Assessment Report

on

“Student Performance Prediction”

submitted as partial fulfillment for the award of

BACHELOR OF TECHNOLOGY DEGREE

SESSION 2024-25

in

CSE(AIML)

By

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Introduction

In today’s education system, identifying students at risk of failing is crucial. Various factors such as attendance, study habits, parental support, and previous academic performance play a vital role in predicting student success. This project focuses on building a machine learning model that uses these factors to classify students into "Pass" or "Fail" categories. Such prediction systems can help in timely intervention to support students in need.

Objective:

To develop a classification model that predicts whether a student will pass or fail based on attendance, previous scores, and study habits.

Methodology

Data Preprocessing

- Loaded and cleaned the dataset provided in CSV format.
- Converted the GPA into a binary target variable:
  - 1 → Pass (GPA $\geq$ 2.0)
  - 0 → Fail (GPA $<$ 2.0)

Feature Selection

- Dropped irrelevant features such as StudentID, GPA, and GradeClass.
- Retained features related to demographics, study behavior, attendance, and parental support.

Model Used

- Used a Random Forest Classifier, which is an ensemble model known for its robustness and high accuracy.
- Model was trained using an 80-20 train-test split.

Evaluation

- Accuracy, Precision, and Recall metrics were calculated.
- A confusion matrix was plotted to visualize prediction performance.

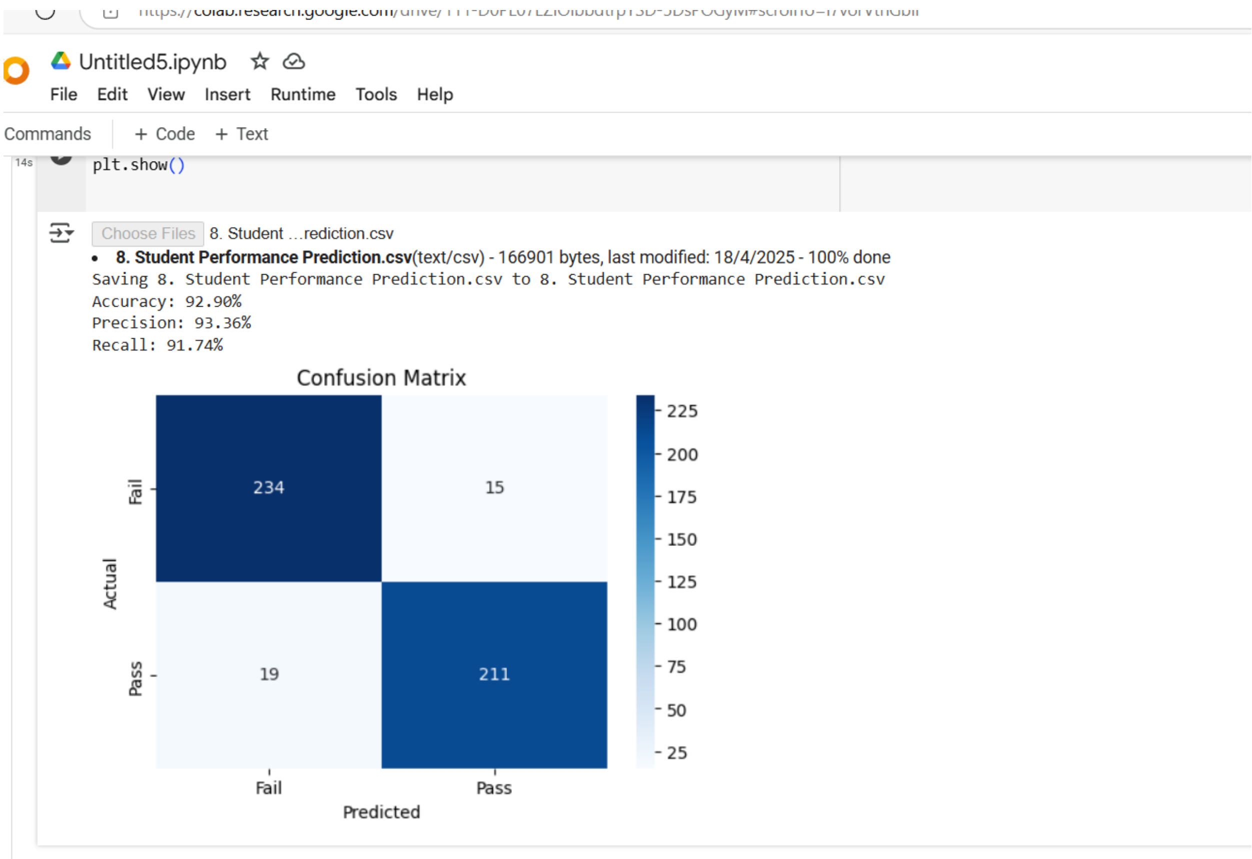
CODE

```
# Upload CSV file
# from google.colab import files
# uploaded = files.upload()

# # Import libraries
# import pandas as pd
# import seaborn as sns
# import matplotlib.pyplot as plt
# from sklearn.model_selection import train_test_split
# from sklearn.ensemble import RandomForestClassifier
# from sklearn.metrics import confusion_matrix, accuracy_score,
precision_score, recall_score

# # Load dataset
# df = pd.read_csv("8. Student Performance Prediction.csv")  # Replace
with your filename if different

# # Create binary target variable: Pass = 1 if GPA >= 2.0, else 0
# df['Pass'] = (df['GPA'] >= 2.0).astype(int)

# # Select features and target
# X = df.drop(columns=['StudentID', 'GPA', 'GradeClass', 'Pass'])
# y = df['Pass']

# # Train-test split
# X_train, X_test, y_train, y_test = train_test_split(X, y,
test_size=0.2, random_state=42)

# # Train model
# model = RandomForestClassifier(random_state=42)
# model.fit(X_train, y_train)

# # Make predictions
# y_pred = model.predict(X_test)
# # Evaluation metrics
# accuracy = accuracy_score(y_test, y_pred)
# precision = precision_score(y_test, y_pred)
# recall = recall_score(y_test, y_pred)
# cm = confusion_matrix(y_test, y_pred)

# # Print metrics
# print(f"Accuracy: {accuracy * 100:.2f}%")
# print(f"Precision: {precision * 100:.2f}%")
# print(f"Recall: {recall * 100:.2f}%")

# # Plot confusion matrix heatmap
# plt.figure(figsize=(6, 4))
# sns.heatmap(cm, annot=True, fmt='d', cmap='Blues',
xticklabels=["Fail", "Pass"], yticklabels=["Fail", "Pass"])
# plt.xlabel("Predicted")
# plt.ylabel("Actual")
# plt.title("Confusion Matrix")
# plt.show()
```

Output/Result

- **Model Accuracy:** 92.90%
- **Precision:** 93.36%
- **Recall:** 91.74%

□ *Confusion Matrix Heatmap:*



```
plt.show()
```

- **8. Student Performance Prediction.csv**(text/csv) - 166901 bytes, last modified: 18/4/2025 - 100% done

```
Saving 8. Student Performance Prediction.csv to 8. Student Performance Prediction.csv
Accuracy: 92.90%
Precision: 93.36%
Recall: 91.74%
```