Smart India Hackathon 2024

GridSense AI

Problem Statement ID: 1624

Problem Statement Title- To develop an Artificial Intelligence (AI) based model for electricity demand projection including peak demand projection for Delhi Power system

Theme: Smart Automation

PS Category: Software

Team ID:

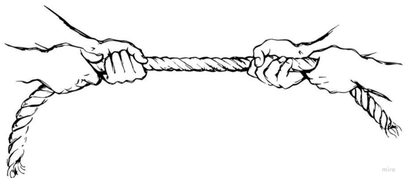
Team Name: SurgeMasters

SurgeMasters

GridSense AI

SMART INDIA HACKATHON 2024

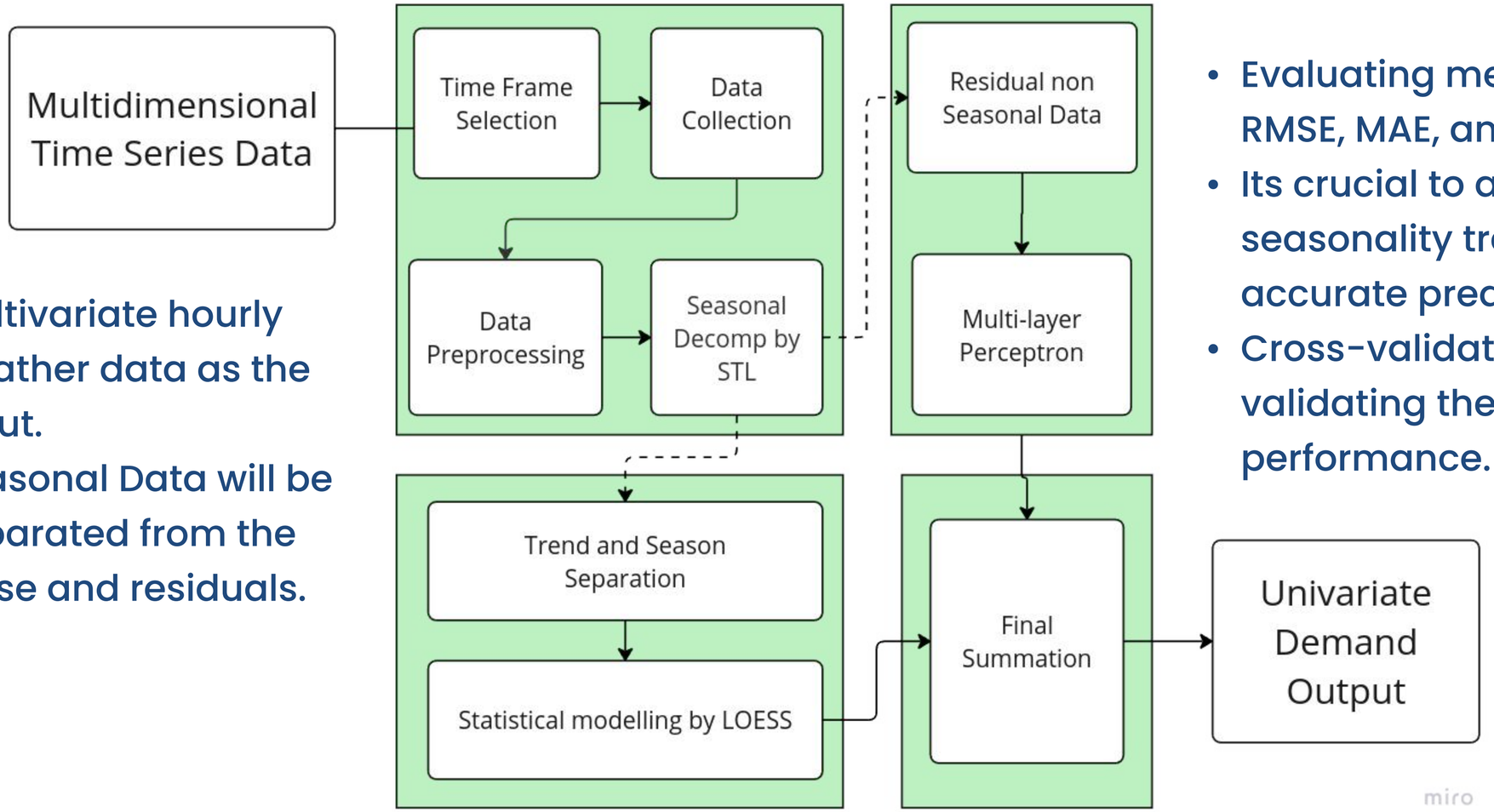
Luxurious Oversupply



Conservative Delivery

Deep Learning Approach

- Multivariate hourly weather data as the input.
- Seasonal Data will be separated from the noise and residuals.



- Evaluating metrics such as RMSE, MAE, and MAPE.[12]
- Its crucial to account seasonality trends to ensure accurate predictions.
- Cross-validation helps in validating the model's performance.

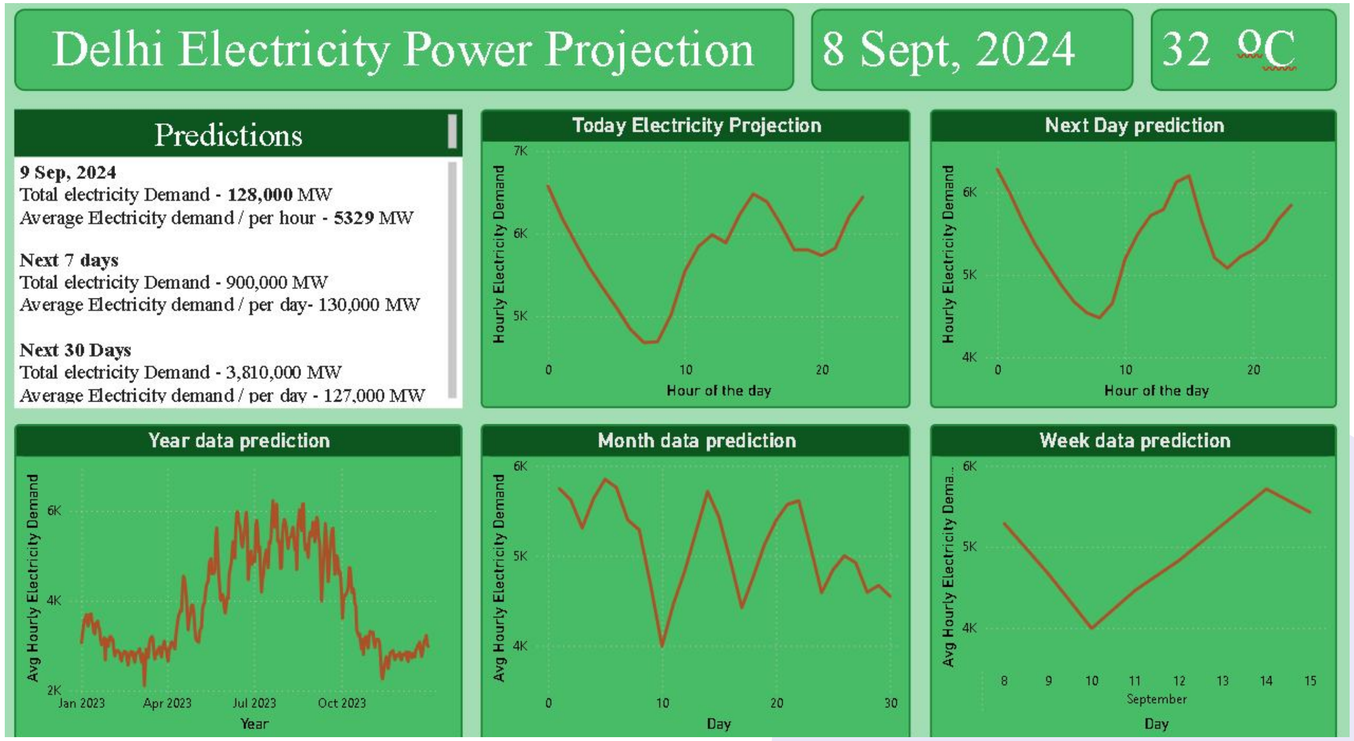
SurgeMasters

TECHNOLOGIES USED

SMART INDIA HACKATHON 2024

USP

- Real-time data from IoT sensors and weather APIs.
- Incorporates a wide range of factors —temperature, humidity, wind speed, dew, holidays, weekends etc.



Virtualization Tools:
Power BI

Web Development:
HTML, CSS, JS and its frameworks , flask for integration

Databases:
SQL - management
Apache - real time processing

Programming language:
Python and its libraries

SurgeMasters

FEASIBILITY AND VIABILITY

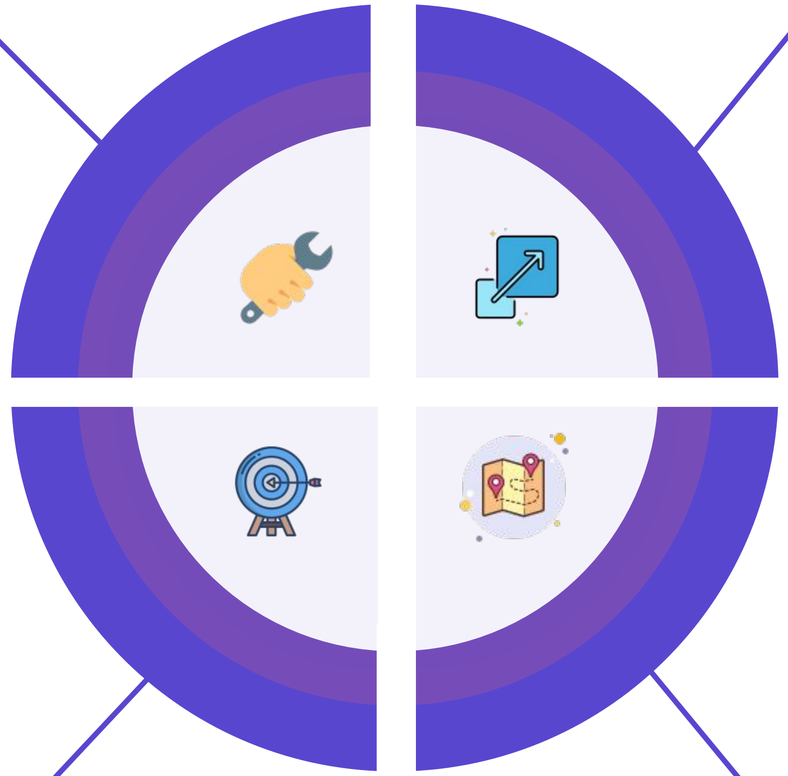
SMART INDIA HACKATHON 2024

Feasibility

- No new infrastructure required.
- Replace current statistical model with innovative machine learning model.
- 6 months migration period.

Scalability

- Large dataset handling capability.
- Change of city via change of dataset.
- Real-time Implementation for National Level scaling.



potential challenges

- Reliability of 3rd party data .
- Balancing solar peaks ,Ev demand and load variations.
- Annually shifting Indian holidays.

Solutions

.

- Asking data from gov agencies (stakeholders) .
- Studying shifting holidays individually .

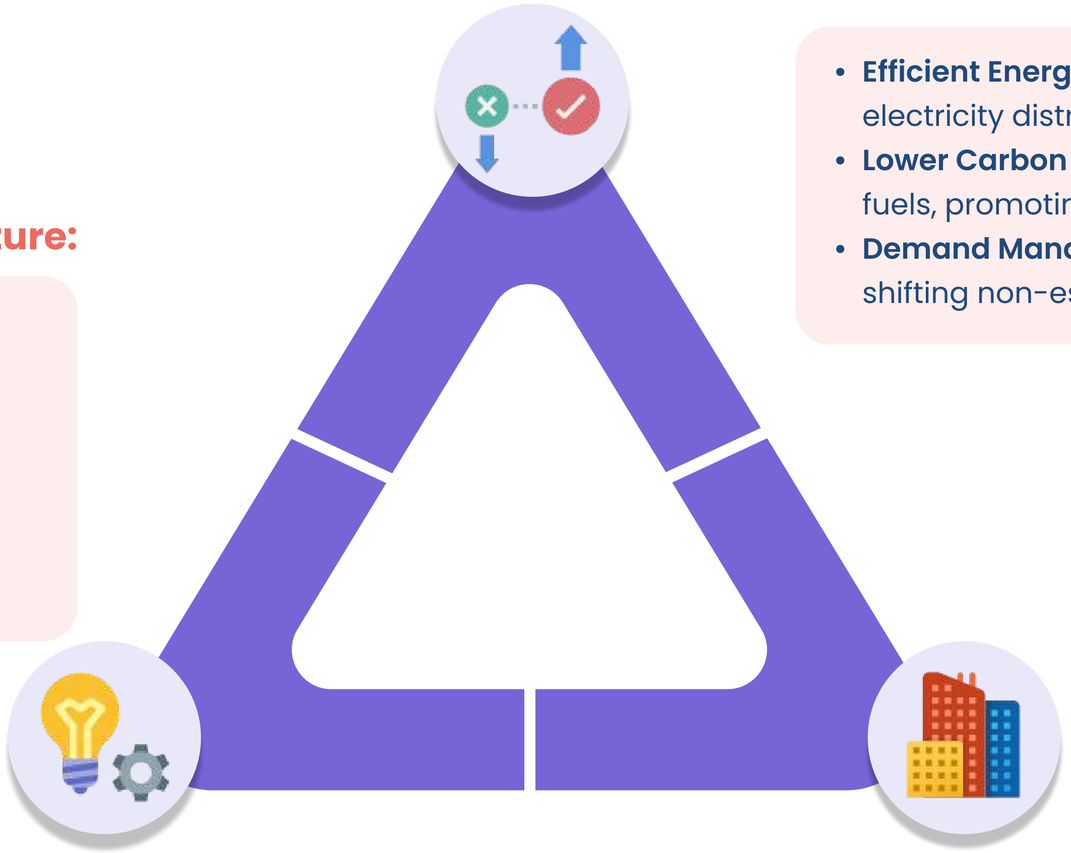
SurgeMasters

IMPACT AND BENEFITS

SMART INDIA HACKATHON 2024

Industry Innovation & Infrastructure:

- **Grid Modernization**: Encourages smart grid technologies.
- **Cost-Effective Power:** Improves power procurement, integrating renewables.
- **Innovation Catalyst:** Promotes AI-driven efficiency across energy systems.



Responsible Consumption & Production:

- **Efficient Energy Use:** Reduces waste and optimizes electricity distribution.
- **Lower Carbon Footprint:** Minimizes reliance on fossil fuels, promoting clean energy.
- **Demand Management:** Balances demand by shifting non-essential use to off-peak hours

Sustainable Cities:

- **Resilient Grids:** Enhances infrastructure to handle peak loads reliably.
- **Optimized Urban Development:** Ensures efficient energy infrastructure in growing areas.
- **Energy Security:** Reduces power outages during extreme weather.

SurgeMasters

RESEARCH AND REFERENCES

SMART INDIA HACKATHON 2024

Machine Learning Strategies for Time Series Forecasting.[1]

An Empirical Comparison of Machine Learning Models for Time Series Forecasting .[2]

Deep Learning for Time-Series Analysis.[3]

Deep learning for time series forecasting: The electric load case.[4]

Multi-step Time Series Forecasting of Electric Load Using Machine Learning Models.[5]

Practical Time Series Analysis - Aileen Nielsen 2019.[6]

Time Series Analysis - James D. Hamilton 1994.[7]

Open Weather Map.[8]

Visual Crossing.[9]

NITI Aayog - India Energy.[10]

LOESS.[11]

Evaluating a machine learning model.[12]

DELHI ELECTRICITY REGULATORY COMMISSION[13]

Delhi Power Outages Report[14]