**Problem: Clustering**

A leading bank wants to develop a customer segmentation to give promotional offers to its customers. They collected a sample that summarizes the activities of users during the past few months. You are given the task to identify the segments based on credit card usage.

**1.1** Read the data, do the necessary initial steps, and exploratory data analysis (Univariate, Bi-variate, and multivariate analysis).

**1.2**  Do you think scaling is necessary for clustering in this case? Justify

**1.3** Apply hierarchical clustering to scaled data. Identify the number of optimum clusters using Dendrogram and briefly describe them

**1.4** Apply K-Means clustering on scaled data and determine optimum clusters. Apply elbow curve and silhouette score. Explain the results properly. Interpret and write inferences on the finalized clusters.

**1.5** Describe cluster profiles for the clusters defined. Recommend different promotional strategies for different clusters.

Dataset for Problem 1: [bank\_marketing\_part1\_Data.csv](https://olympus.mygreatlearning.com/courses/78181/files/6443078/download?verifier=WFdR1CubQ0daXYM0wjjtGPSeSj1CFfEqoQj7847O&wrap=1)

**Data** **Dictionary** **for** **Market** **Segmentation:**

1. spending: Amount spent by the customer per month (in 1000s)
2. advance\_payments: Amount paid by the customer in advance by cash (in 100s)
3. probability\_of\_full\_payment: Probability of payment done in full by the customer to the bank
4. current\_balance: Balance amount left in the account to make purchases (in 1000s)
5. credit\_limit: Limit of the amount in credit card (10000s)
6. min\_payment\_amt : minimum paid by the customer while making payments for purchases made monthly (in 100s)
7. max\_spent\_in\_single\_shopping: Maximum amount spent in one purchase (in 1000s)