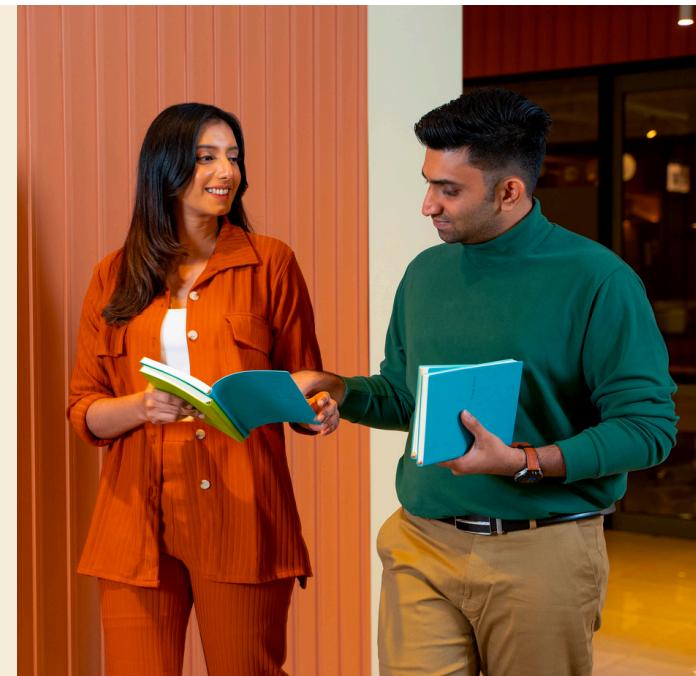PREPARED BY: HAIDER ALI

# CUSTOMER SEGMENTATION ANALYSIS

# Introduction

The goal of this analysis is to group customers based on **Age, Annual Income, and Spending Score**. Understanding these segments is crucial for **personalized offers and targeted marketing campaigns**. For this analysis, we used the **Mall Customers Dataset** from Kaggle. The methodology and results are discussed in detail below.

## Data Overview

The dataset contains **200 customers** with the following features:

- **CustomerID** – Unique identifier for each customer
- **Gender** – Male or Female
- **Age** – Customer age in years
- **Annual Income (k$)** – Customer income in thousands of dollars
- **Spending Score (1-100)** – Score representing purchasing behavior

For clustering, we focused on **Age, Annual Income, and Spending Score**, as these features are most relevant for grouping similar customers.

# Data Cleaning

Data cleaning ensures accurate and reliable analysis. The following steps were performed using **Pandas**, a Python library for data manipulation:

1. **Initial Inspection**
   - Viewed the first five rows to understand the structure and values of the dataset.
2. **Statistical Overview**
   - Examined summary statistics such as mean, standard deviation, minimum, and maximum values to identify unusual patterns.
3. **Data Types**
   - Checked the data types for each column and converted them where necessary.
4. **Removal of Irrelevant Columns**
   - Dropped the CustomerID column, as it does not contribute to clustering.
5. **Duplicates**
   - Checked for duplicate rows; none were found.
6. **Encoding Categorical Variables**
   - Converted the Gender column to numerical format: Male = 0, Female = 1, to make it usable for analysis.
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# Clustering

## Overview

To better understand our customers, we grouped them into distinct segments based on three key attributes:

- **Age** – How old the customer is
- **Annual Income** – Yearly income in thousands of dollars

- **Spending Score** – A score representing purchasing behavior

The goal was to identify **patterns in customer behavior** and provide actionable recommendations for marketing and sales strategies.

## Method

We used a clustering approach to divide customers into **five distinct segments**.

- Each segment represents a group of customers who are **similar in age, income, and spending behavior**.
- This allows us to **target marketing strategies** effectively for each group.

**Key idea:** Customers in the same segment behave similarly, so businesses can design campaigns tailored to each segment.

## Segment Profiles and Insights

| Segment | Who They Are | Key Characteristics | Recommendations |
|---|---|---|---|
| **Young High-Spenders** | Young customers who spend a lot | Avg Age: 26, Avg Income: $60k, High Spending Score | Offer premium products, personalized upsells, trendy campaigns |
| **Average Young** | Younger customers with moderate spending | Avg Age: 28, Avg Income: $45k, Moderate Spending Score | Engage via social media campaigns, promotional offers |
| **Older Low-Spenders** | Older customers who spend less | Avg Age: 45, Avg Income: $50k, Low Spending Score | Encourage loyalty programs, discounts, special deals |
| **High Income Moderate-Spenders** | Wealthy customers who spend moderately | Avg Age: 35, Avg Income: $90k, Moderate Spending Score | Upsell relevant products, personalized campaigns |
| **Other / Miscellaneous** | Customers not in the above groups | Mixed ages and spending patterns | Use generalized marketing strategies |

## Visualization

- Customers were plotted on an **Income vs Spending Score graph**, with each segment highlighted in a different color.
- This helps visually see **where high-value customers are concentrated** and which groups need targeted engagement.

## Key Takeaways

1. **High-value customers** are easy to spot — focus marketing efforts on them first.
2. **Low-spending segments** can be nurtured with discounts and loyalty programs.
3. **Segment-specific strategies** improve ROI compared to generic campaigns.

Clustering gives a **clear, actionable roadmap** to tailor marketing and maximize revenue based on customer behavior.

# Customer Segments Visualization

## Overview

Visualizations help **see customer patterns at a glance**.

- We plot **Annual Income vs Spending Score**, since these two features are most relevant to marketing strategies.
- Each cluster is highlighted in a **different color** so it's easy to identify high-value vs low-value customers.

Purpose: Clients can immediately see which groups are high-spenders, moderate-spenders, or low-spenders.

## Interpretation

- **Top-right clusters:** Customers with **high income and high spending** → premium product targets
- **Bottom-left clusters:** Customers with **lower income and low spending** → discount/loyalty targets
- **Middle clusters:** Moderate spending → personalized campaigns

Visualization makes it obvious which segments to focus on first.