Marketing Analysis

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--1)Create Dataframe

```
val lines = sc.textFile("test/simplilearn/bankmarketingdata.csv")

val bank = lines.map(x => x.split(";"))
```

--Drop header

```
val bankf = bank.mapPartitionsWithIndex { (idx, iter) => if (idx == 0) iter.drop(1) else iter }
```

--Define Class for the schema

```
case class Bank(age:Int, job:String, marital:String, education:String, default:String, balance:Int,
housing:String, loan:String, contact:String, day:Int, month: String, duration:Int, campaign:Int, pdays:Int,
previous:Int, poutcome:String, y:String)


val bankrdd = bankf.map(

    x => Bank(x(0).toInt,

             x(1).replaceAll("\"","")

            ,x(2).replaceAll("\"","")

            ,x(3).replaceAll("\"","")

            ,x(4).replaceAll("\"","")

            ,x(5).toInt

            ,x(6).replaceAll("\"","")

            ,x(7).replaceAll("\"","")

            ,x(8).replaceAll("\"","")

            ,x(9).toInt

            ,x(10).replaceAll("\"","")
            ,x(11).toInt

            ,x(12).toInt

            ,x(13).toInt

            ,x(14).toInt

            ,x(15).replaceAll("\"","")

            ,x(16).replaceAll("\"","")

           )

      )


val bankDF = bankrdd.toDF()


bankDF.registerTempTable("bank")
```

--2) Marketing Success Rate

```
val success = sqlContext.sql("select (a.subscribed/b.total)*100 as success_percent from (select count(*)
as subscribed from bank where y='yes') a,(select count(*) as total from bank) b").show()
```

--2.a) Marketing Failure Rate

```
val failure = sqlContext.sql("select (a.not_subscribed/b.total)*100 as failure_percent from (select
count(*) as not_subscribed from bank where y='no') a,(select count(*) as total from bank) b").show()
```

--3)Max,Min, Mean age of targeted customer

```
bankDF.select(max($"age")).show()

bankDF.select(min($"age")).show()

bankDF.select(avg($"age")).show()
```

--4) Avg and Median balance of customers

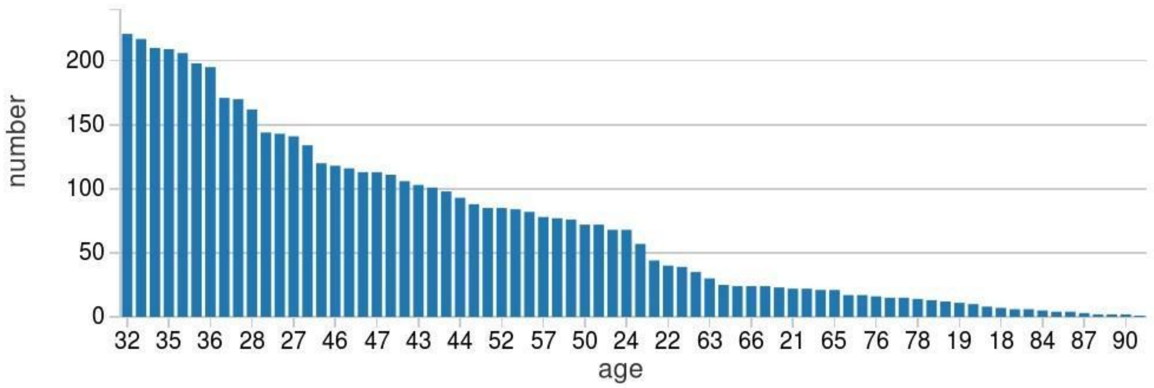
bankDF.select(avg($"balance")).show()

val median = sqlContext.sql("SELECT percentile_approx(balance, 0.5) FROM bank").show()

--5)Check if age matters in the marketing subscription for deposit

val age = sqlContext.sql("select age, count(*) as number from bank where y='yes' group by age order by number desc ").show()

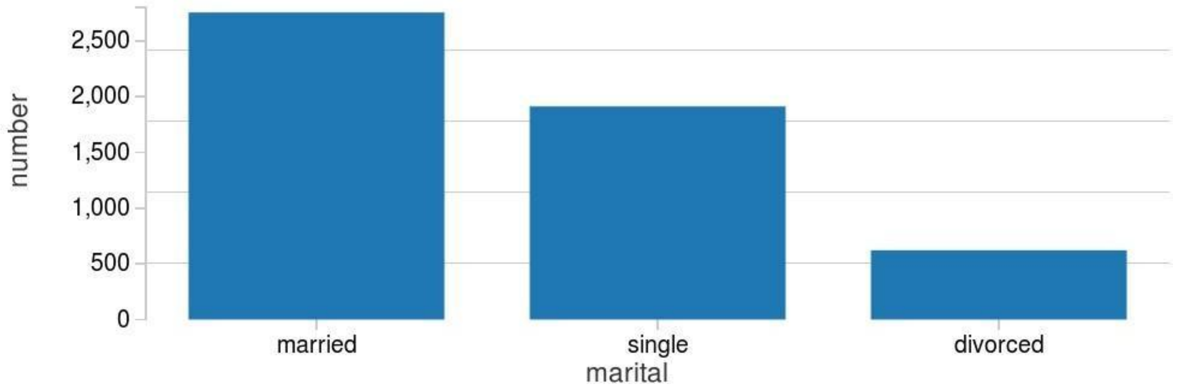
--We see age indeed matters. The age range between (30-36) shows most promise.



--6)Check if marital status matters

val marital = sqlContext.sql("select marital, count(*) as number from bank where y='yes' group by marital order by number desc ").show()

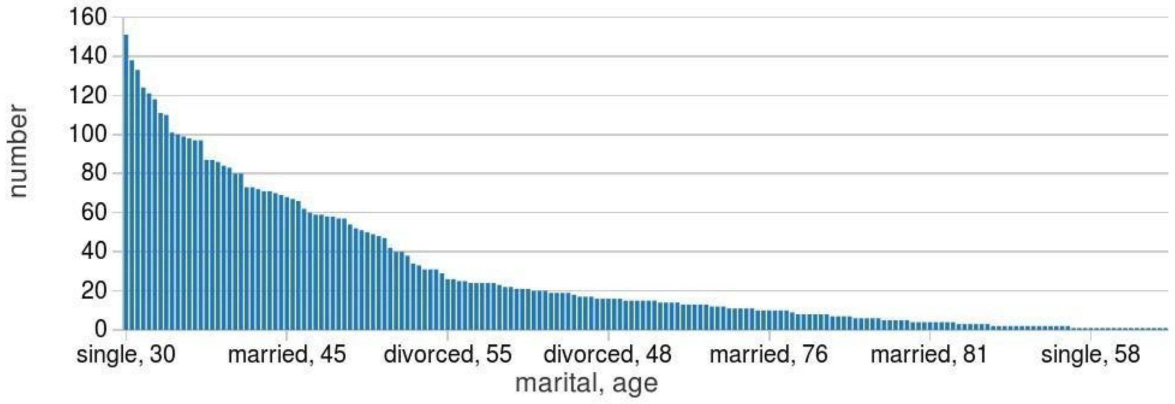
--We see it’s the married couples who go for the subscriptions the most



--7) Check if both matters

val age_marital = sqlContext.sql("select age, marital, count(*) as number from bank where y='yes' group by age,marital order by number desc ").show()

--Single people around the age 30-35 shows most subscriptions



--8) Feature Engineering for cloumn "age"

--Import necessary libraries

import scala.reflect.runtime.universe

import org.apache.spark.SparkConf

import org.apache.spark.SparkContext

```
import org.apache.spark.sql.DataFrame

import org.apache.spark.sql.SQLContext

import org.apache.spark.sql.functions.mean
```

--Defining a new UDF with which we will generate new features.We divide the age groups into 4 categories.

```
val ageRDD = sqlContext.udf.register("ageRDD",(age:Int) => {

    if (age < 20)

    "Teen"

    else if (age > 20 && age <=

    32) "Young"

    else if (age > 33 && age <=

    55) "Middle Aged"

    else

    "Old"

    })
```

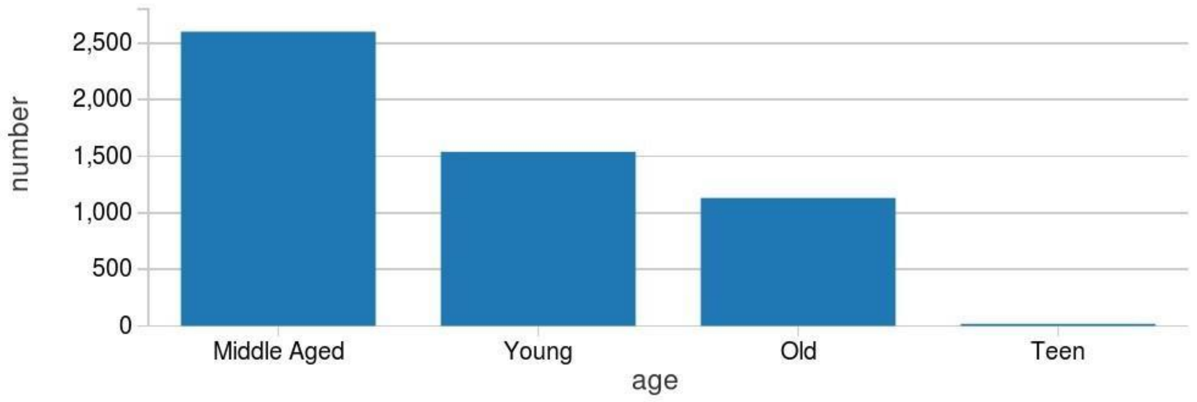
--Replacing old “age” column with new “age” column

```
val banknewDF = bankDF.withColumn("age",ageRDD(bankDF("age")))

banknewDF.registerTempTable("bank_new")
```

--Running a query to see the age group which subscribed the most. We see it’s ‘Middle-Aged’

```
val age_target = sqlContext.sql("select age, count(*) as number from bank_new where y='yes' group by
age order by number desc ").show()
```



--Pipeline

```
val ageInd = new StringIndexer().setInputCol("age").setOutputCol("ageIndex")
```

--Fitting the model

```
var strIndModel = ageInd.fit(banknewDF)
```

--StringIndexerModel.transform() assigns the generated index to each value of the column in the given DataFrame.

--Middle aged is the most frequent word in this data, so it is given index 0

```
strIndModel.transform(banknewDF).select("age","ageIndex").show(5)
```

--So we can conclude from the Feature Engineering that It is the ‘Middle Aged’ people between age 33 and 55 who should be the targeted customers as they subscribe the most