**Apache Spark—Real Time Project—Marketing Analysis**

**Analyze Marketing data for call campaign by bank**

**Try yourself!**

Your client- a Portuguese banking institution—ran a marketing campaign to convince potential customers to invest in bank term deposit. The data is related to direct marketing campaigns of the bank.

The marketing campaigns were based on phone calls. Often, more than one contact by phone to the same client was required, in order to assess if the product (bank term deposit) would be ('yes') or not ('no') subscribed:

Data Fields

1 - age (numeric)

2 - job : type of job (categorical: 'admin.','blue-collar','entrepreneur','housemaid','management','retired','self-employed','services','student','technician','unemployed','unknown')

3 - marital : marital status (categorical: 'divorced', 'married', 'single', 'unknown'; note: 'divorced' means divorced or widowed)

4 - education (categorical: 'basic.4y','basic.6y','basic.9y','high.school','illiterate','professional.course','university.degree','unknown')

5 - default: has credit in default? (categorical: 'no', 'yes', 'unknown')

6 - housing: has housing loan? (categorical: 'no', 'yes', 'unknown')

7 - loan: has personal loan? (categorical: 'no', 'yes', 'unknown')

# related to the last contact of the current campaign:

8 - contact: contact communication type (categorical: 'cellular', 'telephone')

9 - month: Month of last contact (categorical: 'jan', 'feb', 'mar', ..., 'nov', 'dec')

10 - day\_of\_week: last contact day of the week (categorical: 'mon','tue','wed','thu','fri')

11 - duration: last contact duration, in seconds (numeric). Important note: this attribute highly affects the output target (example, 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.

# other attributes:

12 - campaign: number of contacts performed during this campaign and for this client (numeric, includes last contact)

13 - pdays: number of days passed after the client was last contacted from a previous campaign (numeric; 999 means client was not previously contacted)

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')

The Data size is very big and the Marketing team has asked you to use spark and help them get answer to the following questions.

1. load data and create spark data frame

2. Give marketing success rate. (No. of people subscribed / total no. of entries)

Ans> 11.69%

3. Check max, min, Mean and median age of average targeted customer

+--------+--------+-----------------+

|max(age)|min(age)| avg(age)|

+--------+--------+-----------------+

| 95| 18|40.93621021432837|

+--------+--------+-----------------+

4. Check quality of clients by checking average balance, median balance of clients

+------------------+

| avg(balance)|

+------------------+

|1362.2720576850766|

+------------------+

448.0

5. Check if age matters in marketing subscription for deposit

Ans> Not really, avg age is almost similar for both(40~41)

6. Check if marital status mattered for subscription to deposit.

Ans> No,

7. Check if age and marital status together mattered for subscription to deposit scheme

Ans> Not Really

8. Do Feature engineering for age column and find right age effect on campaign

Data Ref: <http://mlr.cs.umass.edu/ml/datasets/Bank+Marketing>

The total time required to complete this task is 8 hours.

Note: The dataset required for this project can be accessed either from the above link or downloaded from the “Download Center”.