Attrition_Analysis_Corrected

April 29, 2024

[1]:
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import pandas as pd
import numpy as np
from sklearn.model_selection import train_test_split
from sklearn.tree import DecisionTreeClassifier
from sklearn.metrics import confusion_matrix, accuracy_score, recall_score,␣
↪precision_score, roc_curve, roc_auc_score, r2_score
import matplotlib.pyplot as plt
import seaborn as sns

# Load the dataset
data = pd.read_csv('general_data.csv')
```

[2]:
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# Cleaning data
data_cleaned = data.drop(['EmployeeCount', 'EmployeeID', 'Over18',␣
↪'StandardHours'], axis=1)
data_cleaned['NumCompaniesWorked'].fillna(data_cleaned['NumCompaniesWorked'].
↪median(), inplace=True)
data_cleaned['TotalWorkingYears'].fillna(data_cleaned['TotalWorkingYears'].
↪median(), inplace=True)

# Encoding categorical variables
data_encoded = pd.get_dummies(data_cleaned, drop_first=True)
```

[3]:
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# Splitting the dataset
X = data_encoded.drop('Attrition_Yes', axis=1)
y = data_encoded['Attrition_Yes']
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3,␣
↪random_state=42)
```

[4]:
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# Training the Decision Tree model
dt_classifier = DecisionTreeClassifier(random_state=42)
dt_classifier.fit(X_train, y_train)

# Predicting and evaluating the model
y_pred = dt_classifier.predict(X_test)
conf_matrix = confusion_matrix(y_test, y_pred)
accuracy = accuracy_score(y_test, y_pred)
```

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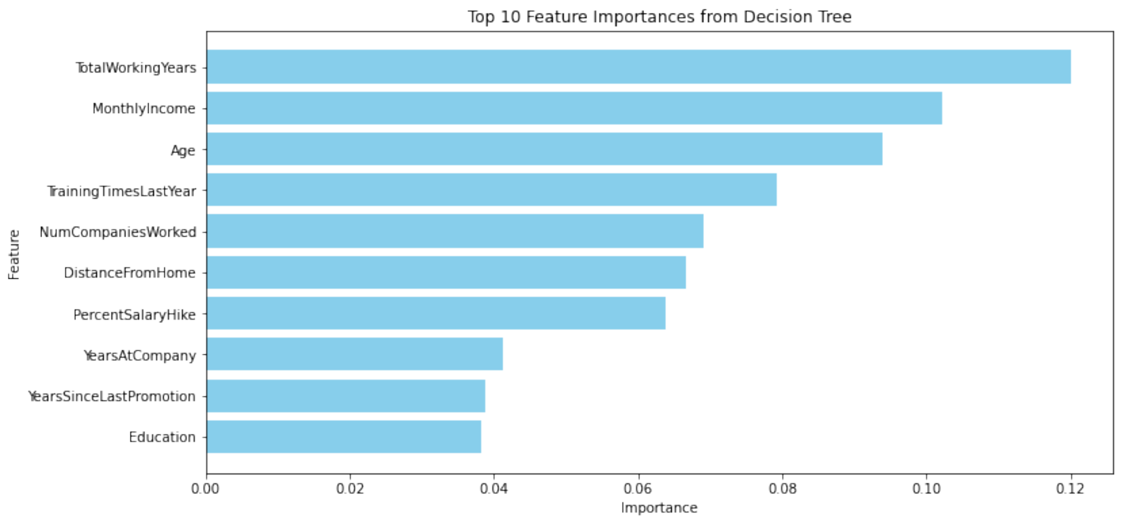
recall = recall_score(y_test, y_pred)
precision = precision_score(y_test, y_pred)
fpr, tpr, thresholds = roc_curve(y_test, dt_classifier.predict_proba(X_test)[:,␣
↪1])
roc_auc = roc_auc_score(y_test, y_pred)
r_squared = r2_score(y_test, y_pred)
```

[5]:
```
# Visualization of Feature Importances
feature_importances = dt_classifier.feature_importances_
features = X.columns
importance_df = pd.DataFrame({'Feature': features, 'Importance':␣
↪feature_importances})
importance_df = importance_df.sort_values(by='Importance', ascending=False).
↪head(10)
plt.figure(figsize=(12, 6))
plt.barh(importance_df['Feature'], importance_df['Importance'], color='skyblue')
plt.xlabel('Importance')
plt.ylabel('Feature')
plt.title('Top 10 Feature Importances from Decision Tree')
plt.gca().invert_yaxis()
plt.show()
```



[6]:
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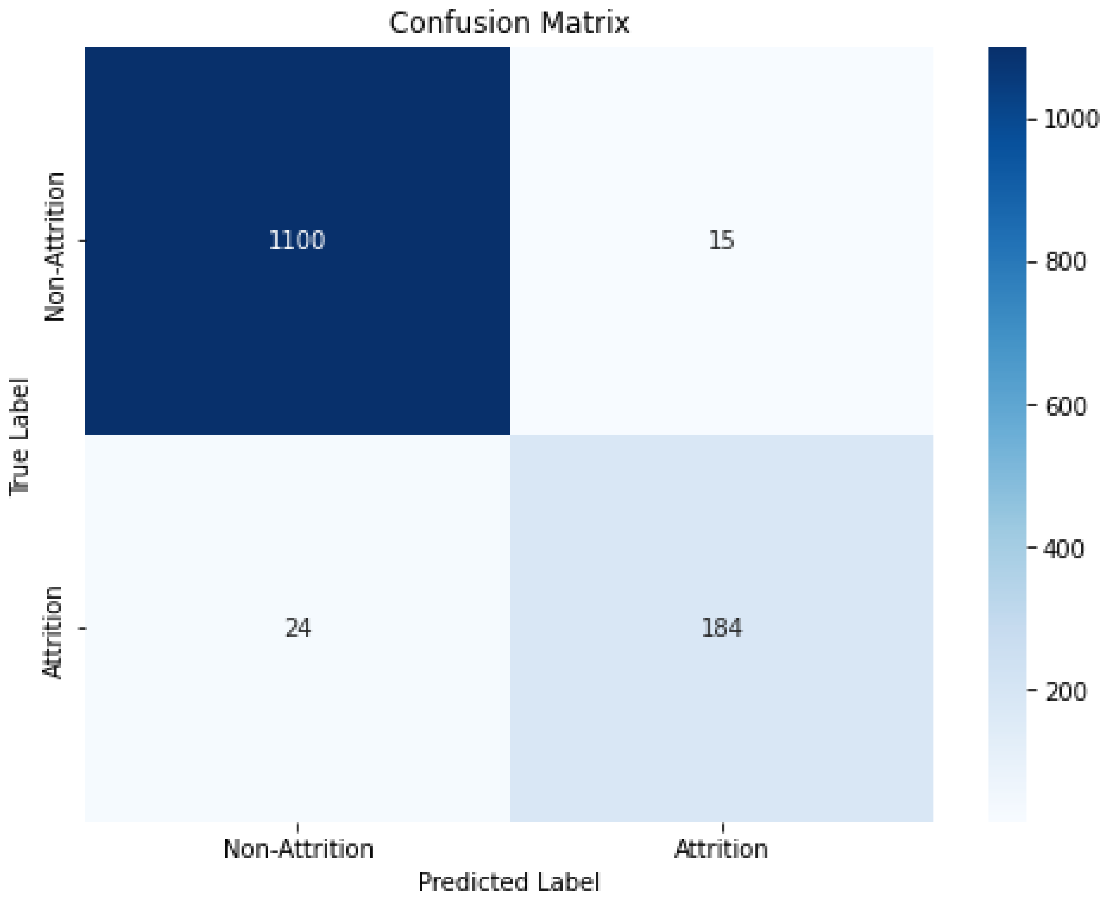
# Visualization of Confusion Matrix
plt.figure(figsize=(8, 6))
sns.heatmap(conf_matrix, annot=True, fmt='d', cmap='Blues',␣
↪xticklabels=['Non-Attrition', 'Attrition'], yticklabels=['Non-Attrition',␣
↪'Attrition'])
plt.xlabel('Predicted Label')
plt.ylabel('True Label')
plt.title('Confusion Matrix')
plt.show()
```



[7]:
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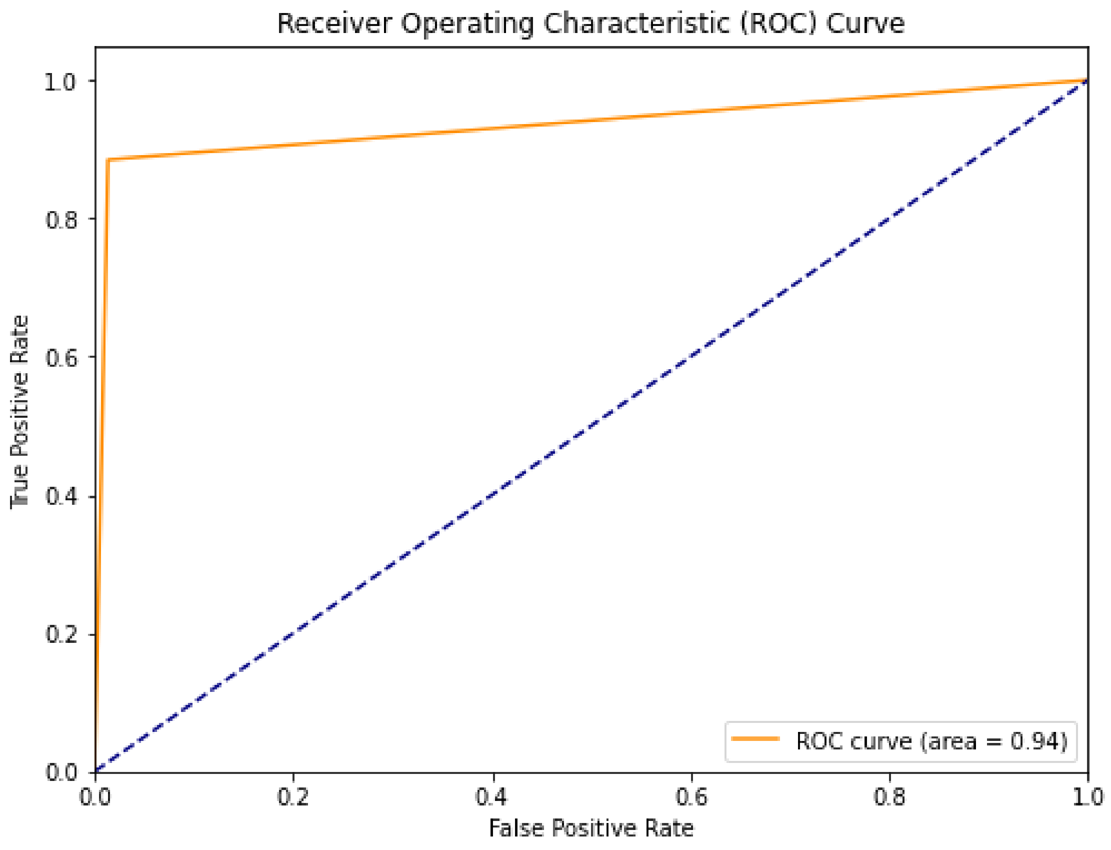
# Visualization of ROC Curve
plt.figure(figsize=(8, 6))
plt.plot(fpr, tpr, color='darkorange', label=f'ROC curve (area = {roc_auc:.
 ↪2f})')
plt.plot([0, 1], [0, 1], color='navy', linestyle='--')
plt.xlim([0.0, 1.0])
plt.ylim([0.0, 1.05])
plt.xlabel('False Positive Rate')
plt.ylabel('True Positive Rate')
plt.title('Receiver Operating Characteristic (ROC) Curve')
plt.legend(loc="lower right")
plt.show()
```


Receiver Operating Characteristic (ROC) Curve
True Positive Rate
False Positive Rate
0.0
0.2
0.4
0.6
0.8
1.0
ROC curve (area = 0.94)