Bank Marketing Data-Analysis Project

Marketing Introduction:-

The process by which companies create value for customers and build strong customer relationships in order to capture value from customers in return. - Kotler and Armstrong (2010).

Marketing campaigns are characterized by focusing on the customer needs and their overall satisfaction. Nevertheless, there are different variables that determine whether a marketing campaign will be successful or not. There are certain variables that we need to take into consideration when making a marketing campaign.

The 4 Ps:-

1) Segment of the Population: To which segment of the population is the marketing campaign going to address and why? This aspect of the marketing campaign is extremely important since it will tell to which part of the population should most likely receive the message of the marketing campaign.

2) Distribution channel to reach the customer's place: Implementing the most effective strategy in order to get the most out of this marketing campaign. What segment of the population should we address? Which instrument should we use to get our message out? (Ex: Telephones, Radio, TV, Social Media Etc.)

3) Price: What is the best price to offer to potential clients? (In the case of the bank's marketing campaign this is not necessary since the main interest for the bank is for potential clients to open deposit accounts in order to make the operative activities of the bank to keep on running.)

4) Promotional Strategy: This is the way the strategy is going to be implemented and how are potential clients going to be address. This should be the last part of the marketing campaign analysis since there has to be an indepth analysis of previous campaigns (If possible) in order to learn from previous mistakes and to determine how to make the marketing campaign much more effective.

What is a Term Deposit?

A Term deposit is a deposit that a bank or a financial institurion offers with a fixed rate (often better than just opening deposit account) in which your money will be returned back at a specific maturity time. For more information with regards to Term Deposits please click on this link from Investopedia.

Machine Learning Steps Involved:-

1. XGBoost

Steps Involved:-

1. Import data from dataset and perform initial high-level analysis:
2. Data Exploration (look at the number of rows, look at the missing values, and look at dataset columns and their values respective to the campaign outcome).
3. Data Cleaning (Cleaning the data: remove irrelevant columns)
4. Dealing with missing and incorrect values,
5. Turning categorical columns into dummy variables.
6. Use machine learning techniques to predict the marketing campaign outcome and to find out factors, which affect the success of the campaign.

Dataset Information:-

The data is related with direct marketing campaigns of a Portuguese banking institution. The marketing campaigns were based on phone calls. Often, more than one contact to the same client was required, in order to access if the product (bank term deposit) would be ('yes') or not ('no') subscribed.

The classification goal is to predict if the client will subscribe (yes/no) a term deposit (variable y).

Attribute Information:-

Input variables:

Bank client data:

1. 1-age (numeric)
2. 2-job : type of job (categorical: 'admin.','blue-collar','entrepreneur','housemaid','management','retired','self-employed','services','student','technician','unemployed','unknown')
3. 3-marital : marital status (categorical: 'divorced','married','single','unknown'; note: 'divorced' means divorced or widowed)
4. 4-education(categorical:'basic.4y','basic.6y','basic.9y','high.school','illiterate','professional.course','university.degree','unknown')
5. 5-default: has credit in default? (categorical: 'no','yes','unknown')
6. 6-housing: has housing loan? (categorical: 'no','yes','unknown')
7. 7-loan: has personal loan? (categorical: 'no','yes','unknown')
8. #### related with the last contact of the current campaign:
9. 8-contact: contact communication type (categorical: 'cellular','telephone')
10. 9-month: last contact month of year (categorical: 'jan', 'feb', 'mar', ..., 'nov', 'dec')
11. 10-day\_of\_week: last contact day of the week (categorical: 'mon','tue','wed','thu','fri')
12. 11-duration: last contact duration, in seconds (numeric). Important note: this attribute highly affects the output target (e.g., if duration=0 then y='no'). Yet, the duration is not known before a call is performed. Also, after the end of the call y is obviously known. Thus, this input should only be included for benchmark purposes and should be discarded if the intention is to have a realistic predictive model.
13. other attributes:12-campaign: number of contacts performed during this campaign and for this client (numeric, includes last contact)
14. 13-pdays: number of days that passed by after the client was last contacted from a previous campaign (numeric; 999 means client was not previously contacted)
15. 14-previous: number of contacts performed before this campaign and for this client (numeric)

15-poutcome: outcome of the previous marketing campaign (categorical: 'failure','nonexistent','success')

Social and economic context attributes

16-emp.var.rate: employment variation rate - quarterly indicator (numeric)

17-cons.price.idx: consumer price index - monthly indicator (numeric)

18-cons.conf.idx: consumer confidence index - monthly indicator (numeric)

19-euribor3m: euribor 3 month rate - daily indicator (numeric)

20-nr.employed: number of employees - quarterly indicator (numeric)

Output variable (desired target):

21-y - has the client subscribed a term deposit? (Binary: 'yes','no')