

# **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

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# DATA COLLECTION AND PRE-PROCESSING:

## 1.DATA ACQUISITION 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.DATA MODULE CONVERSION:

### Data cleaning:

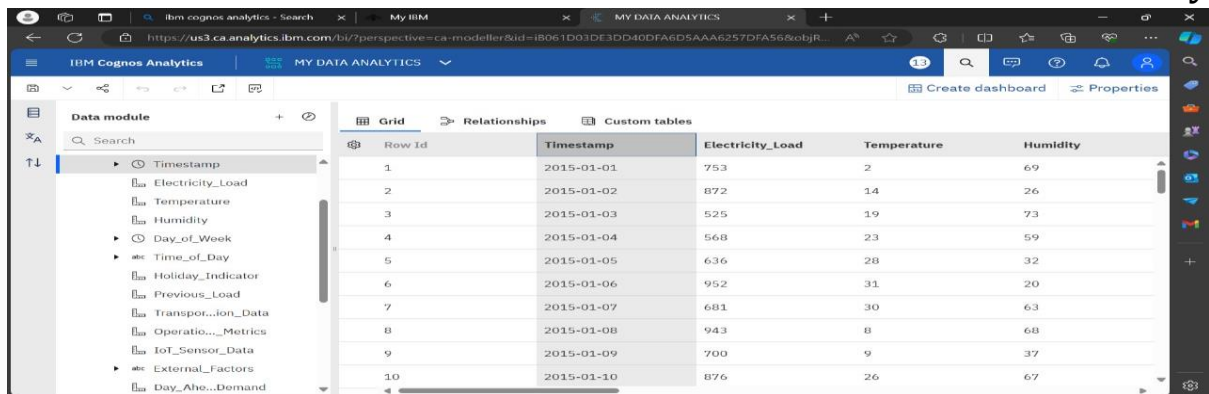
Data cleaning involves identifying and correcting errors or inconsistencies in a dataset to improve its quality and reliability for analysis. Common tasks include removing duplicates, handling missing values, outlier detection and removal and standardizing formats.

The screenshot displays the IBM Cognos Analytics interface. On the left, a 'Data module' pane lists various data sources, including 'External\_Factors'. A 'Clean - External\_Factors' dialog box is open, showing options for 'Whitespace' (Trim leading and trailing whitespace), 'Convert case to' (UPPERCASE, lowercase, Do not change), and 'Return a subsetting of characters' (Start, Length). Below these, there are sections for 'NULL values' with checkboxes for 'Replace this value with NULL' and 'Replace NULL values with'. The main area of the interface shows a data table with columns: 'External\_Factors', 'Day\_Ahead\_Demand', and 'Real\_Time\_LMP'. The table contains 10 rows of data, with the first row showing values 12, 25, and 201. The table is titled 'Electricityload-logistics-iot'.

External_Factors	Day_Ahead_Demand	Real_Time_LMP
12	25	201
13	25	229
14	11	497
15	16	464
16	24	342
17	44	338
18	36	334
19	13	391
20	21	375
21	29	303

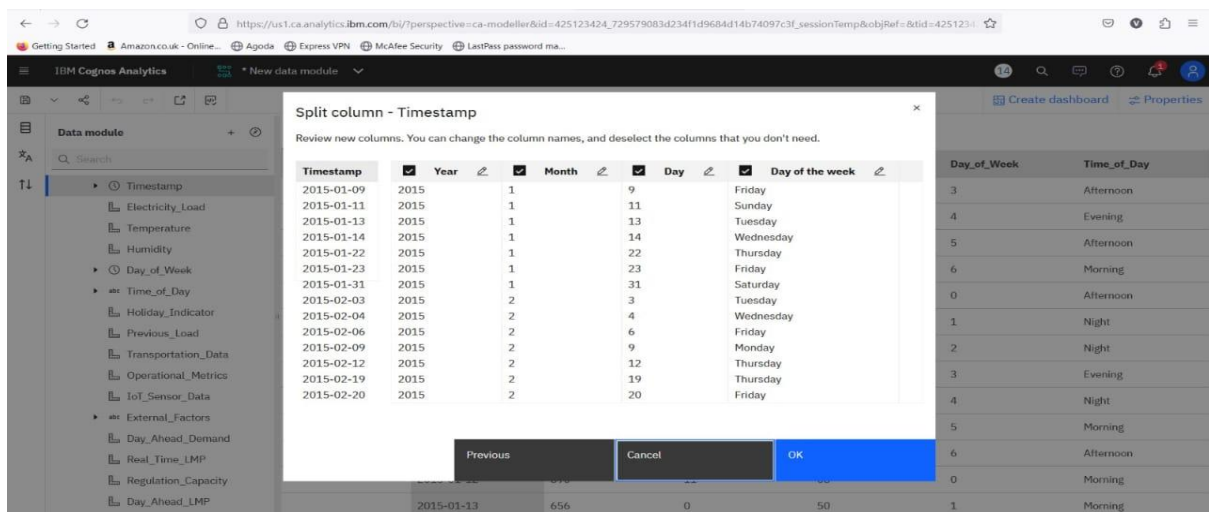
## Data Integration:

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, a 'Data module' pane lists various data sources including Timestamp, Electricity\_Load, Temperature, Humidity, Day\_of\_Week, Time\_of\_Day, Holiday\_Indicator, Previous\_Load, Transportation\_Data, Operational\_Metrics, IoT\_Sensor\_Data, External\_Factors, Day\_Ahead\_Demand, Real\_Time\_LMP, Regulation\_Capacity, and Day\_Ahead\_LMP. The main area displays a 'Grid' view of data with columns: Row Id, Timestamp, Electricity\_Load, Temperature, and Humidity. The data is organized into 10 rows, showing a time series from 2015-01-01 to 2015-01-10.

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

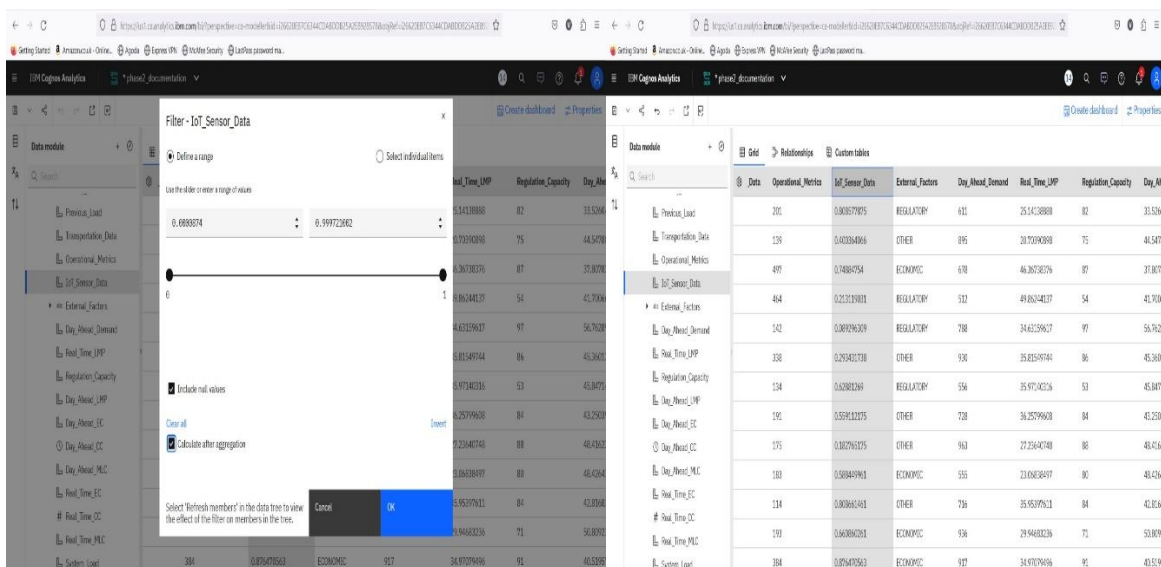
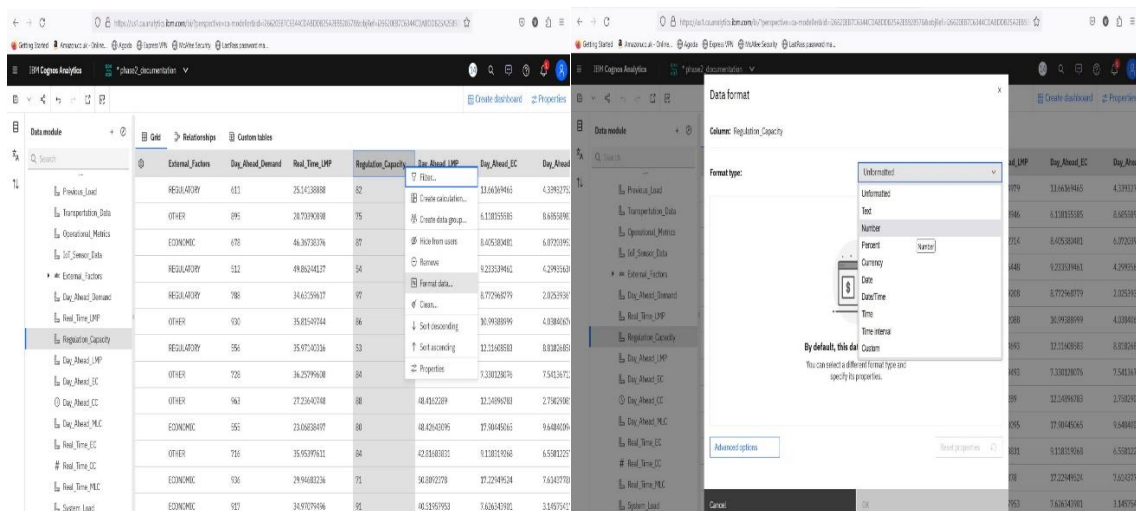


The screenshot shows the 'Split column - Timestamp' dialog box in IBM Cognos Analytics. The dialog allows users to review and split the 'Timestamp' column into its constituent parts: Year, Month, Day, and Day of the week. The 'Timestamp' column is selected, and the 'Split' button is highlighted. The dialog also shows the resulting columns: Day\_of\_Week and Time\_of\_Day.

Timestamp	Year	Month	Day	Day of the week
2015-01-09	2015	1	9	Friday
2015-01-11	2015	1	11	Sunday
2015-01-13	2015	1	13	Tuesday
2015-01-14	2015	1	14	Wednesday
2015-01-22	2015	1	22	Thursday
2015-01-23	2015	1	23	Friday
2015-01-31	2015	1	31	Saturday
2015-02-03	2015	2	3	Tuesday
2015-02-04	2015	2	4	Wednesday
2015-02-06	2015	2	6	Friday
2015-02-09	2015	2	9	Monday
2015-02-12	2015	2	12	Thursday
2015-02-19	2015	2	19	Thursday
2015-02-20	2015	2	20	Friday

## 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:

