Mini Projeto Santander - DSA

In [1]:

```
# Biblioteca import para o projeto
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from sklearn import preprocessing
```

In [2]:

```
df = pd.read_csv("data/train.csv")
```

In [3]:

```
df.head(2)
```

Out[3]:

	ID	var3	var15	imp_ent_var16_ult1	imp_op_var39_comer_ult1	imp_op_var39_comer_ult3
0	1	2	23	0.0	0.0	0.0
1	3	2	34	0.0	0.0	0.0

2 rows × 371 columns

Pré Processamento e Analise

In [4]:

```
df.shape
```

Out[4]:

```
(76020, 371)
```

In [5]:

```
df.describe()
```

Out[5]:

	ID	var3	var15	imp_ent_var16_ult1	imp_op_var39_come
count	76020.000000	76020.000000	76020.000000	76020.000000	76020.0
mean	75964.050723	-1523.199277	33.212865	86.208265	72.3
std	43781.947379	39033.462364	12.956486	1614.757313	339.3
min	1.000000	-999999.000000	5.000000	0.000000	0.0
25%	38104.750000	2.000000	23.000000	0.000000	0.0
50%	76043.000000	2.000000	28.000000	0.000000	0.0
75%	113748.750000	2.000000	40.000000	0.000000	0.0
max	151838.000000	238.000000	105.000000	210000.000000	12888.0

8 rows × 371 columns

In [6]:

```
#Colunas
colunas = list(df.columns)
```

In [7]:

```
df.duplicated()
# Portanto nao temos valores duplicados
```

Out[7]:

```
0        False
1        False
2        False
3        False
4        False
         ...
76015    False
76016    False
76017    False
76018    False
76019    False
Length: 76020, dtype: bool
```

In [8]:

```
def valor_missing(valor):
    if (valor.isnull == True):
        print("Temos valor nulo")
```

In [9]:

```
df.apply(valor_missing)
# Portanto nao temos valores missing
```

Out[9]:

```
ID                          None
var3                        None
var15                       None
imp_ent_var16_ult1          None
imp_op_var39_comer_ult1     None
                            ...
saldo_medio_var44_hace3     None
saldo_medio_var44_ult1      None
saldo_medio_var44_ult3      None
var38                       None
TARGET                      None
Length: 371, dtype: object
```

In [10]:

```
def limite_valor(coluna):
    print("Valor minimo: ", str(coluna.min()), "Valor maximo : ", str(coluna.max()), "
 da coluna : ", str(coluna.name))
```

In [11]:

```
# Alguns saldos possuem valores negativos na conta
# Algumas variaveis tem apenas 1 valor
# df.apply(limite_valor, axis=0)
```

In [12]:

```
#Temos um problema de desbalanceamento
df.TARGET.value_counts()
```

Out[12]:

```
0    73012
1     3008
Name: TARGET, dtype: int64
```

Tratando Valores unicos nas variaveis

In [13]:

```
valores_unicos = []
for coluna in colunas:
    if df[coluna].nunique() < 2:
        del df[coluna]
```

In [14]:

```
df.shape
```

Out[14]:

```
(76020, 337)
```

In [15]:

```
colunas = list(df.columns)
```

Tratando DELTA

In [16]:

```
# Avaliando a variavel "delta" por apresentar valores extremos
df.iloc[:,175:201].describe()
```

Out[16]:

	delta_imp_amort_var18_1y3	delta_imp_amort_var34_1y3	delta_imp_aport_var13_1y3	de
count	7.602000e+04	7.602000e+04	7.602000e+04	
mean	2.630887e+05	2.630887e+05	4.867140e+07	
std	5.129183e+07	5.129183e+07	6.959537e+08	
min	0.000000e+00	0.000000e+00	-1.000000e+00	
25%	0.000000e+00	0.000000e+00	0.000000e+00	
50%	0.000000e+00	0.000000e+00	0.000000e+00	
75%	0.000000e+00	0.000000e+00	0.000000e+00	
max	1.000000e+10	1.000000e+10	1.000000e+10	

8 rows × 26 columns

In [17]:

```
coluna_delta = list(df.iloc[:,175:201])
coluna_delta
```

Out[17]:

```
['delta_imp_amort_var18_1y3',
 'delta_imp_amort_var34_1y3',
 'delta_imp_aport_var13_1y3',
 'delta_imp_aport_var17_1y3',
 'delta_imp_aport_var33_1y3',
 'delta_imp_compra_var44_1y3',
 'delta_imp_reemb_var13_1y3',
 'delta_imp_reemb_var17_1y3',
 'delta_imp_reemb_var33_1y3',
 'delta_imp_trasp_var17_in_1y3',
 'delta_imp_trasp_var17_out_1y3',
 'delta_imp_trasp_var33_in_1y3',
 'delta_imp_trasp_var33_out_1y3',
 'delta_imp_venta_var44_1y3',
 'delta_num_aport_var13_1y3',
 'delta_num_aport_var17_1y3',
 'delta_num_aport_var33_1y3',
 'delta_num_compra_var44_1y3',
 'delta_num_reemb_var13_1y3',
 'delta_num_reemb_var17_1y3',
 'delta_num_reemb_var33_1y3',
 'delta_num_trasp_var17_in_1y3',
 'delta_num_trasp_var17_out_1y3',
 'delta_num_trasp_var33_in_1y3',
 'delta_num_trasp_var33_out_1y3',
 'delta_num_venta_var44_1y3']
```

In [18]:

```
for coluna in coluna_delta:
    df[coluna] = pd.Series([1 if x == 9999999999 else x for x in df[coluna]])
```

In [19]:

```
df.iloc[:,175:201].describe()
```

Out[19]:

	delta_imp_amort_var18_1y3	delta_imp_amort_var34_1y3	delta_imp_aport_var13_1y3	de
count	76020.000000	76020.000000	76020.000000	
mean	0.000026	0.000026	-0.016956	
std	0.005129	0.005129	0.166389	
min	0.000000	0.000000	-1.000000	
25%	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	
75%	0.000000	0.000000	0.000000	
max	1.000000	1.000000	5.500000	

8 rows × 26 columns

Balanceamento dos dados

In [25]:

```
from sklearn.utils import resample
```

In [20]:

```
df.shape
```

Out[20]:

```
(76020, 337)
```

In [21]:

```
# Separate majority and minority classes
df_majority = df[df.TARGET==0]
df_minority = df[df.TARGET==1]
```

In [24]:

```
df_majority.shape, df_minority.shape
```

Out[24]:

```
((73012, 337), (3008, 337))
```

In [29]:

```
# Upsample Classe minoritaria
df_minority_upsampled = resample(df_minority,
                                 replace=True,
                                 n_samples=50000,
                                 random_state=123)

# Concatenando as classes
df_upsampled = pd.concat([df_majority, df_minority_upsampled])

# Avaliar
df_upsampled.TARGET.value_counts()
```

Out[29]:

```
0    73012
1    50000
Name: TARGET, dtype: int64
```

In [30]:

```
df_upsampled.shape
```

Out[30]:

```
(123012, 337)
```

Normalização dos dados

In [31]:

```
min_max_scaler = preprocessing.MinMaxScaler()
```

In [32]:

```
target = df_upsampled['TARGET']
```

In [33]:

```
x = df_upsampled.drop(['TARGET'], axis=1).values #returns a numpy array
df_scaled = min_max_scaler.fit_transform(x)
df_scaled = pd.DataFrame(df_scaled, columns=colunas[0:336])
```

In [34]:

```
df_scaled.head(5)
```

Out[34]:

	ID	var3	var15	imp_ent_var16_ult1	imp_op_var39_comer_ult1	imp_op_var39_co
0	0.000000	0.999764	0.18	0.0	0.00000	
1	0.000013	0.999764	0.29	0.0	0.00000	
2	0.000020	0.999764	0.18	0.0	0.00000	
3	0.000046	0.999764	0.32	0.0	0.01513	
4	0.000059	0.999764	0.34	0.0	0.00000	

5 rows × 336 columns

PCA

In [35]:

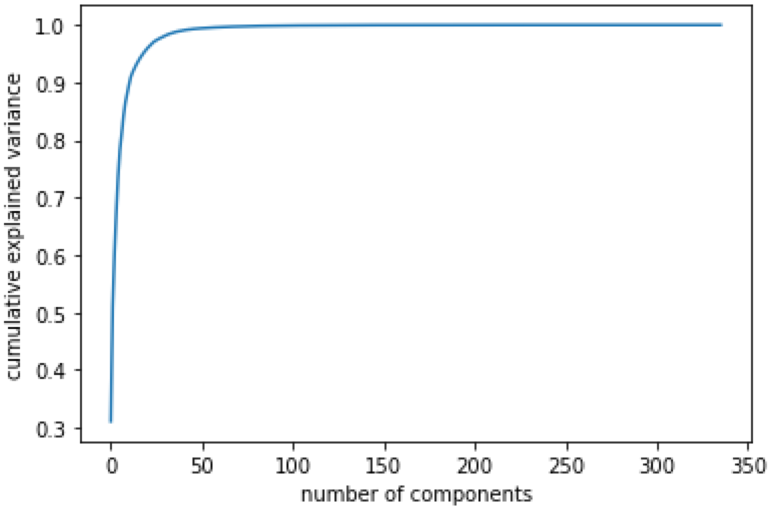
```
del df_upsampled['ID']
```

In [36]:

```
from sklearn.decomposition import PCA
```

In [37]:

```
pca = PCA().fit(df_scaled)
plt.plot(np.cumsum(pca.explained_variance_ratio_))
plt.xlabel('number of components')
plt.ylabel('cumulative explained variance');
```



In [38]:

```
pca = PCA(n_components=50)
df_pca = pca.fit_transform(df_scaled)
```

In [39]:

```
pd.DataFrame(df_pca).shape
```

Out[39]:

```
(123012, 50)
```

Machine Learning

In [40]:

```
from sklearn.ensemble import RandomForestClassifier
from sklearn.model_selection import train_test_split
```

```
C:\Users\bruno\Anaconda3\lib\site-packages\sklearn\ensemble\weight_boostin
g.py:29: DeprecationWarning: numpy.core.umath_tests is an internal NumPy m
odule and should not be imported. It will be removed in a future NumPy rel
ease.
  from numpy.core.umath_tests import inner1d
```

Divisão das variaveis de treino e teste

In [41]:

```
X_train, X_test, y_train, y_test = train_test_split(df_pca, target, test_size=0.30, ran
dom_state=42)
```

In [42]:

```
X_train.shape, y_train.shape
```

Out[42]:

```
((86108, 50), (86108,))
```

In [43]:

```
X_test.shape, y_test.shape
```

Out[43]:

```
((36904, 50), (36904,))
```

Algoritmo RandomForestClassifier

In [44]:

```
rfc = RandomForestClassifier(n_estimators = 200, random_state = 42)
rfc.fit(X_train, y_train)
```

Out[44]:

```
RandomForestClassifier(bootstrap=True, class_weight=None, criterion='gin
i',
            max_depth=None, max_features='auto', max_leaf_nodes=None,
            min_impurity_decrease=0.0, min_impurity_split=None,
            min_samples_leaf=1, min_samples_split=2,
            min_weight_fraction_leaf=0.0, n_estimators=200, n_jobs=1,
            oob_score=False, random_state=42, verbose=0, warm_start=False)
```

In [45]:

```
# Prectitions com os valores de test
predictions = rfc.predict(X_test)
```

Error

In [46]:

```
# Calulo do erro
from sklearn import metrics
# Model Accuracy, how often is the classifier correct?
print("Acuracia:",metrics.accuracy_score(y_test, predictions))
```

```
Acuracia: 0.9833893344894863
```

In [47]:

```
pd.Series(predictions).value_counts()
```

Out[47]:

```
0    21518
1    15386
dtype: int64
```

In [48]:

```
pd.Series(y_test).value_counts()
```

Out[48]:

```
0    22131
1    14773
Name: TARGET, dtype: int64
```