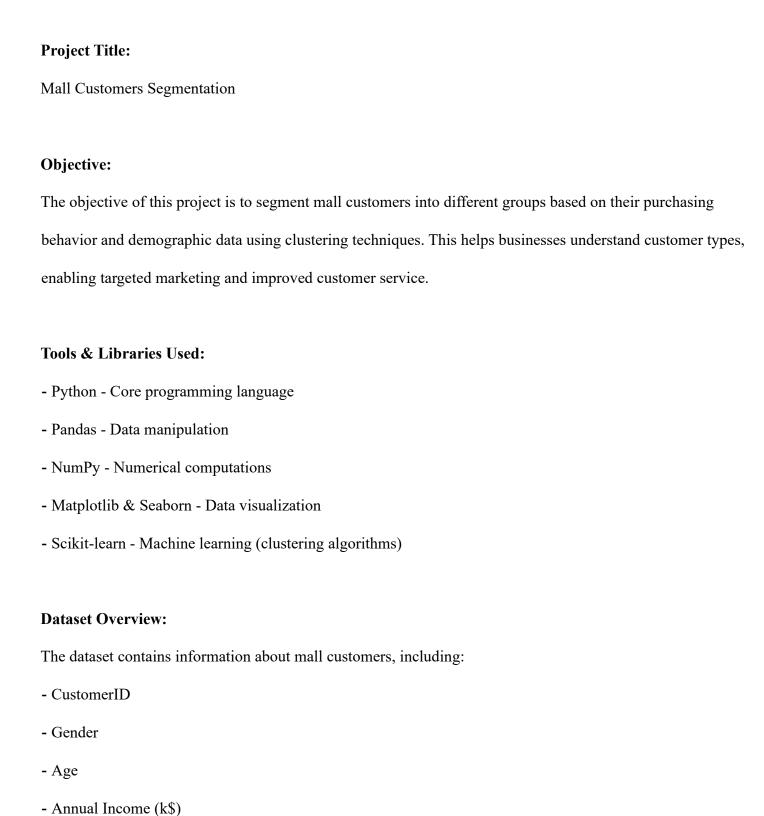
Mall Customers Segmentation Using Python



These attributes are used to understand patterns and segment the customers.

- Spending Score (1-100)

Steps Implemented:

1. Data Loading & Preprocessing:

- Loaded dataset using pandas.read csv().
- Basic checks using info(), describe() and isnull().sum() to confirm data integrity.
- Cleaned and encoded categorical variables (e.g., Gender using LabelEncoder).

2. Exploratory Data Analysis (EDA):

- Univariate analysis of Age, Income, and Spending Score using histograms and boxplots.
- Bivariate analysis using scatter plots and pairplots.
- Heatmaps used to observe correlations between numerical features.

3. Feature Selection for Clustering:

- Chose Annual Income and Spending Score as the key variables for segmentation (2D clustering).
- Applied StandardScaler for normalization before clustering.

4. K-Means Clustering:

- Used Elbow Method to determine the optimal number of clusters (k).
- Fitted the model using KMeans(n clusters=k).
- Visualized the clustered customer segments.

5. Cluster Analysis:

- Each cluster is analyzed based on mean income and spending score:
- High spenders with high income
- Low income low spenders
- Young moderate spenders, etc.

- Visualized with cluster labels on a scatter plot for interpretation.

Outcomes:

- Successfully segmented mall customers into distinct groups.
- Visual insights provide clear business strategies for targeting each group.
- Helped identify key customer profiles, such as:
- High income, low spending (potential upsell targets) Low income, high spending (value-focused customers)

Conclusion:

This project demonstrates a practical implementation of unsupervised learning via K-Means clustering for real-world business use. Mall customer data was analyzed and grouped effectively, offering valuable insights into consumer behavior and enabling better decision-making for marketing teams.

Future Scope:

- Add more features like product categories, visit frequency, etc.
- Implement hierarchical clustering or DBSCAN for comparison.
- Build an interactive dashboard using Streamlit or Power BI.
- Integrate with CRM systems for real-time personalization.