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import pandas as pd
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import classification_report, confusion_matrix,
roc_auc_score, roc_curve

# Cargar el dataset (ajusta el path si lo necesitas)
df = pd.read_csv("cs-training.csv", sep=';')

# Limpiar nombres de columnas (eliminar espacios)
df.columns = df.columns.str.strip()

# Rellenar nulos de forma segura (sin warnings)
df['MonthlyIncome'] =
df['MonthlyIncome'].fillna(df['MonthlyIncome'].median())
df['NumberOfDependents'] = df['NumberOfDependents'].fillna(0)

# Separar variables predictoras y variable objetivo
X = df.drop(['SeriousDlqin2yrs', 'Unnamed: 0'], axis=1)
y = df['SeriousDlqin2yrs']

# Dividir los datos
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2,
random_state=42)

# Entrenar modelo Random Forest
model = RandomForestClassifier(n_estimators=100, random_state=42)
model.fit(X_train, y_train)

# Predicciones
y_pred = model.predict(X_test)
y_prob = model.predict_proba(X_test)[:, 1]

# Evaluación
print("Matriz de Confusión:\n", confusion_matrix(y_test, y_pred))
print("\nReporte de Clasificación:\n", classification_report(y_test, y_pred))
auc = roc_auc_score(y_test, y_prob)
print(f"AUC: {auc:.4f}")

# Gráfica ROC
fpr, tpr, _ = roc_curve(y_test, y_prob)
plt.figure(figsize=(8,6))
plt.plot(fpr, tpr, label=f"AUC = {auc:.4f}")
plt.plot([0,1], [0,1], 'k--')
plt.xlabel("Falsos Positivos")
plt.ylabel("Verdaderos Positivos")
plt.title("Curva ROC - Random Forest")
plt.legend()
plt.grid()
plt.show()

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