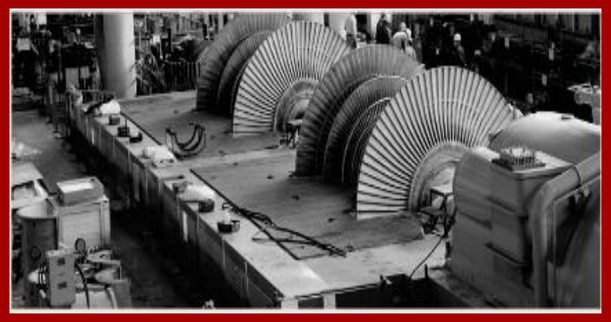
SYMBIOSIS INSTITUTE OF TECHNOLOGY, PUNE

Department of AI and Machine Learning

PROJECT TITLE: ENERGY CONSUMPTION IN STEEL POWER PLANTS

Celebrating 50 Years of Excellence



INTRODUCTION

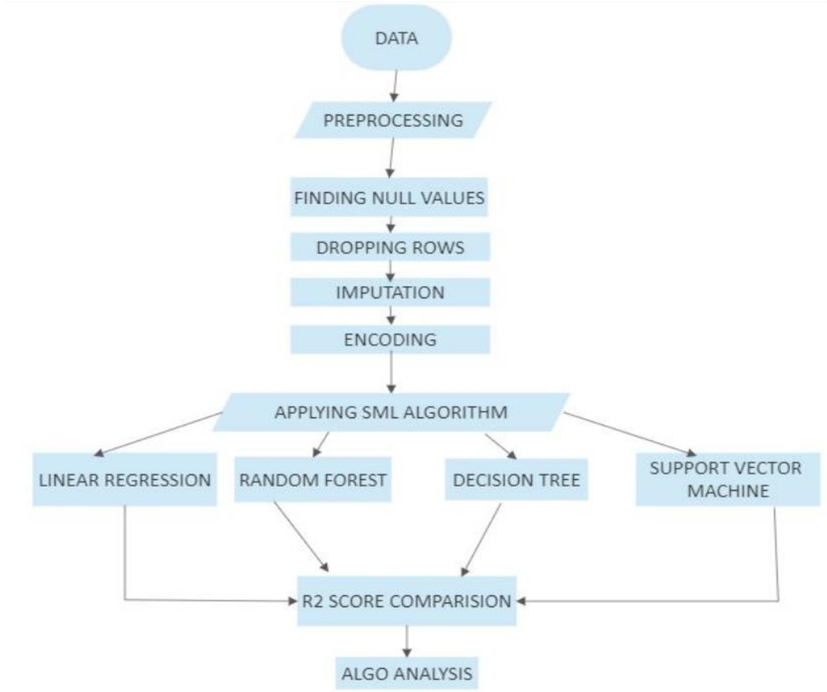
The steel industry is a major energy-intensive industry, and electricity consumption plays a critical role in its operation. Accurate forecasting of electricity consumption in the steel industry is essential for efficient resource allocation, cost optimization, and environmental sustainability.

In this context, this project aims to explore and compare the performance of different machine learning algorithms for predicting electricity consumption in the steel industry. The algorithms that will be used include linear regression, decision tree, random forest, and support vector machine (SVM). The analysis will be based on a dataset containing various features related to electricity consumption and other relevant factors. By comparing the accuracy and efficiency of different algorithms, this study will provide valuable insights into the application of machine learning techniques for forecasting electricity consumption in the steel industry.

OBJECTIVES & AIMS:

- To develop predictive models that can accurately forecast the electricity consumption in the steel industry based on historical data.
- To identify the key factors that influence electricity consumption in the steel industry and to understand their relative importance.
- To explore the potential of different machine learning algorithms in optimizing energy consumption in the steel industry and to identify strategies for reducing energy waste and improving energy efficiency.

METHODOLOGY



DATASET

The information gathered is from the DAEWOO Steel Co. Ltd in Gwangyang, South Korea. It produces several types of coils, steel plates, and iron plates. The information on electricity consumption is held in a cloud-based system.
The information on energy consumption of the industry is stored on the website of the Korea Electric Power Corporation (pccs.kepco.go.kr), and the perspectives on daily, monthly, and annual data are calculated and shown.

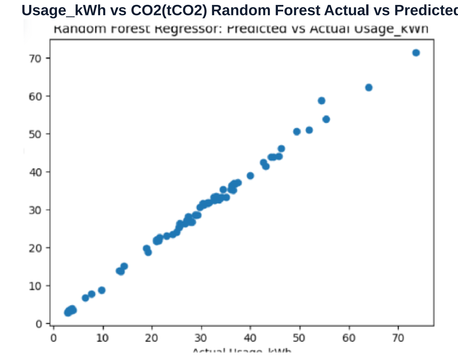
	date	Usage_kWh	Lagging_Current_Reactive.Power_kVarh	Leading_Current_Reactive_Power_kVarh	CO2(tCO2)
0	01/01/2018 00:15	3.17	2.95	0.0	0.0
1	01/01/2018 00:30	4.00	4.46	0.0	0.0
2	01/01/2018 00:45	3.24	3.28	0.0	0.0
3	01/01/2018 01:00	3.31	3.56	0.0	0.0
4	01/01/2018 01:15	3.82	4.50	0.0	0.0

This dataset has 11 columns and 35040 rows.

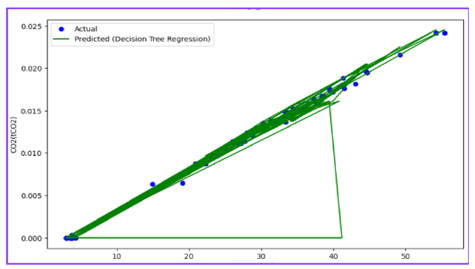
RESULTS:

List of Algorithms	RMSE	R2 Score
Linear Regression	0.001	0.98
Decision Tree	0	1
Random Forest	0.92	0.99
Support Vector Machine	0.009	-0.67

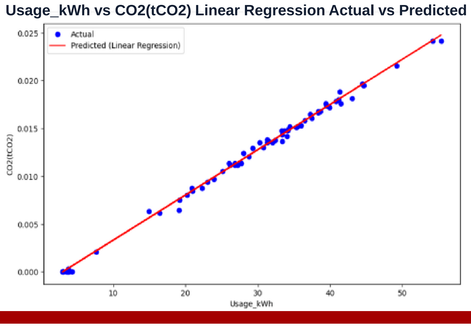
Usage_kWh vs CO2(tCO2) Random Forest Actual vs Predicted



Usage_kWh vs CO2(tCO2) Decision Tree Actual vs Predicted



Usage_kWh vs CO2(tCO2) Linear Regression Actual vs Predicted



CONCLUSION AND FUTURE SCOPE: We have applied various machine learning algorithms on the electricity consumption dataset of a steel industry. We started by exploring the data and visualizing it using different techniques like box plots and correlation matrices. Then, we applied several regression algorithms including Linear Regression, Decision Tree Regression, Random Forest Regression, and Support Vector Regression (SVR).

In conclusion, our analysis provides useful insights into the electricity consumption of a steel industry and demonstrates the effectiveness of machine learning algorithms in predicting energy consumption. These results can be used by steel industries to optimize their energy consumption, thereby reducing their carbon footprint and contributing to a sustainable future.

GROUP MEMBERS: SHIVANI ATIGRE(22070126503) , KARTIK AGGARWAL(21070126047), MOHAMMAD AYAN(21070126055), BHAVISH POLAVARAPU(21070126064)

PROJECT MENTOR NAME: Mayur Gaikwad