

# **PROJECT DEVELOPMENT – OPTIMIZING ENERGY DEMAND AND CONSUMPTION THROUGH DATA-DRIVEN STRATEGIES**

**COLLEGE CODE:** 8203

**COLLEGE NAME:** A.V.C COLLEGE OF ENGINEERING

**TECHNOLOGY:** DATA ANALYTICS

**TOTAL NO. OF STUDENTS IN A GROUP:** 5

**TEAM NAME:** “TECH TITANS”

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# DATA COLLECTION AND PRE-PROCESSING:

## **1.DATACQUISITION AND PREPARATION:**

### Data Collection Methods:

An Optimizing energy demand and consumption dataset typically includes information about energy consumption data, weather data, sensors networked data, Historical Data. It's invaluable for understanding energy demand and consumption, preferences, and predicting future actions. The energy consumption data was collected from the open source through Kaggle-dataset website.

Link:

<https://www.kaggle.com/datasets/nasirayub2/electricityload-logistics-iot>

## **2.DATAMODULE CONVERSION:**

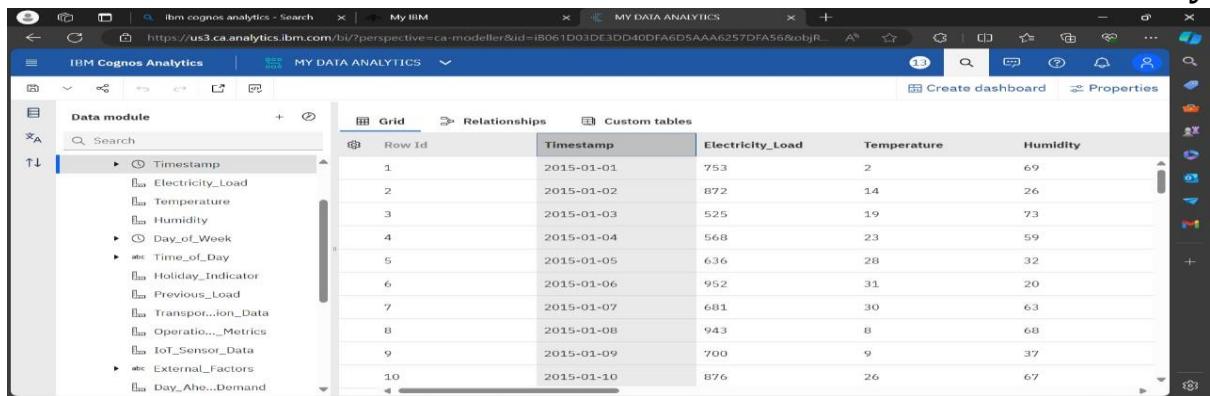
### Data cleaning:

Data cleaning involves identifying and correcting errors or inconsistencies in a dataset to improve its quality and reliability for analysis. Common tasks include removing duplicates, handling missing values, outlier detection and removal and standardizing formats.

The screenshot shows two side-by-side windows of the IBM Cognos Analytics interface. The left window displays a 'Clean - External\_Factors' dialog box. It contains sections for 'Whitespace' (trim leading and trailing whitespace), 'Convert case to' (options: UPPERCASE, lowercase, Do not change), and 'Return a substring of characters' (with 'Start' and 'Length' input fields). A 'Preview' section shows a sample of the data with rows 711 through 717. The right window shows a 'Data module' view with a grid of data. The columns are labeled 'External\_Factors', 'Day\_Ahead\_Demand', and 'Real\_Time\_IMP'. The data rows correspond to the previewed data in the left window, showing values like 611, 25.14138808, and 20.72019088 respectively. The interface includes standard navigation and search tools at the top.

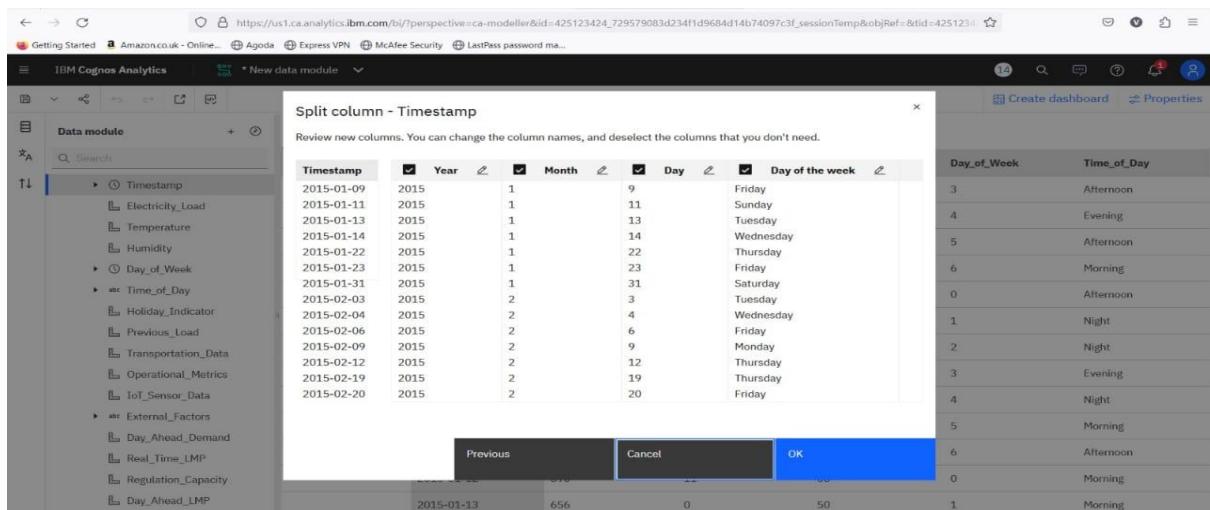
## Data Integration:

Data integration merges data from multiple sources into a unified view, enabling comprehensive analysis and decision-making. It involves transforming, mapping, and reconciling data to ensure consistency



The screenshot shows the IBM Cognos Analytics interface. On the left, there's a sidebar with a 'Data module' section containing various data sources like Timestamp, Electricity\_Load, Temperature, and Humidity. The main area is a 'Grid' view showing a table with columns: Row Id, Timestamp, Electricity\_Load, Temperature, and Humidity. The data spans from January 1, 2015, to January 10, 2015.

Row Id	Timestamp	Electricity_Load	Temperature	Humidity
1	2015-01-01	753	2	69
2	2015-01-02	872	14	26
3	2015-01-03	525	19	73
4	2015-01-04	568	23	59
5	2015-01-05	636	28	32
6	2015-01-06	952	31	20
7	2015-01-07	681	30	63
8	2015-01-08	943	8	68
9	2015-01-09	700	9	37
10	2015-01-10	876	26	67



The screenshot shows the 'Split column - Timestamp' dialog box in IBM Cognos Analytics. It lists the original 'Timestamp' column and allows selecting individual components to split it into: Year, Month, Day, and Day of the week. The resulting columns are shown in a preview table on the right, corresponding to the days from January 9 to January 13, 2015, with their respective day names and times of day (Afternoon, Evening, Morning, Night).

Day_of_Week	Time_of_Day
3	Afternoon
4	Evening
5	Afternoon
6	Morning
0	Afternoon
1	Night
2	Night
3	Evening
4	Night
5	Morning
6	Afternoon
0	Morning
1	Morning

## Data Transformation:

Data transformation involves converting data from one format, structure, or representation to another to suit analytical requirements or integration purposes.

### 3. DATA EXPLORATION (Data Visualization and Data Analysis):

#### Data Visualization:

Data visualization is the graphical representation of data to uncover insights and communicate findings effectively. Types include charts, graphs, maps, and dashboards, each tailored to display specific patterns or relationships in the data.

## Anomaly Detection:

Anomaly detection is the process of identifying data points, events, or patterns that deviate significantly from the norm, potentially indicating errors, outliers, or suspicious activity.

## Insights for Further Analysis:

Energy consumption dataset insights could reveal correlations between demographic factors and consumed behavior, guiding external factors. Additionally, identifying temperature, humidity and electricity loads.

## Screenshots:

