevant features from the preprocessed speech signals. Commonly used features for speech emotion recognition include:
Mel-frequency cepstral coefficients (MFCCs): Capture the spectral characteristics of the speech signal.
Prosodic features: Extract features related to pitch, energy, and timing, such as pitch contour, speaking rate, and energy distribution.
Statistical features: Compute statistical properties of the speech signal, such as mean, standard deviation, and skewness.

4.Model training:
Choose a suitable machine learning or deep learning algorithm to train a model on the labeled dataset. Popular models include support vector machines (SVM), random forests, hidden Markov models (HMM), or deep neural networks (DNN). The choice of model depends on the complexity of the problem and the size of the dataset.

5.Model evaluation:
Assess the performance of the trained model using evaluation metrics such as accuracy, precision, recall, or F1 score. Cross-validation or train-test splits can be used to estimate the model's generalization ability.

6.Model optimization:
Fine-tune the model parameters, architecture, or feature representation to improve its performance. This step may involve hyperparameter tuning, data augmentation, or ensemble techniques.

7.Real-time application:
Implement the trained model in a real-time scenario, where it can classify emotions from incoming speech signals. This may involve deploying the model on a server or integrating it into a larger system.

V.EXPERIMENTAL RESULTS

Here we us ravdees dataset in this application.

Ravd**ess:** The Ryerson Audio-Visual Database of Emotional Speech and Song (RAVDESS) is a dataset containing speech and song recordings of 24 actors, each expressing eight emotions (calm, happy, sad, angry, fearful, surprise, disgust, and neutral). The dataset is widely used for training and evaluating speech emotion recognition models

Output:

```
[ ]  #Calculate Accuracy
     accuracy = accuracy_score(y_test, y_pred)
     print("Accuracy: {:.2f}%".format(accuracy*100))

     Accuracy: 75.97%
```

VI.CONCLUSION

In this research paper, we explored speech emotion recognition using the Librosa library and MLP classifier. Our study yielded significant findings with implications for affective computing and practical applications.

Our developed model accurately identifies and classifies emotions from speech signals, achieving high performance compared to existing methods. The proposed methodology leverages the feature extraction capabilities of the Librosa library and the classification power of the MLP classifier.

Key contributions include a systematic approach for speech emotion recognition and valuable insights into the model's strengths and weaknesses. Future research should focus on dataset expansion, fine-tuning techniques, real-time implementation, and multimodal integration.

Overall, our research advances speech emotion recognition, providing a concise methodology and insights for researchers and practitioners in affective computing.

VII.FUTURE WORK

Future work in speech emotion recognition should involve:

- Multimodal Integration: Explore the combination of speech with other modalities, such as facial expressions or physiological signals, to achieve a more comprehensive understanding of emotions.
- Transfer Learning: Investigate the application of transfer learning
- techniques to leverage pretrained models or related tasks for improved performance**.**
- Real-World Applications: Evaluate the performance of speech emotion recognition models in real-world scenarios, such as call center conversations or social media data.
- Cross-Cultural Studies: Conduct cross-cultural studies to examine the universality of emotion expression in speech and account for cultural variations.

These future directions will contribute to advancing speech emotion recognition and its practical applications.

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