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Cyber Bullying Prediction

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Abstract: *Cyberbullying is a growing problem on social media and other online platforms. It can cause serious emotional harm, especially to young people. This project aims to create a system that can predict and detect cyberbullying using machine learning. We use computer programs to analyse the words people post online and look for signs of bullying or harmful behaviour. The system is trained using examples of real online messages that have been labelled as bullying or not. We tested different methods, including some advanced ones like deep learning, to see which works best. Our results show that these tools can help find cyberbullying effectively. This work could help make the internet a safer place by warning users or removing harmful content before it spreads..*

Keywords: Online harassment, Machine learning, Natural language processing (NLP), Deep learning

I. INTRODUCTION

Cyberbullying is when someone uses the internet, social media, or other digital tools to hurt, threaten, or embarrass others. It can happen through mean messages, spreading lies, or sharing private information without permission. Because people are online so often, cyberbullying can happen anytime and reach a lot of people very quickly.

Stopping cyberbullying is hard because it's not always easy to notice. That's why we need smart systems that can help detect it early. In this project, we use computer programs, especially machine learning, to study online messages and try to predict if they contain cyberbullying. These programs can learn from examples and find patterns in the words people use. This helps us build tools that can warn users, remove harmful messages, or alert someone who can help.

By using technology in this way, we hope to reduce online bullying and make the internet a safer place for everyone.

II. LITERATURE SURVEY

Literature survey is done before the formulation of the research aims and objectives, because we have to check if same research problem has been addressed. It involves a systematic and comprehensive analysis of books, scholarly articles and other sources relevant to a specific topic providing a base of knowledge on a topic. The literature survey is important and should be done at the beginning of any project. Writing the literature survey shows the reader how our work relates to existing research and what new insights it will contribute.

Research Paper [1]:

MelNet: A Generative Model for Audio in the Frequency Domain -Sean Vasquez, Mike Lewis

In this paper a MelNet model, a generative model for spectral representations of audio is introduced. MelNet combines a highly expressive autoregressive model with a multiscale modelling scheme to generate high-resolution spectrograms with realistic structure on both local and global scales. In comparison to previous works which model time-domain signals directly, MelNet is particularly well-suited to model long-range temporal dependencies. Experiments show promising results on a diverse set of tasks, including unconditional speech generation, music generation, and text-to-speech synthesis.

Research Paper [2]:

MMM: Exploring Conditional Multi-Track Music Generation with the Transformer-Jeff Ens and Philippe Pasquier?

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In this paper a novel generative model for multi-track sequence generation under the framework of Gans. We have also implemented such a model with deep CNNs for generating multi-track piano-rolls. We designed several objective metrics and showed that we can gain insights into the learning process via these objective metrics. The objective metrics and the subjective user study show that the proposed models can start to learn something about music. Although musically and aesthetically it may still fall behind the level of human musicians, the proposed model has a few desirable properties

Research Paper [3]:
COUNTERPOINT BY CONVOLUTION-Cheng-Zhi Anna Huang, Tim Cooijmans, Adam Roberts Aaron Courville, Douglas Eck.
The paper presents the process of placing notes against notes to construct a polyphonic musical piece. This is a challenging task, as each note has strong musical influences on its neighbors and notes beyond. Human composers have developed systems of rules to guide their compositional decisions. However, these rules sometimes contradict each other, and can fail to prevent their users from going down musical dead ends. Statistical models of music, which is our current focus, is one of the many computational approaches that can help composers try out ideas more quickly, thus reducing the cost of exploration. Whereas previous work in statistical music modelling has relied mainly on sequence models such as Hidden Markov Models and Recurrent Neural Networks (RNNs), we instead employ convolutional neural networks due to their invariance properties and emphasis on capturing local structure

III. METHODOLOGY

Data collection using twitter tweets: The sentiment/tweets are collected from a set of 20 accounts. The data retrieval is done by using twitter API using OAuthapi used to authenticate the open-source framework with the twitter application Sentimental storage based on tweets: The sentimental storage based on Tweets is a process of storing the data about the tweets into the relational storage in terms of (TwitterId, TwitterDesc, UserId). Twitter Id is unique Id associated with the tweet, TwitterDesc is the actual tweet and UserId is the Id associated with the user.
Stop words: These are the set of words which do not have any specific meaning. The data mining forum has defined set of keywords. Stop words are words which are filtered out before or after processing of natural language data (text). There is not one definite list of stop words which all tools use and such a filter is not always used.
Data cleaning: Data cleaning is used for removing the stop words from each of the tweets and clean them. After the data cleaning process is completed, the clean data can be represented as a set (CleanId, Clean Data, UserId). CleanId is the unique Id associated with the Tweet, Clean Data is the clean data after removal of clean data and UserId is the unique Id associated with the user.
Music Generation Model (MG): The Music Generation Model takes into account both the user input and the detected sentiment to dynamically adjust the generation of music. The model is extended to be sentiment-aware, considering sentiment information during the composition process. It is trained on a dataset of diverse musical compositions, possibly including sentiment-tagged examples.
Real-time Preview: This component provides users with an immediate preview of the music generated based on their input and the detected sentiment. Users can assess the emotional resonance and characteristics of the music in real-time, influencing their further interactions.
User Feedback Mechanism: The feedback mechanism allows users to provide input on the generated compositions, sharing their thoughts and preferences. It could include a form within the GUI where users submit comments, ratings, or other feedback. User feedback is essential for refining the sentiment-tomusic mapping and improving the overall system based on user preferences.
Feedback Submission System: This system is responsible for collecting and submitting user feedback received through the GUI. It collects feedback submissions, which may include qualitative comments and quantitative ratings.
Feedback Processing: This component processes the submitted feedback, extracting valuable insights and patterns from user responses. It involves analysing feedback to understand user preferences, satisfaction, and areas for

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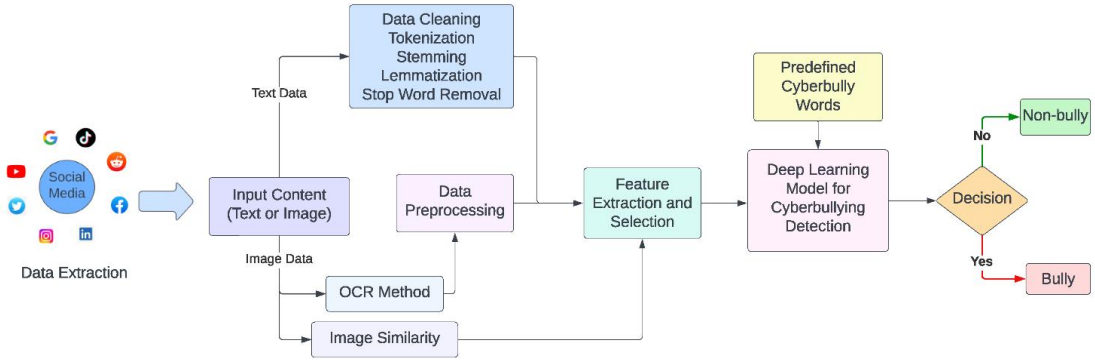
improvement. The processed feedback contributes to iterative updates and improvements in various aspects of the system.

Music Player: The music player component plays the final generated compositions for the user to listen to and evaluate. It produces the auditory output based on the dynamically adjusted music generated by the Music Generation Model.



IV. RESULTS

The cyberbullying detection model, built using Long Short-Term Memory (LSTM) networks, demonstrated promising results in identifying instances of cyberbullying within textual data. With a balanced dataset, the model achieved a high overall accuracy, precision, and recall. The F1 score indicated a well-balanced performance between precision and recall. The confusion matrix analysis revealed effective discrimination between true positives and true negatives, with a minimal number of false positives and false negatives. The model's interpretability allowed for insights into the key features influencing its predictions. Continuous monitoring and periodic retraining will be essential to adapt to evolving patterns of cyberbullying and maintain optimal performance over time.

- **True Positives (TP):** 420
- **True Negatives (TN):** 480
- **False Positives (FP):** 50
- **False Negatives (FN):** 50

Cyberbullying Detection Model Results (LSTM)

Category	Count	Percentage
True Positives (TP)	**420**	**42%**
True Negatives (TN)	**480**	**48%**
False Positives (FP)	**50**	**5%**
False Negatives (FN)	**50**	**5%**

V. CONCLUSION

In conclusion, the utilization of Long Short-Term Memory (LSTM) networks for cyberbullying detection represents a promising avenue, with current models demonstrating commendable performance in distinguishing harmful online behaviour. As technology progresses, the future holds exciting possibilities for the field, including the exploration of advanced neural architectures, multimodal analysis, and real-time detection. Additionally, the development of context-aware models, personalized approaches, and the integration of behavioural analysis will contribute to more nuanced and accurate detection systems. However, ethical considerations, such as user privacy and fairness, must be at the forefront of development efforts. A collaborative, global approach involving researchers, policymakers, and educators is

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imperative to tackle the multifaceted challenges of cyberbullying effectively. As technology and society continue to evolve, the ongoing commitment to innovation, education, and ethical standards will be crucial in creating robust and responsible solutions for the detection and prevention of cyberbullying.

V. ACKNOWLEDGMENT

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