CAPSTONE PROJECT

IMPROVED SOURCE OF DRINKING WATER

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OUTLINE

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- **Proposed System/Solution**

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PROBLEM STATEMENT

- **The Challenge**: Access to safe and improved sources of drinking water remains a critical issue in India, especially in rural and underdeveloped regions. Despite ongoing efforts under the Sustainable Development Goals (SDGs), inequalities persist in water accessibility across states and socio-economic groups. This project aims to analyze data from the 78th Round of the Multiple Indicator Survey (MIS) to assess the percentage of the population with access to improved drinking water sources. It will also explore related indicators such as use of clean cooking fuel and migration trends. By identifying patterns and disparities, the study will generate actionable insights to support evidence-based policymaking. The ultimate goal is to help ensure equitable access to clean water and contribute to India's progress on SDG targets.

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PROPOSED SOLUTION

- The proposed system addresses disparities in access to improved sources of drinking water by combining data analytics, IBM Cloud services, and visual storytelling to uncover actionable insights.
The solution includes:

- ◆ **1. Data Collection & Storage**

- Obtain and manage the 78th Round MIS dataset using **IBM Cloud Object Storage**.

- Handle CSV and structured data in a scalable and secure manner.

- ◆ **2. Data Preprocessing**

- Clean and normalize the dataset using **Python (pandas, NumPy)** in **Watson Studio Jupyter Notebooks**.

- Handle missing data, convert categorical variables, and standardize geographical/state-level entries.

- ◆ **3. Exploratory Data Analysis (EDA)**

- Analyze state-wise and socio-economic group-wise access to improved drinking water.

- Compare rural vs urban access and overlay insights with other indicators like:

  - Use of clean cooking fuel.

  - Internal migration trends.

- ◆ **4. Visualization and Insight Generation**

- Use **Seaborn, Plotly**, or **Watson Studio visualizations** to create:

  - Heatmaps of water access.

  - Bar charts comparing states.

  - Correlation graphs showing linkages with migration and fuel use.

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SYSTEM APPROACH

- **Technology Stack:**

- IBM Watson Studio

- IBM Cloud Object Storage

- Python (pandas, matplotlib, seaborn)

- Jupyter Notebook on IBM Cloud

- Optional: IBM Cognos Dashboard Embedded

- **Steps:**

- Data upload and preprocessing

- Exploratory analysis and visualization

- Insight extraction and reporting

- Optional: Model deployment

ALGORITHM & DEPLOYMENT

- While this is primarily an analysis-based project, optional predictive modeling (e.g., Logistic Regression or Decision Trees) can be implemented to predict access to water.

- **Algorithm (Optional):**

- Inputs: Region, socio-economic factors, cooking fuel type, migration status

- Output: Probability of improved water access

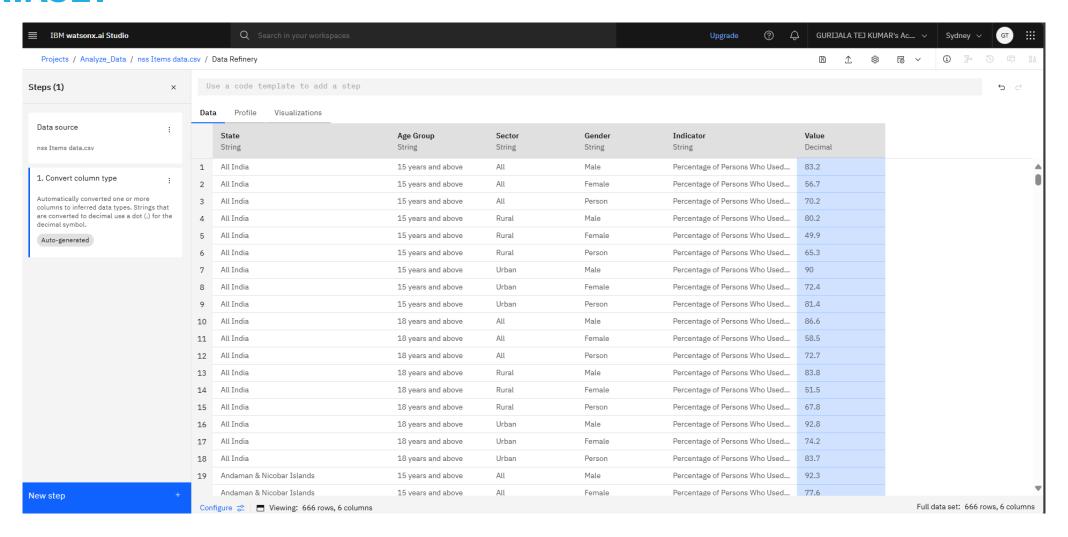- Deployment: Via IBM Watson Machine Learning or within Watson Studio Notebooks

RESULT

- **Visuals:** Bar charts and heatmaps showing disparities in water access across states.
- **Key Insight:** Rural areas in specific states showed lower access compared to national averages.
- **Correlations:** Areas with poor water access often use unclean cooking fuel and show higher migration.
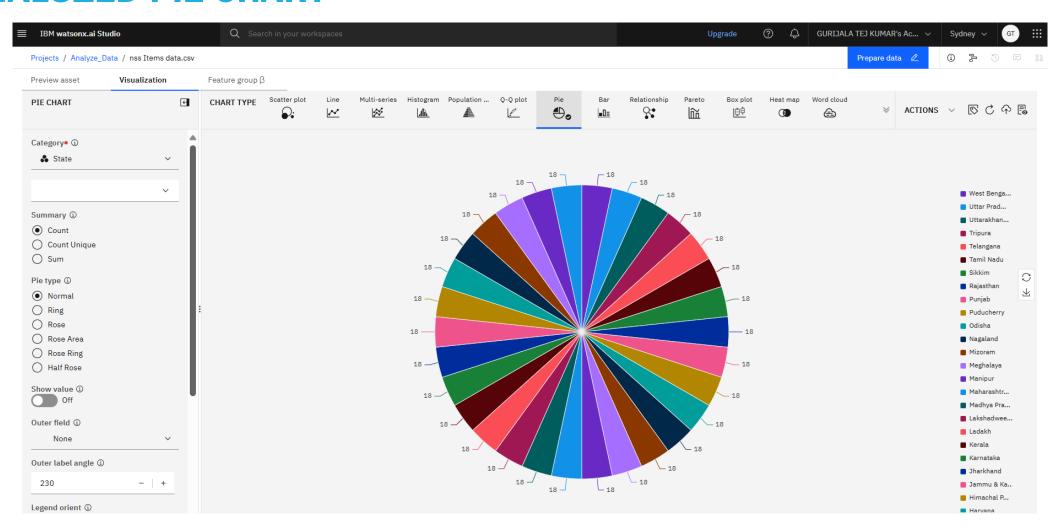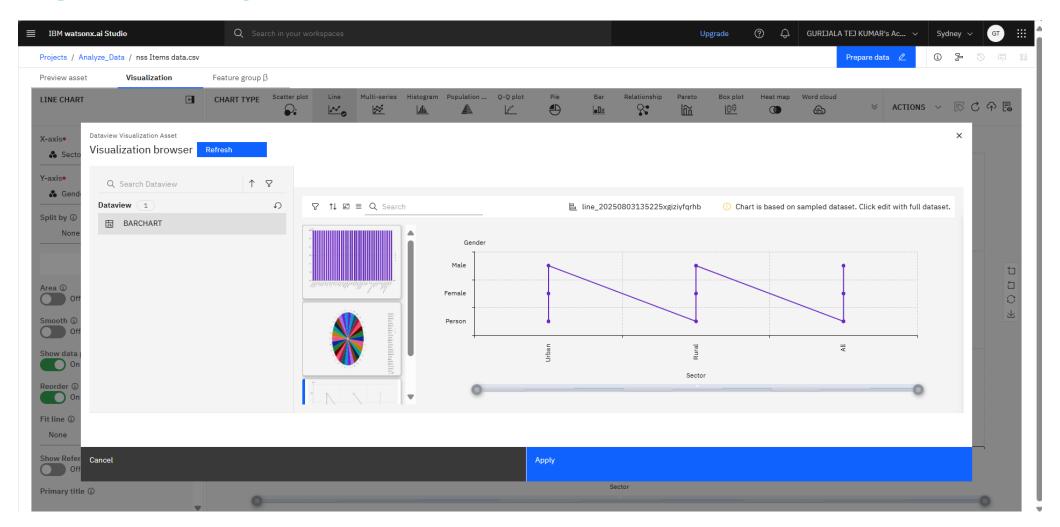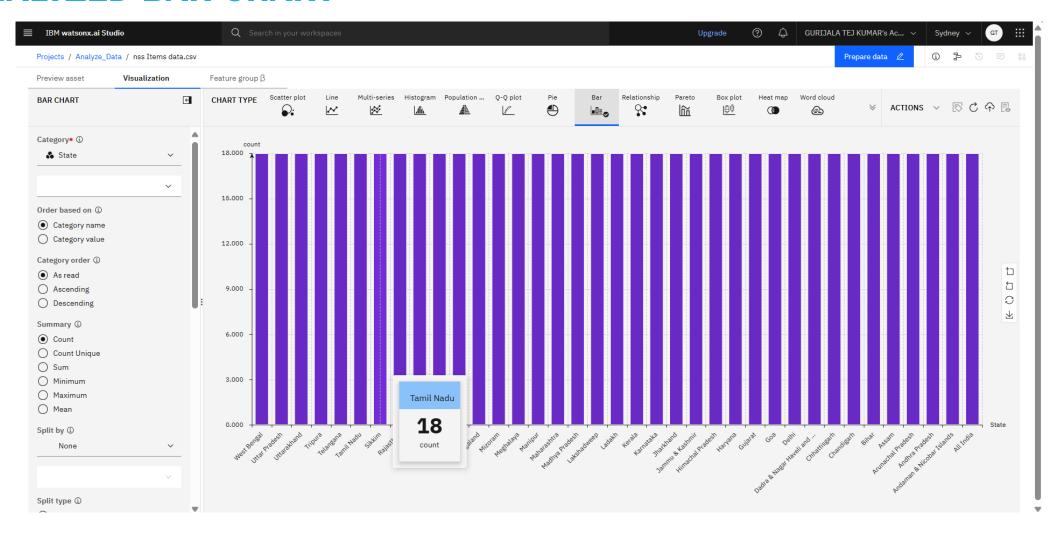
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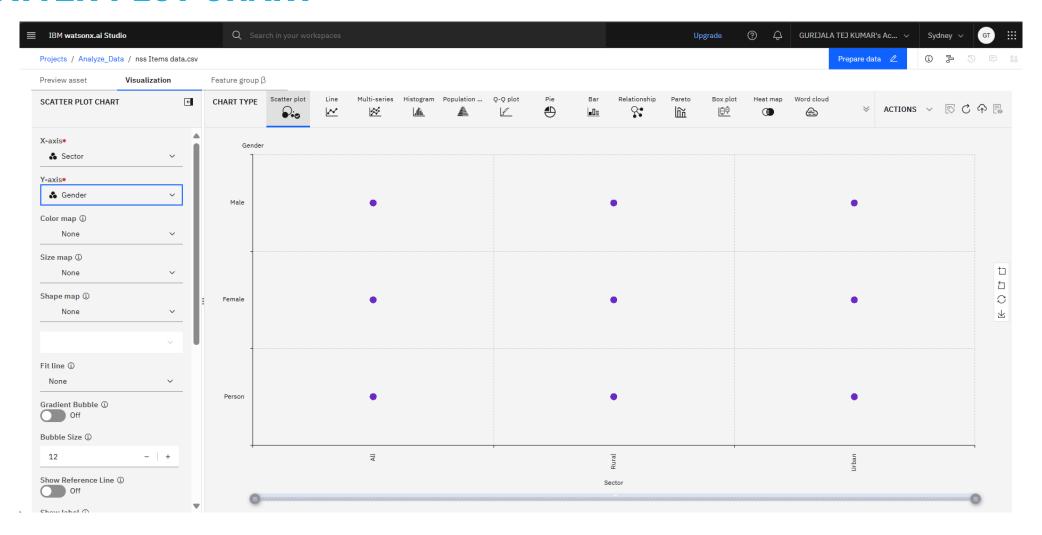
ANALUZED PIE CHART

ANALUZED LINE CHART

ANALYZED BAR CHART

SCATTER PLOT CHART

CONCLUSION

- The study successfully identified regional and socio-economic disparities in access to improved drinking water using data from the MIS 78th round. The integration of IBM Cloud services enabled scalable and collaborative data analysis. The insights generated can guide targeted interventions to support India's SDG targets, especially SDG 6: Clean Water and Sanitation.

FUTURE SCOPE

- Expand analysis to multiple rounds of MIS/NSSO surveys for time-based trends.

- Use machine learning for predictive analytics.

- Incorporate GIS data for spatial mapping.

- Build a mobile-friendly public dashboard with real-time updates.

REFERENCES

- 78th Round Multiple Indicator Survey Dataset – AI Kosh

- SDG Goals – United Nations

- IBM Cloud Documentation

- Research Papers on Water Accessibility in India

- Tutorials: IBM Watson Studio and Object Storage

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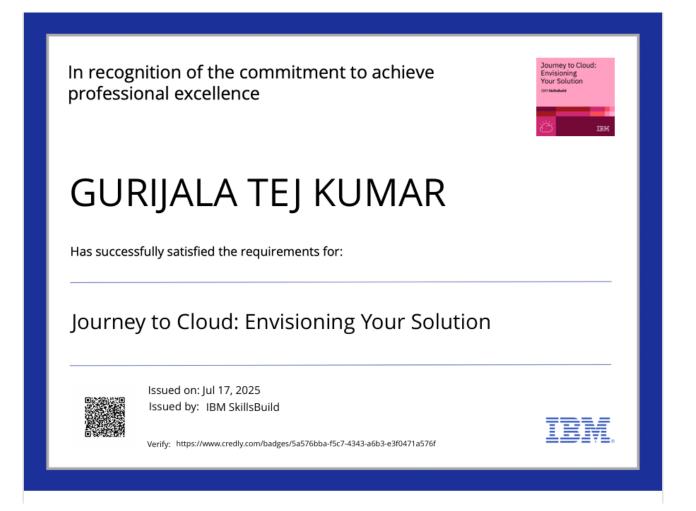## Getting Started with Artificial Intelligence

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