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# SARCASAM Analysis in Social Networks using Deep Learning

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**ABSTRACT:** Twitter is one of the biggest social media sites, where users may share their thoughts, ideas, and opinions as well as discuss current events and live tweets. In the subject of opinion mining, creating reliable and effective algorithms for sarcasm detection on Twitter is an intriguing task. Sarcasm is the use of positive language to convey depressing emotions while speaking in opposition to one's own intentions. Sarcasm is frequently employed on social networking and micro blogging platforms, where users can offend others and find it difficult to express their true feelings. The deep learning technique utilised in the current algorithms to identify these sarcastic tweets has the limitation of not being able to predict continuous variables. A novel deep learning algorithm is proposed to identify both positive and negative terms as well as sarcasm in comments. Deep neural networks are used to classify the comments into positive and negative word categories. Customers' opinions are mined using sentiment analysis to find and extract information from the text. Sarcastically stated statements from social networking sites can be quickly categorised and recognised by using VADER (Valence Aware Dictionary and Sentiment Reasoner).

In our project we will be using Convolution Neural Network (CNN) + Long Short Term Memory (LSTM) as existing and Tree Convolution Neural Network (TCNN) as proposed system. From the result its proved that proposed Tree Convolution Neural Network (TCNN) works better than existing Convolution Neural Network (CNN) + Long Short Term Memory (LSTM) in terms of accuracy.

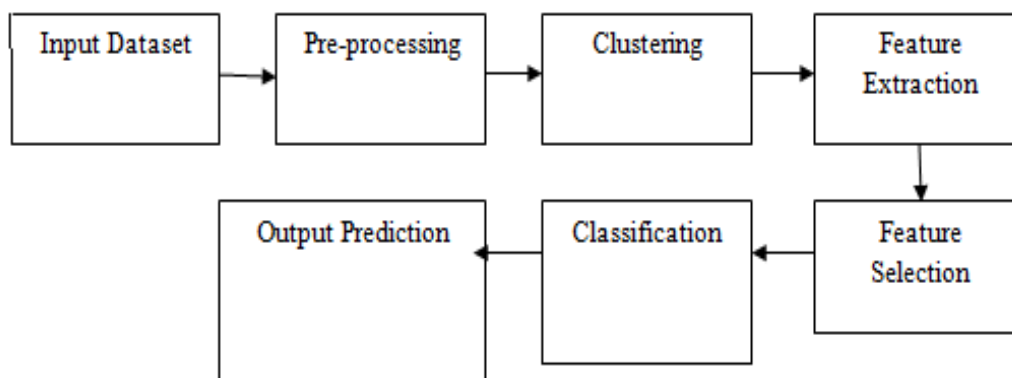


Figure 1: SYSTEM ARICHITECTURE

## **I. INTRODUCTION**

In recent years, hate speech has been increasing in-person and online communication. The social media as well as other online platforms are playing an extensive role in the breeding and spread of hateful content – eventually which leads to hate crime. For example, according to recent surveys, the rise in online hate speech content has resulted in hate crimes including Trump’s election in the US, the Manchester and London attacks in the UK, and terror attacks in New Zealand. To tackle these harmful consequences of hate speech, different steps including legislation have been taken by the European Union Commission. Recently, the European Union Commission also enforced social media networks to sign an EU hate speech code to remove hate speech content within 24 hours.

However, the manual process to identify and remove hate speech content is laborintensive and time-consuming. Due to these concerns and widespread hate speech content on the internet, there is a strong motivation for automatic hate speech detection. The automatic detection of hate speech is a challenging task due to disagreements on different hate speech definitions. Therefore, some content might be hateful to some individuals and not to others, based on their concerned definitions. According hate speech is: “the content that promotes violence against individuals or groups based on race or ethnic origin, religion, disability, gender, age, veteran status, and sexual orientation/gender identity”. Despite these different definitions, some recent studies claimed favorable results to detect automatic hate speech in the text. The proposed solutions employed the different feature engineering techniques and ML algorithms to classify content as hate speech. Regardless of this extensive amount of work, it remains difficult to compare the performance of these approaches to classify hate speech content. To the best of our knowledge, the existing studies lack the comparative analysis of different feature engineering techniques and ML algorithms.

## **II. LITERATURE REVIEW**

With the developments in the information technology and improvements in the communication channels, sarcasm is spreading all over the world, resulting in huge losses. There have been several researches done in the field of sarcasm detection, with various methods employed in detection and prevention. The main challenges in order to develop the next generation of intelligent Systems are:

- It should be robust against noise and distortion
- It should be occur naturally and frequently
- Inaccurate prediction of type of sarcasm recognition.
- Less accuracy.

## **III. METHODOLOGY**

The design methodology for this project follows a structured approach combining natural language processing and deep learning techniques to detect sarcasm in social media texts. The project begins with data collection from reliable sources like public sarcasm datasets or social media APIs. This is followed by data preprocessing, where the raw textual data is cleaned and prepared through tokenization, removal of special characters, stop words, and normalization.

After preprocessing, the data is transformed into numerical representations using word embeddings such as Word2Vec or GloVe to capture semantic meaning. The core model architecture uses a Bi-LSTM network, which is well-suited for understanding the context of words from both forward and backward directions in a sentence—a crucial aspect of detecting sarcasm. The model is trained using labeled data, and its performance is evaluated using metrics like accuracy, precision, recall, F1-score, and confusion matrix. Finally, the model is used for prediction, where new social media inputs are classified as sarcastic or non-sarcastic. The methodology emphasizes modular design, performance optimization, and real-world applicability.

#### IV. IMPLEMENTATION

Implementation is the process that actually yields the lowest-level system elements in the system hierarchy (system breakdown structure). The system elements are made, bought, or reused. Production involves the hardware fabrication processes of forming, removing, joining, and finishing; or the software realization processes of coding and testing; or the operational procedures development processes for operators' roles. If implementation involves a production process, a manufacturing system which uses the established technical and management processes may be required.

The purpose of the implementation process is to design and create (or fabricate) a system element conforming to that element's design properties and/or requirements. The element is constructed employing appropriate technologies and industry practices. This process bridges the system definition processes and the integration process. System Implementation is the stage in the project where the theoretical design is turned into a working system. The most critical stage is achieving a successful system and in giving confidence on the new system for the user that it will work efficiently and effectively. The existing system was long time process.

The proposed system was developed using Python. The existing system caused long time transmission process but the system developed now has a very good user-friendly tool, which has a menu-based interface, graphical interface for the end user. After coding and testing, the project is to be installed on the necessary system. The executable file is to be created and loaded in the system. Again the code is tested in the installed system. Installing the developed code in system in the form of executable file is implementation.

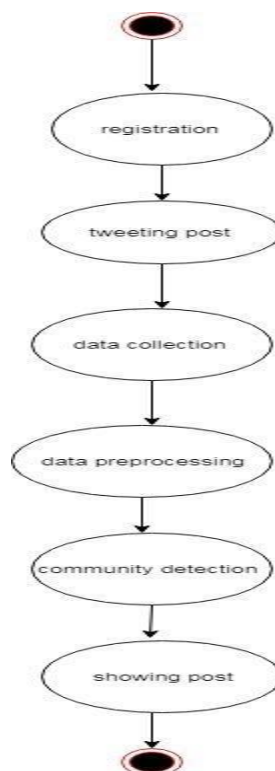


Figure 2: Data Flow

## V. RESULTS AND CONCLUSION

The growing use of social media platforms has led to an increased exchange of informal and often emotionally charged communication, including sarcastic comments. Detecting sarcasm in such content is a complex task due to its subtle and context-dependent nature. This research aimed to develop a deep learning-based model capable of accurately identifying sarcastic remarks from social media posts. In this section, we present the experimental findings and provide an in-depth discussion on the model's performance and behavior.

The evaluation of the proposed sarcasm detection system was conducted using a benchmark dataset consisting of labeled textual data collected from various social networking sites. The dataset was preprocessed and fed into a deep learning architecture—specifically, a Bidirectional Long Short-Term Memory (Bi-LSTM) network—designed to capture the sequential and contextual dependencies in the text.

The model's performance was quantitatively assessed using standard classification metrics including accuracy, precision, recall, and F1-score. These metrics were chosen to provide a balanced view of how well the model distinguishes sarcastic content from non-sarcastic content, especially given the potential class imbalance in real-world data. Additionally, a confusion matrix was used to further analyze the distribution of correct and incorrect predictions. Beyond the numerical evaluation, a qualitative analysis was performed to interpret specific cases where the model succeeded or failed in detecting sarcasm. This helped uncover certain patterns and limitations in the model's understanding of complex linguistic cues such as irony, contradiction, and cultural references.

This section not only reports the results obtained but also offers a critical discussion of the implications of those results. The strengths and limitations of the deep learning model are examined, along with potential factors that influenced the outcomes. Finally, insights are drawn regarding the broader applicability of the system and directions for future research are proposed.



Figure 5.1 Model Accuracy Comparison

# Sarcasm Detection

Enter a sentence:

Oh, great. Another meeting has been scheduled.

**Detect Sarcasm**

**Prediction: Sarcastic**

## VI. FUTURE WORK

In the future, the sarcasm detection system can be improved by incorporating conversational context, which helps in understanding sarcasm dependent on prior messages. Using advanced models like BERT or GPT can enhance the model's ability to grasp subtle language patterns. Multimodal approaches—combining text with audio, emojis, or images—can provide better accuracy, especially for social media platforms.

The model can also be expanded to support multiple languages and cultural expressions of sarcasm. Additionally, deploying the model in real-time applications (e.g., chatbots, browser plugins) and making predictions more explainable would increase its practical value and user trust.

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