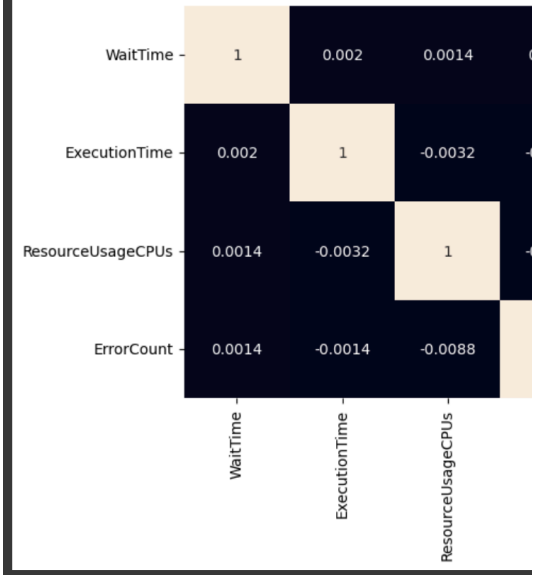
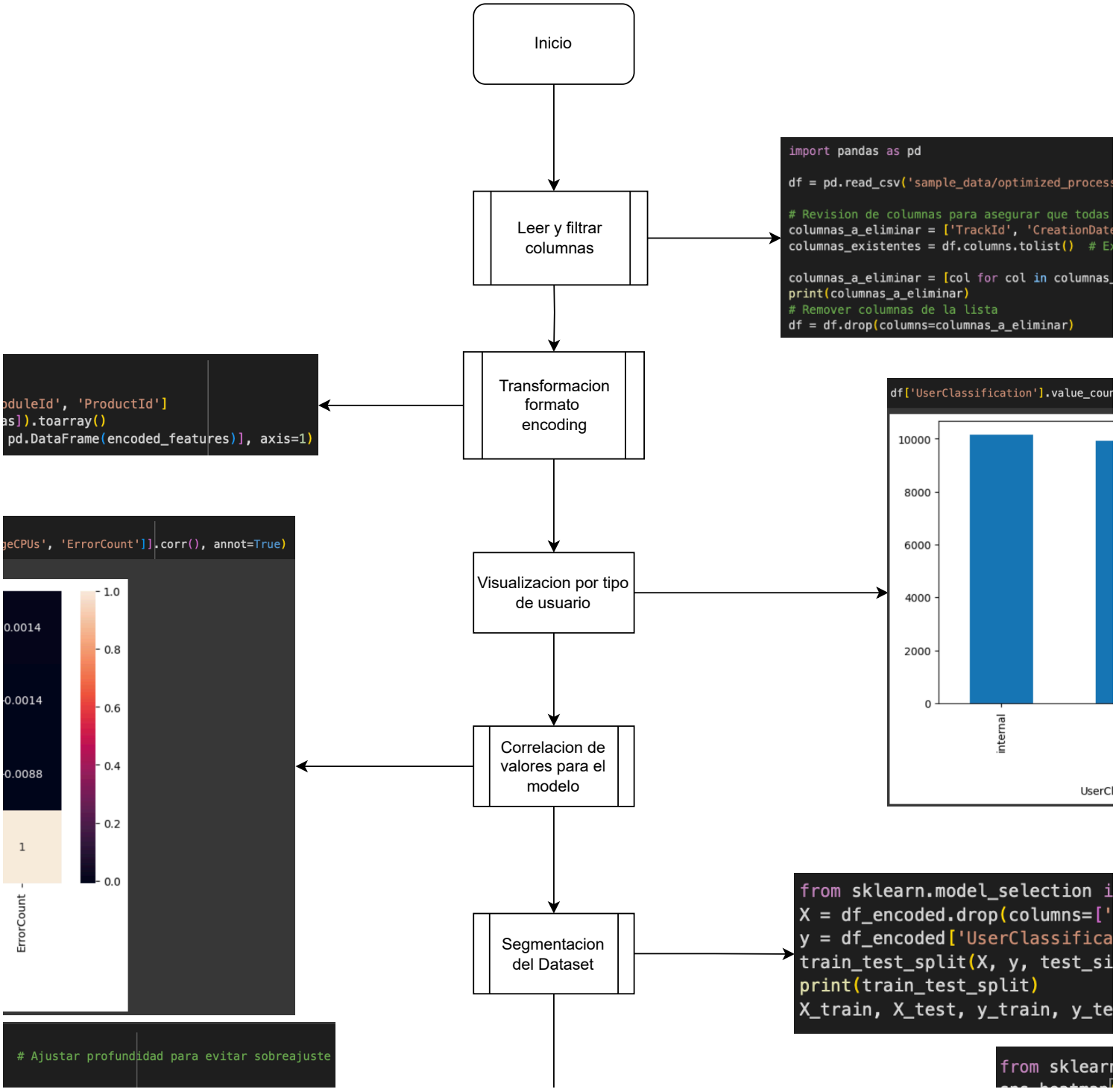
```python
from sklearn.preprocessing import OneHotEncoder
encoder = OneHotEncoder(drop='first')
categoricas = ['ProcessType', 'TransactionHealth', 'Mo
encoded_features = encoder.fit_transform(df[categorica
df_encoded = pd.concat([df.drop(columns=categoricas),
```

```python
import seaborn as sns
sns.heatmap(df[['WaitTime', 'ExecutionTime', 'ResourceUsag
```

```
<Axes: >
```

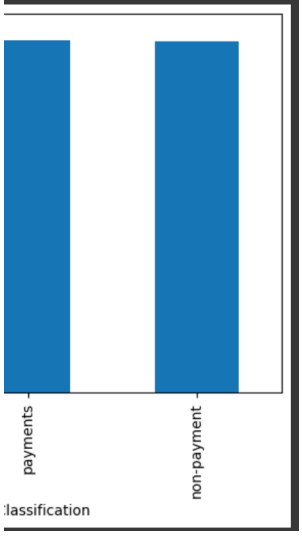



```python
from sklearn.tree import DecisionTreeClassifier
modelo = DecisionTreeClassifier(max_depth=5, random_state=42)
modelo.fit(X_train, y_train)
```


Inicio
Leer y filtrar columnas
Transformacion formato encoding
Visualizacion por tipo de usuario
Correlacion de valores para el modelo
Segmentacion del Dataset
import pandas as pd
df = pd.read_csv('sample_data/optimized_proces
# Revision de columnas para asegurar que todas
columnas_a_eliminar = ['TrackId', 'CreationDat
columnas_existentes = df.columns.tolist()
columnas_a_eliminar = [col for col in columnas_
print(columnas_a_eliminar)
# Remover columnas de la lista
df = df.drop(columns=columnas_a_eliminar)
oduleId', 'ProductId']
as]).toarray()
pd.DataFrame(encoded_features)], axis=1)
df['UserClassification'].value_cour
10000
8000
6000
4000
2000
0
internal
UserCl
geCPUs', 'ErrorCount']].corr(), annot=True)
0.0014
0.0014
0.0088
1
ErrorCount
1.0
0.8
0.6
0.4
0.2
0.0
from sklearn.model_selection i
X = df_encoded.drop(columns=['
y = df_encoded['UserClassifica
train_test_split(X, y, test_si
print(train_test_split)
X_train, X_test, y_train, y_te
Ajustar profundidad para evitar sobreajuste
from sklearn

```
ses_dataset_trans.csv')

 existan
e', 'StartDate', 'EndDate', 'UserId', 'UserName', 'UserClientName'] # Innecesarias para el arbol
xtraccion de nombres de columnas

_a_eliminar if col in columnas_existentes]  # Filter out non-existent columns
```

```
nts().plot(kind='bar')
```




```
import train_test_split
UserClassification'])
tion']
ze=0.2, random_state=42)

st = train_test_split(X, y, test_size=0.2, random_state=42) # Principio 80% y 20%
```

```
n.metrics import confusion_matrix
```

```
DecisionTreeClassifier(max_depth=5, random_state=42)
```

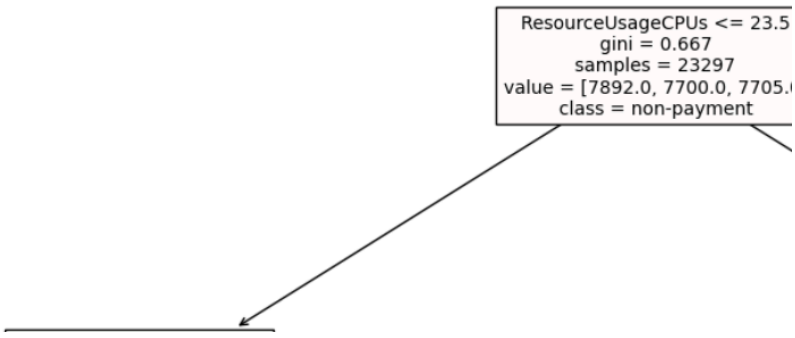
```
from sklearn.metrics import accuracy_score
y_pred = modelo.predict(X_test)
print(f'Precisión: {accuracy_score(y_test, y_pred):.2f}')
```

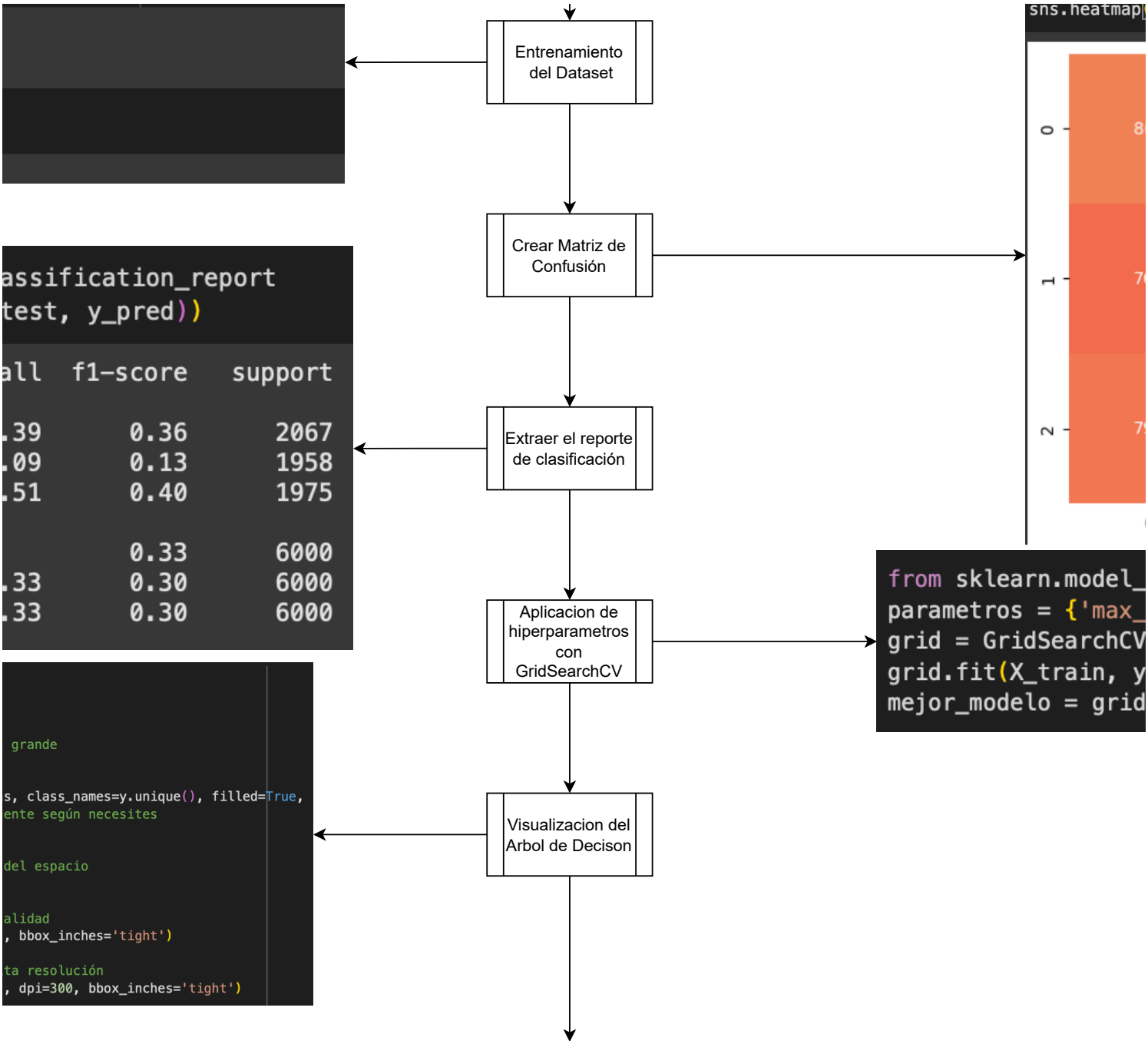
```
Precisión: 0.33
```

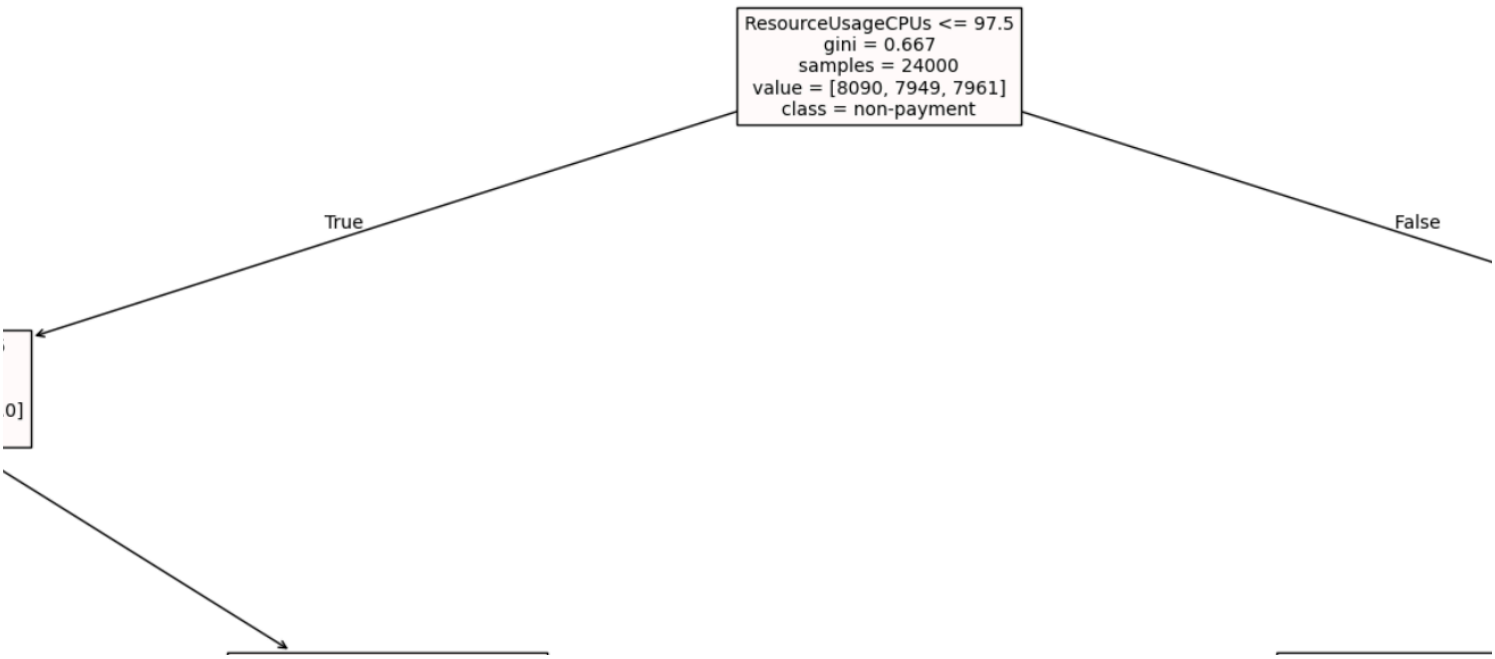
```
from sklearn.metrics import cla
print(classification_report(y_t
```

	precision	reca
internal	0.34	0.
non-payment	0.29	0.
payments	0.33	0.
accuracy		
macro avg	0.32	0.
weighted avg	0.32	0.

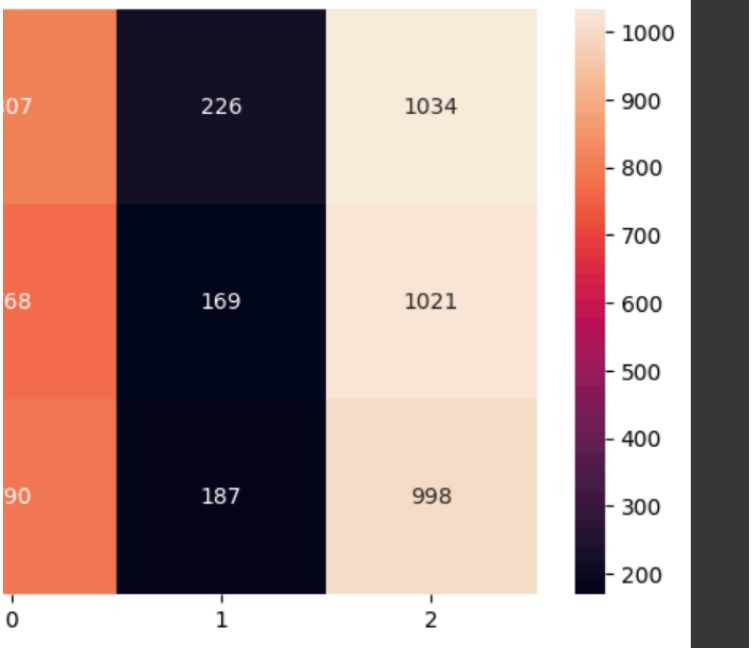
```
from sklearn.tree import plot_tree
import matplotlib.pyplot as plt

# Aumentar el tamaño de la figura
plt.figure(figsize=(30, 15))  # Tamaño aún más

# Guardar en formato SVG para mejor zoom
plot_tree(mejor_modelo, feature_names=X.columns
          fontsize=10)  # Ajustar tamaño de fu

# Mostrar la figura
plt.tight_layout()  # Para mejor distribución
plt.show()

# Guardar como archivo SVG para zoom de alta c
plt.savefig('arbol_decision.svg', format='svg'

# Opcionalmente también guardar como PNG de al
plt.savefig('arbol_decision.png', format='png'
```



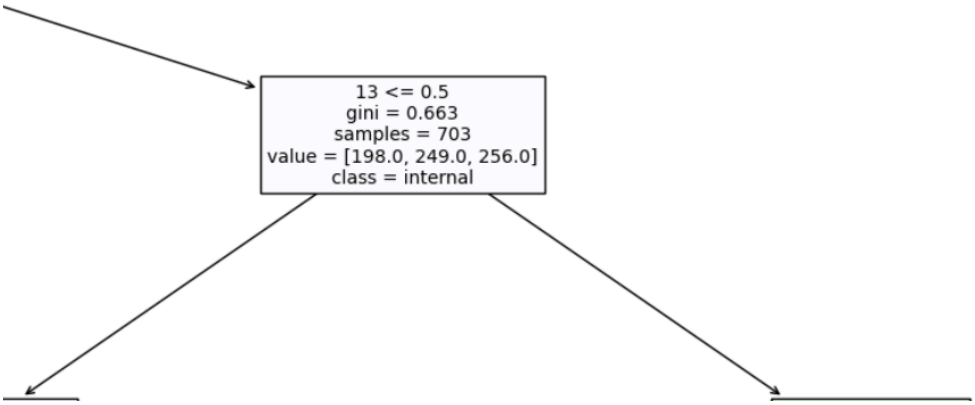

Entrenamiento del Dataset
Crear Matriz de Confusión
Extraer el reporte de clasificación
Aplicacion de hiperparametros con GridSearchCV
Visualizacion del Arbol de Decison
sns.heatmap
assification_report
test, y_pred))
all f1-score support
.39 0.36 2067
.09 0.13 1958
.51 0.40 1975
0.33 6000
.33 0.30 6000
.33 0.30 6000
from sklearn.model_
parametros = {'max_
grid = GridSearchCV
grid.fit(X_train, y
mejor_modelo = grid
grande
s, class_names=y.unique(), filled=True,
ente según necesites
del espacio
alidad
, bbox_inches='tight')
ta resolución
, dpi=300, bbox_inches='tight')

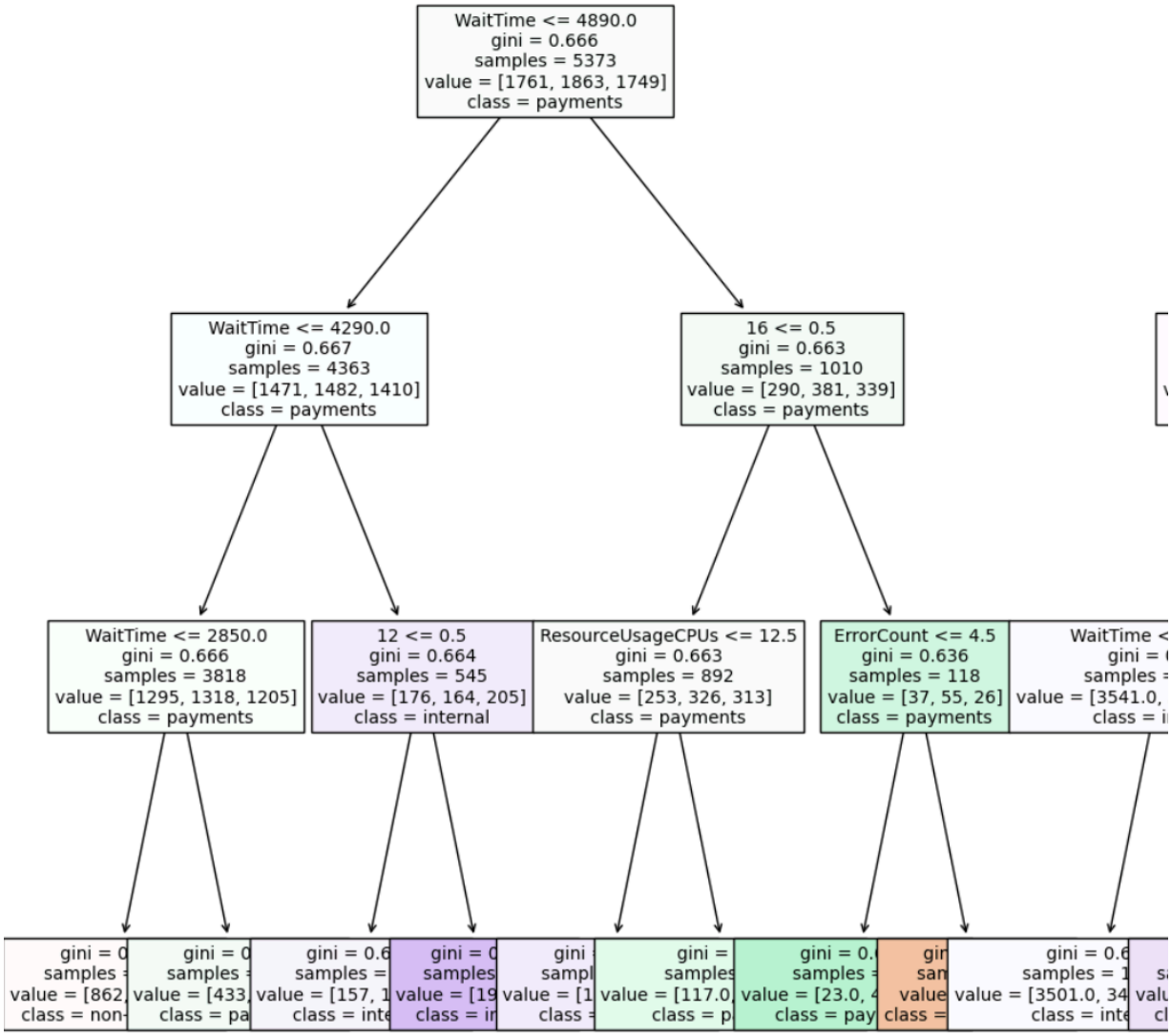

ResourceUsageCPUs <= 97.5
gini = 0.667
samples = 24000
value = [8090, 7949, 7961]
class = non-payment
True
False

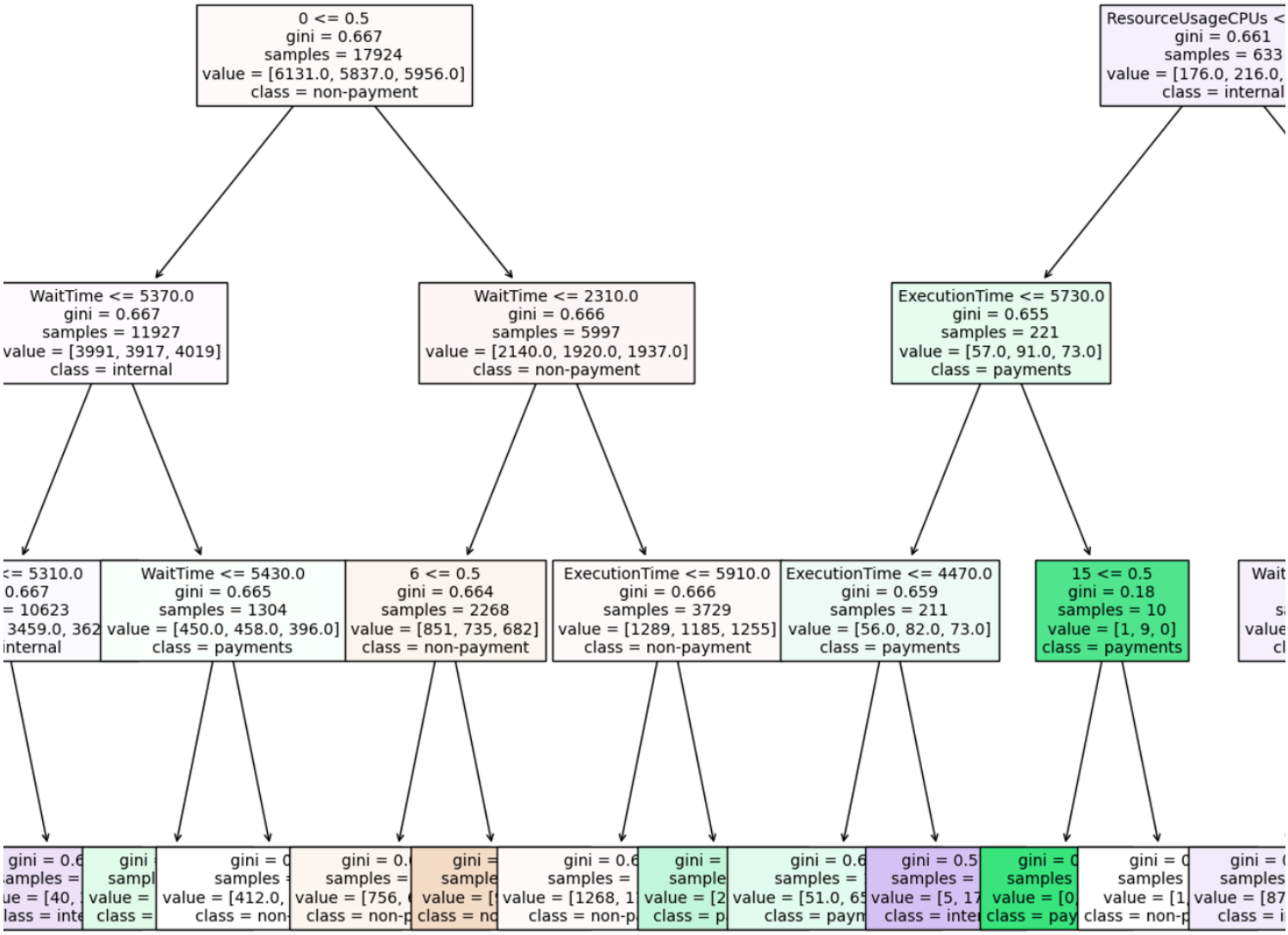
```
(confusion_matrix(y_test, y_pred), annot=True, fmt='d')
```

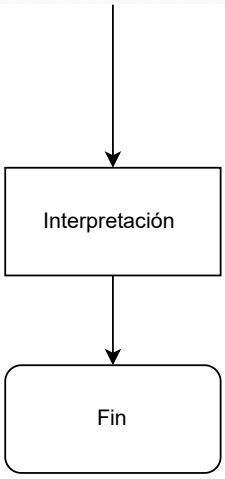


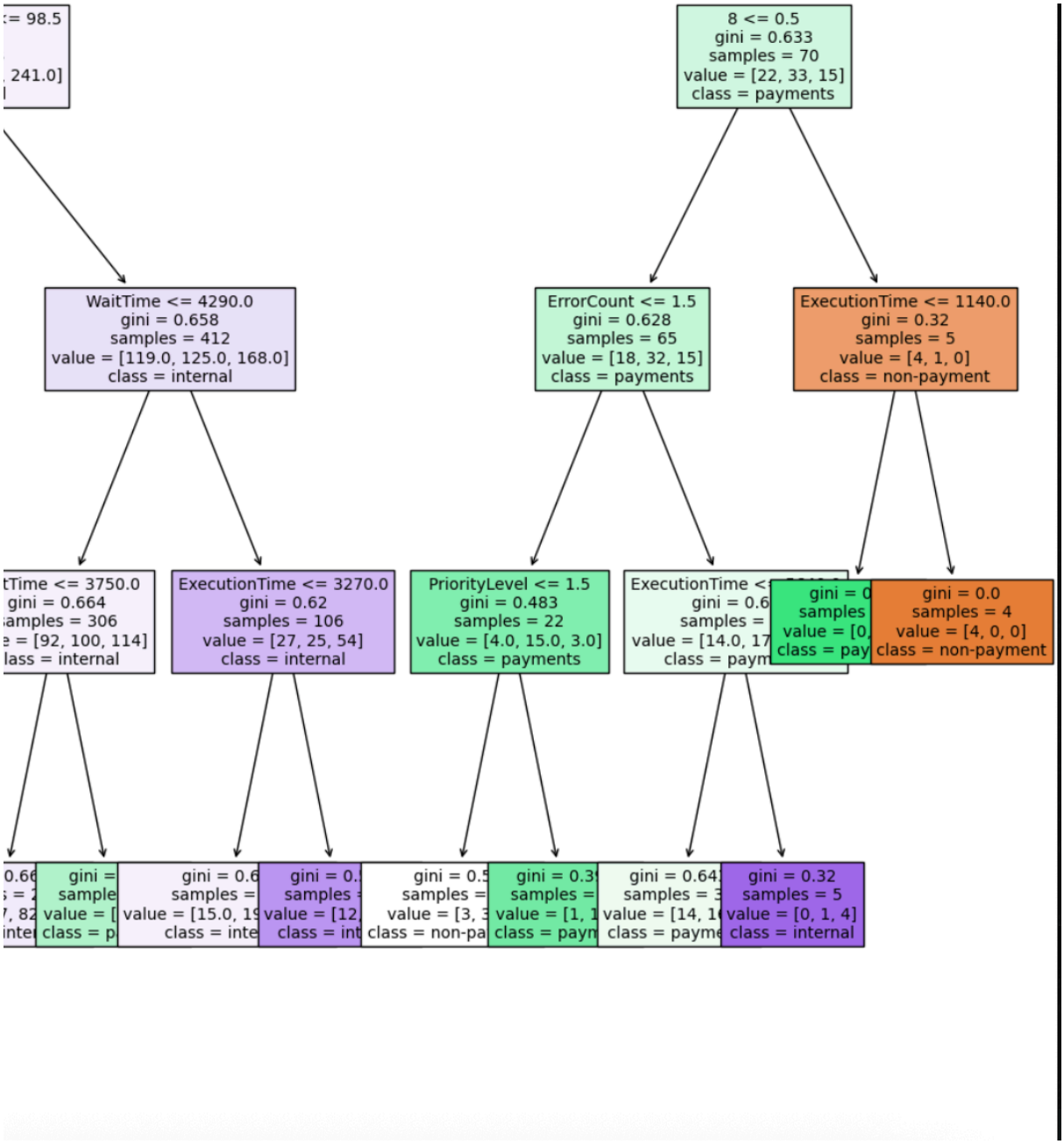

```
selection import GridSearchCV
depth': [3, 5, 7], 'min_samples_split': [2, 5, 10]}
(DecisionTreeClassifier(), parametros, cv=5)
_train)
.best_estimator_
```

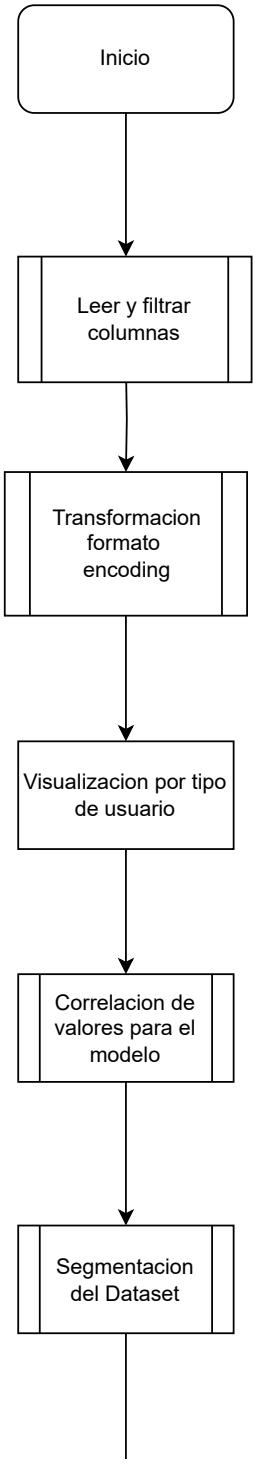



WaitTime <= 4890.0
gini = 0.666
samples = 5373
value = [1761, 1863, 1749]
class = payments
WaitTime <= 4290.0
gini = 0.667
samples = 4363
value = [1471, 1482, 1410]
class = payments
16 <= 0.5
gini = 0.663
samples = 1010
value = [290, 381, 339]
class = payments
WaitTime <= 2850.0
gini = 0.666
samples = 3818
value = [1295, 1318, 1205]
class = payments
12 <= 0.5
gini = 0.664
samples = 545
value = [176, 164, 205]
class = internal
ResourceUsageCPUs <= 12.5
gini = 0.663
samples = 892
value = [253, 326, 313]
class = payments
ErrorCount <= 4.5
gini = 0.636
samples = 118
value = [37, 55, 26]
class = payments


0 <= 0.5
gini = 0.667
samples = 17924
value = [6131.0, 5837.0, 5956.0]
class = non-payment
ResourceUsageCPUs <
gini = 0.661
samples = 633
value = [176.0, 216.0,
class = internal
WaitTime <= 5370.0
gini = 0.667
samples = 11927
value = [3991, 3917, 4019]
class = internal
WaitTime <= 2310.0
gini = 0.666
samples = 5997
value = [2140.0, 1920.0, 1937.0]
class = non-payment
ExecutionTime <= 5730.0
gini = 0.655
samples = 221
value = [57.0, 91.0, 73.0]
class = payments
<= 5310.0
0.667
= 10623
3459.0, 362
internal
WaitTime <= 5430.0
gini = 0.665
samples = 1304
value = [450.0, 458.0, 396.0]
class = payments
6 <= 0.5
gini = 0.664
samples = 2268
value = [851, 735, 682]
class = non-payment
ExecutionTime <= 5910.0
gini = 0.666
samples = 3729
value = [1289, 1185, 1255]
class = non-payment
ExecutionTime <= 4470.0
gini = 0.659
samples = 211
value = [56.0, 82.0, 73.0]
class = payments
15 <= 0.5
gini = 0.18
samples = 10
value = [1, 9, 0]
class = payments
Wait
value
cl


Interpretación
Fin


= 98.5
241.0]
8 <= 0.5
gini = 0.633
samples = 70
value = [22, 33, 15]
class = payments
WaitTime <= 4290.0
gini = 0.658
samples = 412
value = [119.0, 125.0, 168.0]
class = internal
ErrorCount <= 1.5
gini = 0.628
samples = 65
value = [18, 32, 15]
class = payments
ExecutionTime <= 1140.0
gini = 0.32
samples = 5
value = [4, 1, 0]
class = non-payment
tTime <= 3750.0
gini = 0.664
amples = 306
e = [92, 100, 114]
lass = internal
ExecutionTime <= 3270.0
gini = 0.62
samples = 106
value = [27, 25, 54]
class = internal
PriorityLevel <= 1.5
gini = 0.483
samples = 22
value = [4.0, 15.0, 3.0]
class = payments
gini = 0.0
samples = 4
value = [4, 0, 0]
class = non-payment
gini = 0.32
samples = 5
value = [0, 1, 4]
class = internal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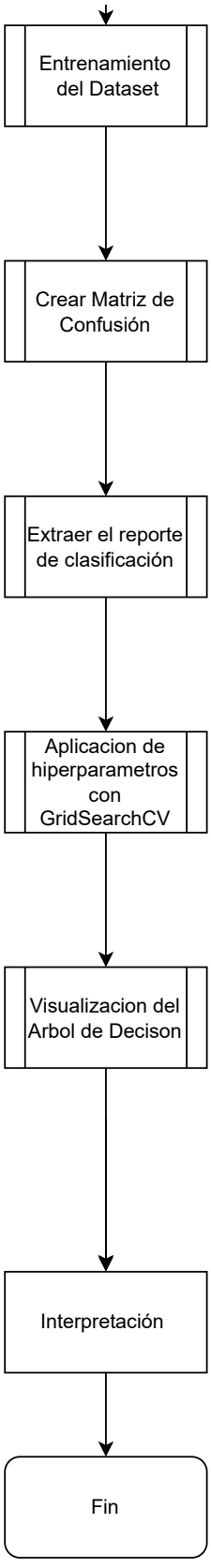
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