SCIENCE AND TECHNOLOGY PUBLIC OUTREACH IN AMRIT KAAL

INDIA INTERNATIONAL SCIENCE FESTIVAL 2023

SPACE HACKATHON

In Association with इसरो ISRO | राष्ट्रीय नवप्रवर्तन प्रतिष्ठान – भारत National Innovation Foundation - India

H2S HACK2SKILL

Team Name: Space Explorers

Name of College/University: Vellore Institute of Technology

Team Member Details:

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Problem Statement:

Explain your understanding on Problem Statement:

1. Nighttime light data is a powerful tool for studying things like city growth, economic activities, and changes in the environment.

2. We want to use this data to see how electrification in rural areas affects education, agriculture, and other aspects. We'll also create a formula to show how each state contributes to the country's overall economic growth.

3. By the end, we should understand how rural electrification impacts education, agriculture, and economic conditions. We'll also have a grasp of the overall social and economic situation in a region.

Brief about your approach:

To enrich our analysis for the years 2018-2022, we harnessed a predictive model using historical datasets to estimate socio-economic factors linked to NTL data. Visual appeal was added through vibrant color-coded maps and region-specific graphs, providing a dynamic portrayal of the intricate relationship between NTL data and key parameters across districts and states.

Detailed Proposal & Solution Approach

1.Comprehensive Data Analysis: Extensively analyzed diverse datasets, correlating Nighttime Light (NTL) data with socio-economic factors from 2018 to 2022, aligning with the challenge's timeframe.

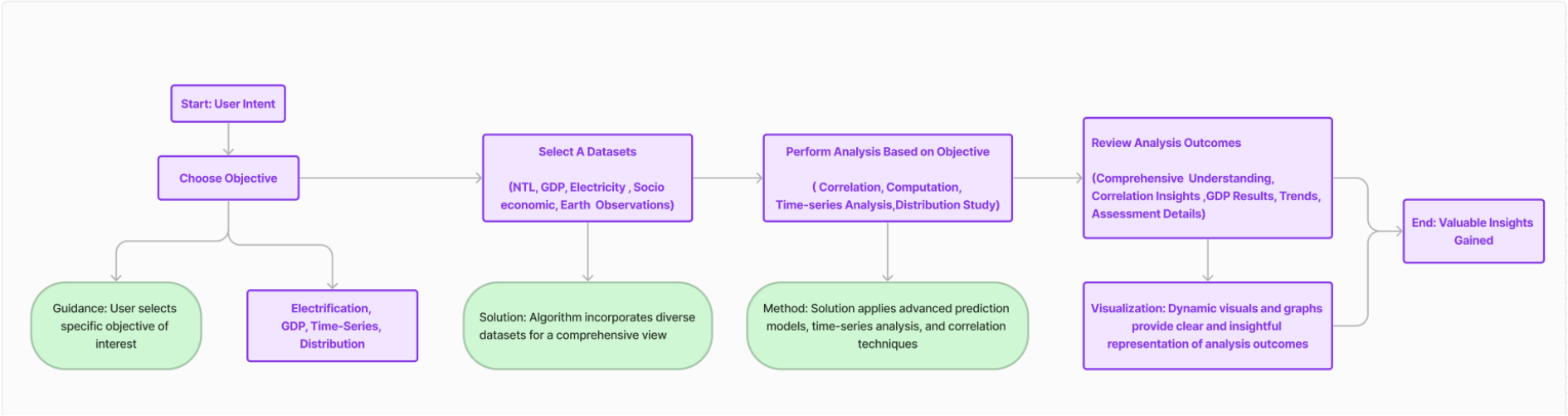
2.Innovative Prediction Model: Implemented an advanced model addressing data scarcity by estimating key socio-economic characteristics based on insights from prior years' datasets, ensuring robust understanding.

3.Strategic Feature Selection: Incorporated significant columns in predicted datasets by district/state, enhancing interpretability. These selected columns, impactful on NTL data, form the rationale for nuanced relationship perspectives.

4.Dynamic Shaded Maps: Utilized color-coded maps for each dataset, dynamically representing the association between NTL data and socio-economic parameters. Gradient colors highlight important column values relative to dataset extremes.

5.Insightful Graphs by Region: Employed engaging graph visualizations depicting the region's dynamics. X-axis spans 2018-2022, Y-axis illustrates relative values of parameters/luminiscence from NTL data, providing a comprehensive understanding of their impact over time.

User Journey Map : How will a user use our solution



Key Features:

1.Dynamic Visualizations: Engaging Plotly tools for interactive, dynamic data exploration.

2.Explainability: Transparent explanations on socio-economic factors and NTL data impact.

3.Scalability: Adaptable across regions, ensuring versatility for diverse datasets.

4.Real-world Impact: Practical implications discussed for decision-making and regional development.

5.Collaborative Approach: Integrated external datasets for richer insights and real-world relevance.

Programming Languages:

Python : For Data analysis, Machine Learning and Deep Learning
R: For Data Visualization and 3d maps plotting

Libraries and Packages:

Pandas: For data manipulation and analysis.
NumPy: For numerical operations on arrays and matrices.
Sci-kit Learn: For implementing machine learning models and feature selection techniques.
Matplotlib, Seaborn and Plotly: For basic plotting, for advanced statistical visualizations and for creating dynamic and interactive visualizations.
Geopandas: For working with geospatial data and creating maps.
Folium: For creating leaflet maps.
TensorFlow: For implementing deep learning models.

Tools and Technologies:

Jupyter Notebook or Jupyter Lab: For interactive development and presentation.
GIS Tools: For advanced mapping and spatial analysis.
GitHub: For version control and collaboration.

References/Acknowledgement

- https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/23T_15112023DC8BC0D99A594FEFA99D803DCEADB73D.PDF
- https://bhuvanpanchayat.nrsc.gov.in/index.html
- https://www.gisvacancy.com/map/districts-wise-latitudes-longitudes-finder/#google_vignette
- https://ndap.niti.gov.in/dataset/6795