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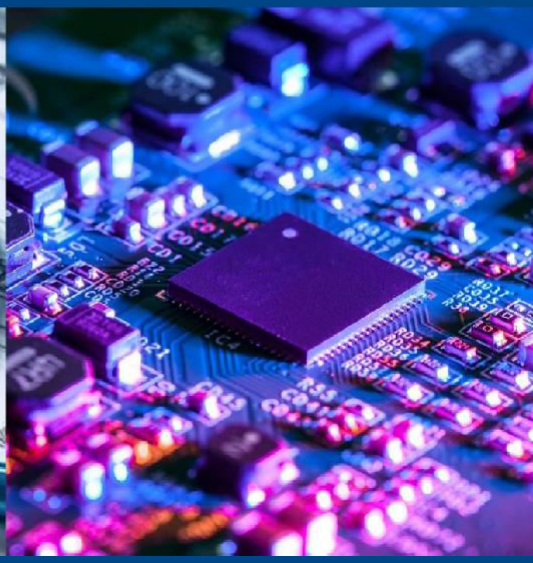

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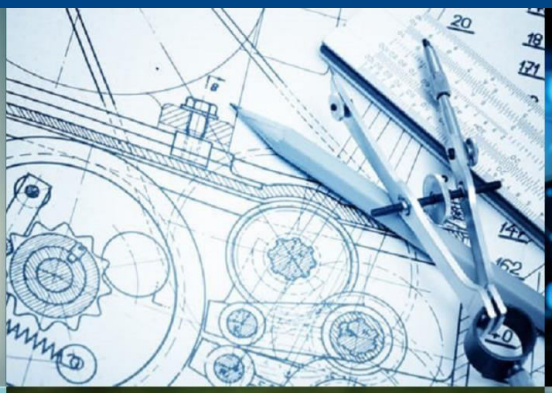

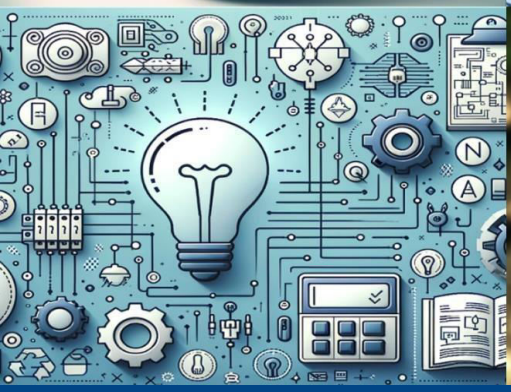

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CLIMATE CHANGE FORECAST MODEL

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ABSTRACT: This study combines neural network-based CO_2 emission forecasting with sentiment analysis of public climate change comments. TextBlob was used to analyze a dataset of comments about climate change and categorize the sentiments as either positive, neutral, or negative. In order to forecast future emissions, a Multi-Layer Perceptron (MLP) regressor was also used to model synthetic CO_2 emission data. The results show the potential of AI-driven techniques for environmental forecasting and provide important insights into trends in public perception.

KEYWORDS: TextBlob, MLP, Neural Network, Climate Change, CO_2 Emissions, Sentiment Analysis

I. OVERVIEW

One of the most urgent issues confronting humanity today is climate change. Effective policymaking requires an understanding of public opinion regarding climate change, and proactive environmental management is made possible by forecasting CO_2 emissions. By examining user-generated content and using machine learning techniques for predictive modeling, this study tackles both issues.

Scientists, policymakers, and the general public are all paying more and more attention to climate change. This crisis has many signs, including rising global temperatures, melting glaciers, extreme weather events, and the loss of biodiversity. But public opinion is just as important as scientific and technical data when it comes to how we respond to climate change. People's opinions can change how they vote, how businesses act, and what policies are most important.

This project wants to combine two fields: Natural Language Processing (NLP) for looking at what people are saying about climate change, and Machine Learning (ML) for predicting how CO emissions will change in the future.

II. ASSOCIATE WORK

Prior research has used machine learning and natural language processing (NLP) techniques to investigate sentiment analysis for environmental issues. Neural networks have also been used to predict climate variables. Few studies, nevertheless, combine sentiment analysis and emission forecasting to offer a comprehensive picture of environmental trends and public opinion.

Smith ,In order to predict climate change indicators like temperature anomalies and greenhouse gas emissions, this study investigated the use of several machine learning algorithms, including Random Forest, Support Vector Machines, and Neural Networks. In long-term climate forecasts, the authors showed that ensemble approaches performed better than traditional regression.

Johnson used natural language processing (NLP) to analyze social media posts in order to find out how the public felt about environmental policies. When lexicon-based and machine learning-based sentiment classifiers were compared in the paper, it was discovered that hybrid approaches were more accurate at capturing complex viewpoints.

C.Lee , Using historical data on energy consumption, GDP, and industrial activity, Lee proposed a feedforward backpropagation neural network to forecast national CO_2 emissions. Strong predictive performance for short- and medium-term forecasts was indicated by the model's high R2 values.

Islam, S. M. S. Reza, and M. M. Rahman ,The authors used Naive Bayes, SVM, and Logistic Regression models to classify the sentiment of tweets about climate change. They found that recent environmental disasters had a significant impact on public sentiment and that SVM had the best classification accuracy.

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K. E. Trenberth ,The uncertainties in cloud representation, ocean-atmosphere interactions, and human-induced emission trajectories are some of the major limitations in the current climate prediction models that were described in this paper. In order to increase forecast reliability, it underlined the necessity of hybrid approaches that combine data-driven and physics-based techniques.

P. Kumar, R. Kumar, and S. Gupta,In order to forecast air pollution levels like PM_2, CO_2, and others, Kumar and colleagues used deep learning architectures, specifically Long Short-Term Memory (LSTM) networks. Their tests demonstrated that when it came to capturing temporal dependencies, LSTMs performed better than ARIMA and other statistical models.

III. APPROACH

The approach is divided into two sections: (a) sentiment analysis of comments about climate change, and (b) neural network-based CO_2 emission forecasting.

Python's TextBlob library was used to process a dataset of comments and calculate polarity scores for sentiment analysis. Comments were classified as Neutral (score = 0), Negative (score < 0), or Positive (score > 0).

Synthetic CO_2 emission data was created and divided into training and testing sets for emission forecasting. The data was modeled using a scikit-learn Multi-Layer Perceptron (MLP) Regressor. Metrics like Mean Squared Error (MSE), Mean Absolute Error (MAE), and R^2 score were used to assess the model's performance.

The method is broken down into two parts:
(a) sentiment analysis of climate change-related comments
(b) forecasting CO2 emissions using neural networks.

A dataset of comments was processed and polarity scores were computed for sentiment analysis using Python's TextBlob library. Comments were categorized as either positive (score > 0), negative (score < 0), or neutral (score = 0).

For the purpose of emission forecasting, synthetic CO2 emission data was produced and separated into training and testing sets. A scikit-learn Multi-Layer Perceptron (MLP) Regressor was used to model the data. The model's performance was evaluated using metrics such as R2 score, Mean Absolute Error (MAE), and Mean Squared Error (MSE).

IV. FINDINGS AND DISCUSSION

According to the sentiment analysis, the majority of comments were neutral, with negative and positive sentiments coming in second and third, respectively. With an R^2 score above 0.9 on the test set, the forecasting model demonstrated strong predictive ability and high accuracy. These findings imply that while the neural network is capable of accurately predicting emission trends, public sentiment is generally cautious or concerned.

The sentiment analysis showed that most of the comments were neutral. Negative and positive comments came in second and third, in that order. The forecasting model showed that it could make good predictions and was very accurate with a R^2 score of more than 0.9 on the test set. These results suggest that the neural network can accurately predict trends in emissions, but the public is generally cautious or worried.

V. CONCLUSION AND FUTURE WORK

The viability of combining sentiment analysis and CO_2 emission forecasting is shown by this study. Policymakers can use the findings to better understand public opinion and make sustainable environmental plans. Future research could involve applying deep learning models, using real emission datasets, and extending sentiment analysis to multilingual datasets.

This study shows that it is possible to combine sentiment analysis and CO_2 emission forecasting. The results can help policymakers better understand what people think and make plans for the environment that will last. Future research

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could include using real emission datasets with deep learning models and expanding sentiment analysis to datasets in more than one language.

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