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Sentimental Analysis & Emotion Detection Using Ml , Dl & Random Under Sampling

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Abstract :
The proliferation of textual data across digital platforms has given rise to the need for automated sentiment analysis and emotion detection. This project addresses this demand by proposing a comprehensive solution that leverages both traditional machine learning (ML) techniques and state-of-the-art deep learning (DL) architectures, while also mitigating class imbalance through random under sampling. In today's data-driven world, understanding the sentiments and emotions expressed in textual data is of paramount importance. This project presents a comprehensive solution to the challenges of sentiment analysis and emotion detection by harnessing the power of machine learning (ML), deep learning (DL), and strategic random under sampling. The explosion of textual data on digital platforms necessitates automated methods for sentiment analysis, involving the classification of text into positive, negative, or neutral sentiments. Furthermore, emotion detection requires the identification of specific emotions, such as happiness, anger, and sadness, within this text. These tasks are compounded by imbalanced datasets where some classes are significantly underrepresented. Accurate sentiment analysis and emotion detection have profound implications across various domains, including brand management, customer satisfaction analysis, and mental health monitoring. The models developed in this project will empower decision-makers with insights derived from textual data, enhancing the quality of user experiences and informed decision-making.

Keywords : *Machine Learning , Deep Learning , Sentiment Analysis , Data Preprocessing*

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I. Introduction

Sentiment analysis involves determining whether a piece of text, speech, or video conveys a positive, negative, or neutral sentiment. On the other hand, emotion detection delves deeper, aiming to identify specific emotional states, such as happiness, anger, sadness, or surprise. These techniques find applications in a wide range of domains, including marketing, customer feedback analysis, mental health monitoring, and entertainment. Sentiment analysis and emotion detection, powered by machine learning techniques, offer a means to unlock valuable insights from these rich sources of information.

Sentiment analysis and emotion detection are widespread and diverse. They have revolutionized customer service by automatically assessing customer feedback and reviews.

They're fundamental in tracking public opinion on social and political issues, enabling policymakers and businesses to make informed decisions. They are also invaluable in the field of market research, helping companies understand consumer behavior, preferences, and reactions.

II. Existing System

The Haar Cascade algorithm is applied to detect faces in the collected images. The results of emotion detection from faces and sentiment analysis from text are integrated. This integration provides a holistic view of the sentiment and emotions expressed in the data. Ensuring that the CNN models are well-trained and that the system provides accurate results is essential.

III. Methodology

A. CNN

A Convolutional Neural Network (CNN) is a type of deep neural network primarily designed for processing and analyzing visual data, including images and videos. CNNs have gained immense popularity in various applications, from computer vision tasks to natural language processing.

B. Haar Cascade

Cascading classifiers are trained with positive sample views of a particular object and arbitrary negative images of the same size. The Haar Cascade is a machine learning object detection algorithm used to identify objects or regions of interest in images or video.

1. Implementation

Gather the dataset containing text data for sentiment analysis and multimedia data for emotion detection. Train an emotion detection model using CNNs or deep learning techniques. Combine the sentiment analysis and emotion detection models into a single system. If required, set up the system for real-time analysis, allowing it to continuously process incoming data and provide real-time feedback on sentiment and emotions.

2. System Architure

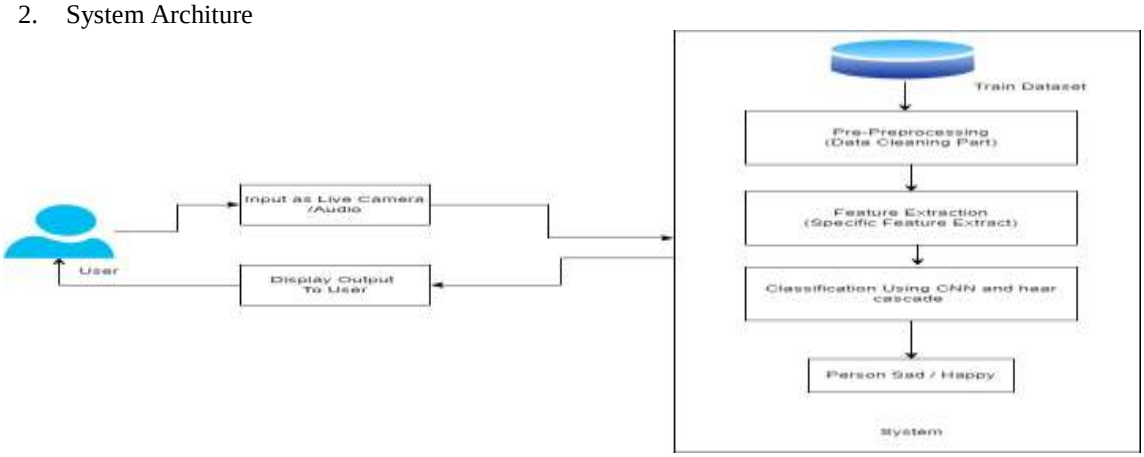

Fig. 1: System Architure an flow of System

IV. Advantages and Disadvantages

A. Advantages

Machine learning algorithms can process and analyze large volumes of text data quickly and efficiently, which would be challenging and time-consuming for humans to do manually.

Emotion detection can be used to personalize user experiences.

B. Disadvantages

Models can misclassify sentiments or emotions, leading to incorrect analyses and decisions.

The accuracy of sentiment analysis and emotion detection heavily depends on the quality and diversity of the training data.

V. Results and Discussion

This segment contains the findings as well as discussion. By laying out the computer hardware as well as software set up used for the testing. Later, this discuss numerous assessment methods and performance of our model in relation to them. We used a variety of performance measurements, including precision, recall, F-measure and also compared different ML classifiers.

Sentiment Analysis findings are very affected by a number of things, including data pretreatment. Another critical component is the choice of a classification algorithm to train and test the Twitter data. This examined the data with a variety of classifiers, including SVM, naive Bayes, and others, to determine the best classifier. XGB classifier outperformed other classifiers with respect to accuracy.

VI. Conclusion

Sentiment Analysis and Emotion Detection are crucial applications of machine learning that provide valuable insights into understanding human emotions, opinions, and attitudes. These techniques have found wide-ranging applications across various domains, including social media monitoring, customer feedback analysis, market research, and healthcare.

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