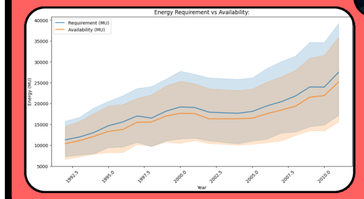
RENEWABLE ENERGY DATA ANALYSIS AND PREDICTION

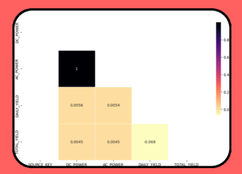
ABSTRACT:
This project analyzes and visualizes energy data trends in India, predicting future energy requirements using machine learning and interactive Streamlit visualizations.

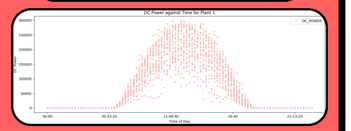
DATA SOURCES:
KAGGLE:https://www.kaggle.com/datasets/anikannal/solar-power-generation-data?select=Plant_2_Generation_Data.csv
Data.gov.in:https://www.data.gov.in/dataset-group-name/Renewable%20Energy

OBJECTIVE:
The objective is to analyze energy data, visualize trends, and predict future requirements using machine learning

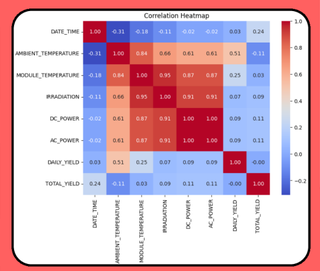
DATA PRE-PREOCESSING:
Data preprocessing involved cleaning the datasets by handling missing values, converting date formats, and normalizing numerical values. Features like energy requirements, hydro inflows, and generation data were extracted for trend analysis and prediction. The data was split for training and testing to build a linear regression model for predicting future energy demands.

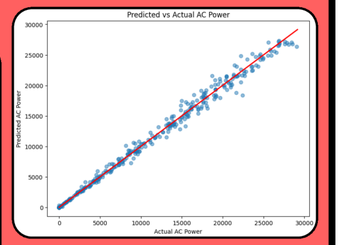






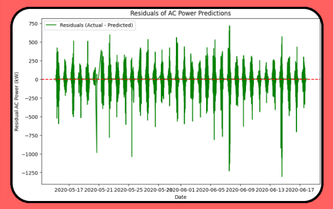
FEATURE SELECTION:
Key features like year, energy requirements, hydro inflows, and generation were selected for analysis and prediction.





MODEL SELECTED:
- Random Forest Regressor
- Linear regression

MODEL EVALUATION:
- Mean Squared Error (MSE) and R^2 Score
- Visual Comparison of Actual vs. Predicted Values
- Cross-Validation



CONCLUSION:
- **Effective Prediction:** The Random Forest model accurately predicts solar power generation using key features.
- **Key Influencers Identified**: Significant factors impacting output, like temperature and irradiation, are highlighted.
- **Proactive Maintenance**: The analysis pinpoints panels needing maintenance, optimizing energy generation.
- **Data-Driven Insights**: The dashboard enables stakeholders to make informed decisions for improved solar plant management.

VARIABLES:
The main variables include year, energy requirement, energy availability, hydro inflows, and generation.

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