# NATURAL GAS CONSUMPTION IN UŞAK (2015–2018)

**Dataset Description:**

| Column Name | Description |
|---|---|
| Year        *enlem* | Year of the data record (e.g., 2015, 2016...) |
| ~~boylam~~ Longitude, latitude | Geographical coordinates of the user's gas meter |
| Jan usd/tr - Dec usd/tr | Monthly USD/TRY exchange rates |
| Jan - Dec | Monthly natural gas consumption (in cubic meters) |
| Total | Annual consumption total |

*Note: Each row represents a yearly or regional consumption profile.*

**Project Objective:**

*yıllık      bölgesel*

In this project, students are expected to apply **unsupervised learning** techniques, particularly **clustering**, to identify patterns, segment usage profiles, and detect anomalies in the dataset. You are expected to deliver insights in the following four areas:

**1. Consumption Pattern-Based Clustering**  → *kıları*

- Use monthly consumption percentages to group different types of usage profiles.
- **Goal:** Identify distinct seasonal or consistent consumption behaviors.
- *Hint:* Use KMeans, Agglomerative Clustering, or dimensionality reduction with PCA or t-SNE for visualization.

**2. Clustering Based on Exchange Rate Influence**

- Combine monthly USD/TRY exchange rates with consumption data.
- **Goal:** Identify whether certain consumer profiles are sensitive to currency fluctuations.
- *Hints:* Normalize features before clustering. Explore correlations between exchange rate spikes and usage drops.

**3. Anomaly Detection**

- Detect rows (years or entries) that significantly deviate from the rest.
- **Goal:** Highlight unusual consumption behaviors or potential data anomalies.
- *Hints:* Apply algorithms like DBSCAN, Isolation Forest, or calculate Z-scores for outlier detection.

**4. Geospatial Consumption Profiling**

- Dataset includes location or regional metadata as longitude and latitude, use it to map consumer profiles geographically.
- **Goal:** Identify areas with similar consumption behaviors or outliers by location.
- *Hints:* Use folium, geopandas, or plot clustering results on a map using coordinates if available.