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# Import libraries
import pandas as pd
import numpy as np
import seaborn as sns
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import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.tree import DecisionTreeClassifier
from sklearn.metrics import accuracy_score, classification_report

# Load dataset
data = pd.read_csv('/content/CompanySupplyChainDataset.csv', encoding='ISO-8859')

# Map 'Delivery Status' column to numeric values
data['Delivery Status'] = data['Delivery Status'].map({
    'Late delivery': 1,
    'Advance shipping': -1,
    'Shipping on time': 0,
    'Shipping canceled': -2
})

# Define features and target variable
X = data[['Days for shipping (real)', 'Days for shipment (scheduled)', 'Delivery Status']]
y = data['Late_delivery_risk']

# Split data into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_state=42)

# Train a Decision Tree Classifier
model = DecisionTreeClassifier(random_state=42)
model.fit(X_train, y_train)

# Predict on test set
y_pred = model.predict(X_test)

# Evaluate model
accuracy = accuracy_score(y_test, y_pred)
print("Model Accuracy:", accuracy)
print(classification_report(y_test, y_pred))

# Visualization 1: Distribution of Days for Shipping vs. Late Delivery Risk
plt.figure(figsize=(8, 6))
sns.histplot(data, x='Days for shipping (real)', hue='Late_delivery_risk', kde=True)
plt.title('Days for Shipping (Real) vs Late Delivery Risk')
plt.show()

# Visualization 2: Scatter Plot of Days Scheduled vs. Real Days with Late Delivery Risk
plt.figure(figsize=(10, 6))
sns.scatterplot(data=data, x='Days for shipment (scheduled)', y='Days for shipping (real)', hue='Late_delivery_risk')
plt.title('Days Scheduled vs Real Days with Late Delivery Risk')
plt.show()

# Visualization 3: Delivery Status and Late Delivery Risk
plt.figure(figsize=(8, 6))
sns.countplot(data=data, x='Delivery Status', hue='Late_delivery_risk')
plt.title('Delivery Status vs Late Delivery Risk')
plt.show()
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Model Accuracy: 1.0

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	precision	recall	f1-score	support
0	1.00	1.00	1.00	2285
1	1.00	1.00	1.00	2491
accuracy			1.00	4776
macro avg	1.00	1.00	1.00	4776
weighted avg	1.00	1.00	1.00	4776





