```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.feature_selection import SelectKBest, f_classif
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score
from sklearn import preprocessing
from sklearn.decomposition import PCA
import numpy as np
import seaborn as sns

def convertir_columna_a_numeros(columna):
    valores_unicos = columna.dropna().unique()
    mapping = {valor: indice for indice, valor in
enumerate(valores_unicos)}
    return columna.map(mapping)

def convertir_dataframe(df, columnas):
    for col in columnas:
        df[col] = convertir_columna_a_numeros(df[col].astype(str))
    return df

EmpleadosAttrition =
pd.read_csv("0.mikh5r1gs60.fukzkek4yb4empleadosRETO.csv")
EmpleadosAttrition = EmpleadosAttrition.drop(["EmployeeCount",
"EmployeeNumber", "Over18", "StandardHours"], axis=1)
columnas_convertir = ["BusinessTravel", "Department",
"EducationField", "JobRole", "MaritalStatus", "Gender",
"OverTime","Attrition"]
ParaSueldo = EmpleadosAttrition[["Department","MonthlyIncome"]]
EmpleadosAttrition = convertir_dataframe(EmpleadosAttrition,
columnas_convertir)
EmpleadosAttrition["DistanceFromHome_km"] =
EmpleadosAttrition["DistanceFromHome"]
EmpleadosAttrition["DistanceFromHome"] =
EmpleadosAttrition["DistanceFromHome"].str.split().str[0].astype(int)
EmpleadosAttrition
```

	Age	BusinessTravel	Department	DistanceFromHome	Education	\
0	50	0	0	1	2	
1	36	0	0	6	2	
2	21	0	1	7	1	
3	52	0	0	7	4	
4	33	0	0	15	1	
..	...	...	...	...	...	
395	33	0	0	14	3	
396	31	0	1	20	3	
397	37	2	0	11	3	
398	38	0	0	4	2	
399	33	0	0	14	3	

```
     EducationField  EnvironmentSatisfaction  Gender
JobInvolvement  \
0                 0                        4       0               3

1                 0                        2       0               3

2                 1                        2       0               3

3                 2                        2       0               3

4                 0                        2       0               3

..              ...                      ...     ...             ...

395               0                        3       0               3

396               2                        2       1               1

397               4                        2       0               3

398               0                        4       1               3

399               0                        4       1               3


     JobLevel  ...  PercentSalaryHike  PerformanceRating  \
0           4  ...                 22                  4
1           2  ...                 20                  4
2           1  ...                 13                  3
3           3  ...                 19                  3
4           3  ...                 12                  3
..        ...  ...                ...                ...
395         1  ...                 13                  3
396         2  ...                 11                  3
397         3  ...                 14                  3
398         1  ...                 19                  3
399         1  ...                 13                  3

     RelationshipSatisfaction  TotalWorkingYears
TrainingTimesLastYear  \
0                           3                 32
1
1                           4                  7
0
2                           2                  1
3
3                           4                 18
4
4                           4                 15
2
```

```
..                          ...                 ...                       ..
.
395                          3                   8
2
396                          3                   4
2
397                          3                  10
1
398                          4                   7
5
399                          4                   8
5

    WorkLifeBalance  YearsInCurrentRole  YearsSinceLastPromotion
Attrition  \
0                   2                   4                         1
0
1                   3                   2                         0
0
2                   3                   0                         1
1
3                   3                   6                         4
0
4                   4                   6                         7
1
..                ...                 ...                       ...
...
395                 1                   4                         0
1
396                 3                   2                         2
1
397                 3                   8                         0
0
398                 2                   0                         0
0
399                 3                   7                         1
0

     DistanceFromHome_km
0                   1 km
1                   6 km
2                   7 km
3                   7 km
4                  15 km
..                   ...
395                14 km
396                20 km
397                11 km
398                 4 km
399                14 km
```

```
[400 rows x 27 columns]
```

```
X =
EmpleadosAttrition.drop(["Attrition","HiringDate","DistanceFromHome_km
"], axis = 1)
y = EmpleadosAttrition["Attrition"]
selector = SelectKBest(k = 18)
X_train, X_test, y_train, y_test = train_test_split(X, y,
test_size=0.2, random_state=42)
X_train_selected = selector.fit_transform(X_train, y_train)
X_test_selected = selector.transform(X_test)
model = LogisticRegression(max_iter=10000)
model.fit(X_train_selected, y_train)
y_pred = model.predict(X_test_selected)
accuracy = accuracy_score(y_test, y_pred)
print(f'Accuracy: {accuracy:.2f}')
selected_feature_names = X.columns[selected_features]
print(f"Selected feature names: {selected_feature_names}")
```

```
Accuracy: 0.88
Selected feature names: Index(['Age', 'Department', 'EducationField',
'EnvironmentSatisfaction',
       'JobInvolvement', 'JobLevel', 'JobRole', 'JobSatisfaction',
       'MonthlyIncome', 'OverTime', 'PercentSalaryHike',
'TotalWorkingYears',
       'TrainingTimesLastYear', 'YearsInCurrentRole',
       'YearsSinceLastPromotion'],
      dtype='object')
```

```
EmpleadosAttrition["Year"] =
EmpleadosAttrition["HiringDate"].str.split("/").str[-1].astype(int)
EmpleadosAttrition["YearsAtCompany"] = 2018 -
EmpleadosAttrition["Year"]
EmpleadosAttrition[["Year","YearsAtCompany","DistanceFromHome_km","Dis
tanceFromHome"]]
```

	Year	YearsAtCompany	DistanceFromHome_km	DistanceFromHome
0	2013	5	1 km	1
1	2015	3	6 km	6
2	2017	1	7 km	7
3	2010	8	7 km	7
4	2011	7	15 km	15
..	...	...	...	...
395	2013	5	14 km	14
396	2016	2	20 km	20
397	2008	10	11 km	11
398	2018	0	4 km	4
399	2010	8	14 km	14

```
[400 rows x 4 columns]
```

```
EmpleadosAttrition = EmpleadosAttrition.drop(["Year", "HiringDate",
"DistanceFromHome_km"], axis = 1)
sueldo_promedio = ParaSueldo.groupby("Department")
["MonthlyIncome"].mean()
SueldoPromedioDepto = pd.DataFrame(sueldo_promedio)
SueldoPromedioDepto.rename(columns={"MonthlyIncome":
"SueldoPromedio"}, inplace=True)
SueldoPromedioDepto
```

```
                         SueldoPromedio
Department
Human Resources             6239.888889
Research & Development      6804.149813
Sales                       7188.250000
```

```
escalador = preprocessing.MinMaxScaler()
SueldoPromedioDepto["SueldoPromedio"] =
escalador.fit_transform(SueldoPromedioDepto["SueldoPromedio"].to_numpy
().reshape(-1, 1))
SueldoPromedioDepto
```

```
                         SueldoPromedio
Department
Human Resources                0.000000
Research & Development         0.594985
Sales                          1.000000
```

```
Data = EmpleadosAttrition.corr()
mask = abs(Data["Attrition"].astype(float)) > .1
mask
```

```
Age                          True
BusinessTravel              False
Department                  False
DistanceFromHome            False
Education                   False
EducationField              False
EnvironmentSatisfaction      True
Gender                      False
JobInvolvement               True
JobLevel                     True
JobRole                     False
JobSatisfaction              True
MaritalStatus               False
MonthlyIncome                True
NumCompaniesWorked          False
OverTime                     True
PercentSalaryHike           False
```

```
PerformanceRating           False
RelationshipSatisfaction    False
TotalWorkingYears            True
TrainingTimesLastYear       False
WorkLifeBalance             False
YearsInCurrentRole           True
YearsSinceLastPromotion     False
Attrition                    True
YearsAtCompany               True
Name: Attrition, dtype: bool
```

```
EmpleadosAttritionFinal =
EmpleadosAttrition[EmpleadosAttrition.columns[mask]]
EmpleadosAttritionFinal
```

```
     Age  EnvironmentSatisfaction  JobInvolvement  JobLevel
JobSatisfaction  \
0     50                        4               3         4
4
1     36                        2               3         2
2
2     21                        2               3         1
2
3     52                        2               3         3
2
4     33                        2               3         3
3
..   ...                      ...             ...       ...
...
395   33                        3               3         1
4
396   31                        2               1         2
3
397   37                        2               3         3
4
398   38                        4               3         1
3
399   33                        4               3         1
2

     MonthlyIncome  OverTime  TotalWorkingYears  YearsInCurrentRole  \
0            17399         0                 32                   4
1             4941         0                  7                   2
2             2679         0                  1                   0
3            10445         0                 18                   6
4            13610         1                 15                   6
..             ...       ...                ...                 ...
395           2436         1                  8                   4
396           4559         1                  4                   2
397          12185         1                 10                   8
```

```
398           3306         0                    7                     0
399           2756         0                    8                     7
```

```
     Attrition  YearsAtCompany
0            0               5
1            0               3
2            1               1
3            0               8
4            1               7
..         ...             ...
395          1               5
396          1               2
397          0              10
398          0               0
399          0               8

[400 rows x 11 columns]
```

```
pca = PCA(2)
pca.fit(EmpleadosAttritionFinal.drop(["Attrition"], axis = 1))
print(pca.components_)
print("Ratio = ",pca.explained_variance_ratio_)
```

```
[[ 7.88889039e-04 -1.11509847e-05 -4.52350949e-06  2.18447247e-04
  -1.47384271e-06  9.99998757e-01 -2.93013784e-06  1.17203793e-03
   2.88509713e-04  5.98546688e-04]
 [ 8.98401724e-01  2.12622118e-03  3.98182803e-03  7.72521638e-03
   8.67110716e-04 -1.26675443e-03 -2.06640070e-03  4.32815279e-01
   3.12104224e-02  6.69664399e-02]]
Ratio =  [9.99994493e-01 2.98247670e-06]
```

```
EmpleadosAttritionPCA =
pca.transform(EmpleadosAttritionFinal.drop(["Attrition"], axis = 1))
EmpleadosAttritionPCA
```

```
array([[ 1.04884936e+04,  5.86514794e+00],
       [-1.96953347e+03, -1.96942232e+00],
       [-4.23155152e+03, -1.53810203e+01],
       [ 3.53448957e+03,  1.06611561e+01],
       [ 6.69946653e+03, -1.17843660e+01],
       [ 3.42250729e+03,  1.17288370e+01],
       [-2.13554845e+03, -1.57001727e+01],
       [-1.54253373e+03, -4.90920701e+00],
       [ 3.94447990e+03, -1.51368329e+00],
       [-1.83953778e+03, -9.58797831e+00],
       [-4.50452798e+03,  5.06375139e+00],
       [ 4.06549296e+03,  1.43923696e+01],
       [-4.59753572e+03, -2.28409352e+00],
       [ 3.69847852e+03, -3.21492722e+00],
       [ 1.18784855e+04, -1.68233148e+00],
```

```
       [ 3.01347074e+03, -4.59522296e+00],
       [-2.28353070e+03, -5.26620113e+00],
       [-1.50451462e+03,  2.01778361e+00],
       [ 1.29224807e+04, -9.76507437e+00],
       [ 7.94149718e+03,  8.54012160e+00],
       [-1.44052934e+03, -4.43501413e+00],
       [-2.87552090e+03,  1.49524973e+01],
       [-8.19533179e+02, -6.89308863e+00],
       [-5.30954922e+03, -1.22824475e+01],
       [-7.78521375e+02,  1.10968764e+01],
       [-8.48528098e+02,  2.53188689e+00],
       [-5.90155026e+03, -1.41608890e+01],
       [-4.74253516e+03, -4.99800697e+00],
       [ 7.42549740e+03,  1.94119435e+00],
       [-2.48852062e+03,  6.00963655e+00],
       [-3.77952753e+03, -4.01692642e+00],
       [-4.56852385e+03,  8.23474886e+00],
       [ 1.02584972e+04,  2.26739093e+00],
       [-1.60152764e+03, -4.07511340e+00],
       [-4.29153044e+03,  2.93181392e+00],
       [-1.25050968e+03,  1.92089284e+01],
       [ 2.46947155e+03,  1.76769874e+00],
       [ 4.19250766e+03,  1.87917509e+01],
       [ 2.61446253e+03, -7.08263165e+00],
       [ 9.69472244e+02, -1.63024561e+00],
       [ 3.77548500e+03,  9.99215240e+00],
       [-2.88552778e+03, -2.61595768e+00],
       [ 5.59347383e+03,  2.43660280e+00],
       [-1.42253505e+03, -5.49178521e+00],
       [-7.38529246e+02, -5.44197432e+00],
       [ 3.54250345e+03,  9.14657224e+00],
       [-1.16553000e+03,  4.63766285e-02],
       [-2.47051039e+03,  5.50852698e+00],
       [ 9.36478135e+02,  2.62780552e+00],
       [-4.58453258e+03,  1.00200544e+00],
       [-2.75852545e+03, -3.84380879e+00],
       [ 1.02124822e+04, -7.34494128e+00],
       [ 1.24814818e+04, -6.72646195e+00],
       [-9.95370214e+01, -1.11661271e+01],
       [-6.66525077e+02,  3.26421807e+00],
       [-2.93254055e+03, -6.61196120e+00],
       [-4.50652762e+03,  4.29898139e+00],
       [ 9.21345370e+03, -2.11173455e+01],
       [ 1.17544780e+04, -1.16054014e+00],
       [-4.05251605e+03,  7.88157513e+00],
       [ 9.08146675e+03, -6.86387295e+00],
       [ 1.71746734e+03, -7.06738971e+00],
       [-3.24514302e+02,  1.33453973e+00],
       [-2.56854159e+03, -1.00910556e+01],
```

```
       [ 4.02147592e+03, -5.33675635e-01],
       [ 1.72472209e+02, -4.48713334e+00],
       [ 3.07446773e+03, -9.59043150e-01],
       [ 3.88247000e+03, -1.04445365e+01],
       [-4.12851974e+03,  7.58499026e+00],
       [-1.90752807e+03, -4.59007459e+00],
       [-1.51152049e+03,  7.76792962e+00],
       [-2.22852934e+03, -3.04923727e+00],
       [-4.33951763e+03,  5.50271362e+00],
       [-4.88251506e+03,  3.06891636e+00],
       [-3.99953625e+03, -4.63060146e+00],
       [-4.58555326e+03, -1.68030636e+01],
       [-4.11653562e+03, -3.60995895e+00],
       [ 8.68482708e+02, -4.96908454e-02],
       [-2.83951394e+03,  5.63330956e+00],
       [-4.59154476e+03, -7.74469023e+00],
       [-4.39652826e+03, -3.09492802e+00],
       [ 1.30624837e+04, -8.80143144e+00],
       [-5.63527303e+02, -6.22081448e+00],
       [ 6.55346174e+03, -9.09623918e+00],
       [-4.51255040e+03, -1.41274679e+01],
       [-2.56553608e+03, -5.94787718e+00],
       [ 1.07394844e+04, -1.30505238e+00],
       [-2.35451241e+03,  9.29756644e+00],
       [ 2.03246754e+03, -9.53856157e+00],
       [-1.42851498e+03,  1.34502259e+01],
       [-1.56751936e+03, -3.58213238e-01],
       [ 1.05334585e+04, -1.85278147e+01],
       [-1.23351534e+03,  4.87736960e+00],
       [ 1.46946891e+03, -7.11872877e+00],
       [-1.19653452e+03, -4.88284452e+00],
       [-4.21952275e+03,  1.06366457e+00],
       [ 4.50546074e+03, -1.41967792e+01],
       [-3.27751711e+03,  9.22911866e+00],
       [ 1.92346951e+03, -4.63583613e+00],
       [ 6.36470187e+02, -6.73579678e+00],
       [-3.84252954e+03, -2.33540357e+00],
       [-4.77853373e+03, -3.67863732e+00],
       [-1.53453139e+03, -3.74683559e+00],
       [ 9.50466420e+02, -2.76079754e+00],
       [-3.83851727e+03,  9.02320851e+00],
       [ 3.73948499e+03,  9.10200658e+00],
       [-6.22525633e+02,  8.09156289e-01],
       [-3.37053116e+03, -6.82873787e+00],
       [ 7.36450663e+03,  1.35753264e+01],
       [-1.60954308e+03, -9.20736741e+00],
       [-5.82954244e+03, -5.26939696e+00],
       [-3.07753766e+03, -6.03380452e+00],
       [ 1.27905008e+04,  1.05320580e+01],
```

```
       [ 2.81447644e+03, -5.15293854e+00],
       [-1.97450492e+03,  1.67016837e+01],
       [ 1.01574834e+04, -7.13822219e+00],
       [ 3.06946847e+03, -6.54471711e+00],
       [-1.68252109e+03, -2.35184945e+00],
       [-3.96850075e+03,  2.34791917e+01],
       [-2.01050242e+03,  2.03718624e+01],
       [ 7.20749967e+03,  1.59071134e+01],
       [-4.56852908e+03,  4.11002844e+00],
       [-5.12054886e+03, -1.24546868e+01],
       [ 9.44831589e+01,  1.25317051e+01],
       [-4.47053165e+03,  1.78781038e+00],
       [-4.76752786e+03,  2.13610574e+00],
       [ 1.00746930e+03, -9.50322687e+00],
       [ 6.29548631e+03, -3.57367442e+00],
       [ 1.72250378e+03,  1.23453357e+01],
       [-2.02752830e+03, -3.65480615e+00],
       [-4.11533916e+02, -4.08529224e+00],
       [-2.62650626e+03,  1.62598581e+01],
       [-2.52953309e+03, -3.20557591e+00],
       [-2.37652381e+03,  2.59660766e+00],
       [ 1.56346999e+03, -8.94146890e+00],
       [ 3.68548035e+03,  7.44750586e+00],
       [-1.50551219e+03,  2.02329311e+01],
       [-1.82516707e+02,  1.07415649e+01],
       [-4.77852018e+03,  1.03019368e+01],
       [ 3.49517158e+02,  2.63145354e+01],
       [ 1.66748127e+03,  5.17425851e+00],
       [-4.14452477e+03,  6.33359700e+00],
       [ 3.97249058e+03,  1.70662159e+01],
       [ 3.25852469e+03,  2.05394765e+01],
       [-1.75952423e+03,  2.16156116e+00],
       [ 1.27544978e+04,  1.22713430e+00],
       [-4.08532864e+02, -2.84821009e+00],
       [-1.44352256e+03,  4.22516945e+00],
       [-4.30054731e+03, -1.42320219e+01],
       [-2.50753359e+03, -4.31303295e+00],
       [-4.82053175e+03,  2.26852223e+00],
       [-1.70049196e+03,  1.47627961e+01],
       [ 6.68046869e+03, -4.72421024e+00],
       [-4.53851444e+03,  1.12418099e+01],
       [-8.55225426e+01,  2.89284549e+00],
       [-4.87754837e+03, -1.18632393e+01],
       [ 1.31346011e+03, -9.12732442e+00],
       [-1.34852169e+03,  5.83673119e+00],
       [-4.22653490e+03,  8.52276013e-01],
       [-5.22531833e+02, -3.72818121e+00],
       [ 4.02350673e+03,  1.79657934e+01],
       [ 3.90948228e+03,  2.13297717e+00],
```

```
       [-4.31751780e+03,  8.21002548e+00],
       [-4.79153186e+03, -4.27815790e+00],
       [-2.57552912e+03, -5.26756867e+00],
       [-3.88853112e+03,  1.58861749e+00],
       [ 1.12614897e+04,  3.32192048e+00],
       [-2.26154129e+03, -9.08349152e+00],
       [ 6.54747382e+03, -1.08076636e+01],
       [ 9.84550043e+03,  1.10916520e+01],
       [ 5.57948596e+03,  6.53019330e+00],
       [-4.29752637e+03, -2.50451331e+00],
       [ 1.18004773e+04, -9.86782942e-01],
       [-1.84349785e+03,  1.47060394e+01],
       [-4.40954313e+03, -6.13818411e+00],
       [-4.80552209e+03,  1.14316877e+01],
       [-4.53851959e+03,  1.88096806e+01],
       [ 1.26344869e+04, -7.34991031e+00],
       [-3.12553836e+03, -7.47146482e+00],
       [-3.68949340e+03,  1.97386198e+01],
       [-4.07353362e+03, -3.13927468e+00],
       [ 1.21384875e+04, -4.27727761e+00],
       [-4.06652598e+03,  2.87572256e+00],
       [-4.63653208e+03,  6.69054193e+00],
       [ 3.61649172e+03,  8.96712521e+00],
       [-3.97853336e+03, -1.58244249e+00],
       [-5.25504138e+02,  1.80901140e+01],
       [-3.91655350e+03, -1.75732017e+01],
       [-7.48530475e+02, -5.65750304e+00],
       [-2.93552001e+03,  5.07300812e+00],
       [-1.70152734e+03, -5.24898969e+00],
       [-4.65151626e+03,  1.45397996e+01],
       [ 9.88148884e+03, -1.06711574e+00],
       [-4.19052730e+03, -3.53546443e+00],
       [-2.29550018e+03,  1.38325557e+01],
       [-1.90752906e+03,  2.81501592e+00],
       [-3.77053014e+03,  3.59395044e+00],
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       [ 5.73503058e+02,  1.61928102e+01],
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       [-4.15452776e+03, -9.76542250e-01]])
```
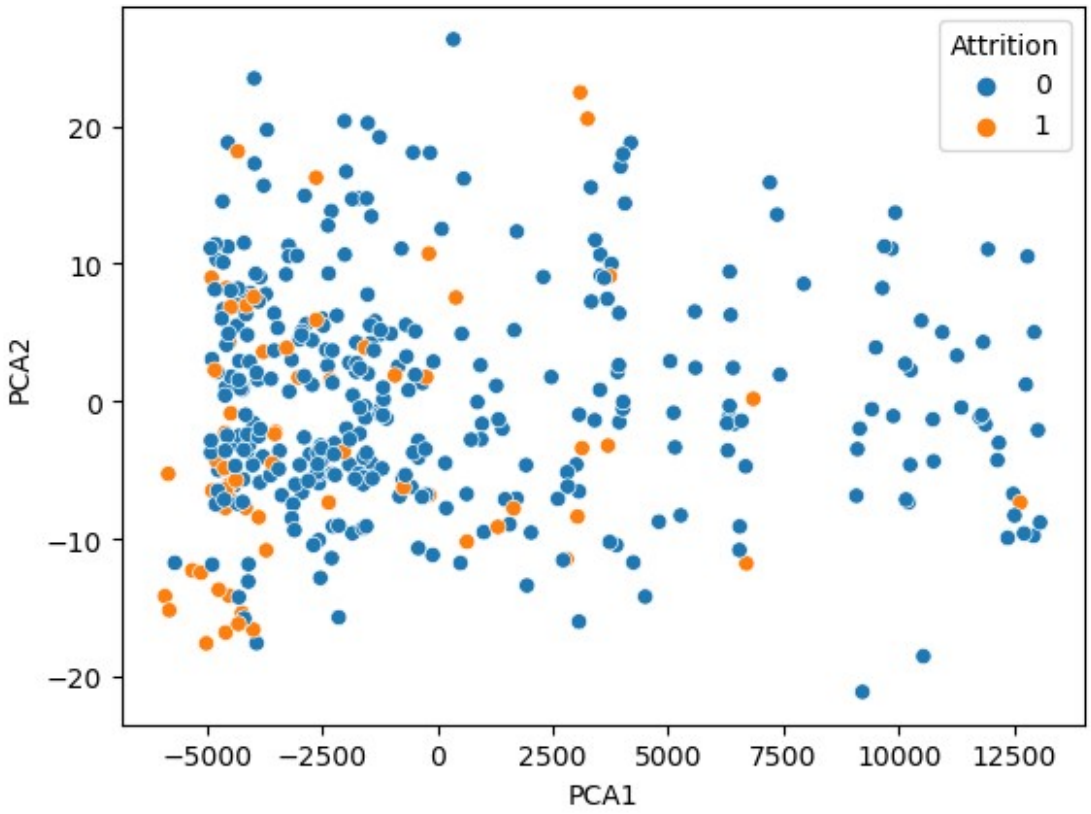

```
Scatter = pd.DataFrame({"PCA1": EmpleadosAttritionPCA[:,0],"PCA2":
EmpleadosAttritionPCA[:,1], "Attrition" :
EmpleadosAttritionFinal["Attrition"] })
sns.scatterplot(data = Scatter, x ="PCA1", y = "PCA2", hue =
"Attrition")
```

```
<Axes: xlabel='PCA1', ylabel='PCA2'>
```




```
EmpleadosAttritionFinal.to_csv("EmpleadosAttritionFinal.csv",
index=False)
```