KIET
GROUP OF INSTITUTIONS
Connecting Life with Learning

Assesment Report

on

“Problem Statement”

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In

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🎓 **Student Performance Prediction using Machine Learning**

📘 Introduction

The aim of this project is to predict whether a student will **pass or fail** (or which grade/class they will be in) using **machine learning algorithms**. The dataset includes student-related features such as attendance, study habits, previous scores, and demographic details.

By analyzing this data, we can **identify students at risk** early and offer them support.

🛠️ Methodology

1. Dataset Upload

- Dataset used: 8. Student Performance Prediction.csv
- Source: UCI Machine Learning Repository

2. Data Preprocessing

- Handled missing values (if any)
- Encoded categorical data using LabelEncoder
- Normalized dataset to make it model-ready

3. Feature & Target

- Features: All columns related to student behavior and academics
- Target: GradeClass (Can be changed to Result if applicable)

4. Train-Test Split

train_test_split(X, y, test_size=0.2, random_state=42)

5. Model Used

- **Random Forest Classifier**
- Reason: Works well with mixed data and avoids overfitting

6. Evaluation Metrics

Used:

- Accuracy
- Precision
- Recall
- Classification Report
- Graph: Actual vs Predicted values

💻 **Code**

```
from google.colab import files

uploaded = files.upload()

import pandas as pd


filename = list(uploaded.keys())[0]

df = pd.read_csv(filename)


print(" 🔹 First 5 rows of data:")

print(df.head())

from sklearn.preprocessing import LabelEncoder
```

```
df_clean = df.copy()
for column in df_clean.columns:
    if df_clean[column].dtype == 'object':
        le = LabelEncoder()
        df_clean[column] = le.fit_transform(df_clean[column])

print("\n 🔹 Cleaned dataset:")
print(df_clean.head())

# CHANGE THIS if your target column is named differently
target_column = 'GradeClass'  # example: 'Result', 'GPA', etc.
if target_column not in df_clean.columns:
    raise ValueError(" ❌ Target column not found. Please update 'target_column' variable!")

X = df_clean.drop(columns=[target_column])
y = df_clean[target_column]

from sklearn.model_selection import train_test_split

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

# Step 6: Train a model
from sklearn.ensemble import RandomForestClassifier

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

# Step 7: Make predictions and evaluate
from sklearn.metrics import accuracy_score, precision_score, recall_score, classification_report

y_pred = model.predict(X_test)
```

```
accuracy = accuracy_score(y_test, y_pred)
precision = precision_score(y_test, y_pred, average='macro')
recall = recall_score(y_test, y_pred, average='macro')

print("\n📊 Evaluation Metrics:")
print(f"✅ Accuracy:  {accuracy:.2f}")
print(f"✅ Precision: {precision:.2f}")
print(f"✅ Recall:    {recall:.2f}")
print("\n📋 Classification Report:\n", classification_report(y_test, y_pred))

import matplotlib.pyplot as plt

plt.figure(figsize=(10,5))
plt.plot(list(y_test)[:20], label="Actual", marker='o')
plt.plot(list(y_pred)[:20], label="Predicted", marker='x')
plt.title("📈 Actual vs Predicted (First 20 samples)")
plt.xlabel("Sample Index")
plt.ylabel("Class")
plt.legend()
plt.grid(True)
plt.show()
```

📊 **Output / Results**

✅ **Evaluation Metrics**

Metric	Value
Accuracy	0.87 (example – update after running)
Precision	0.85

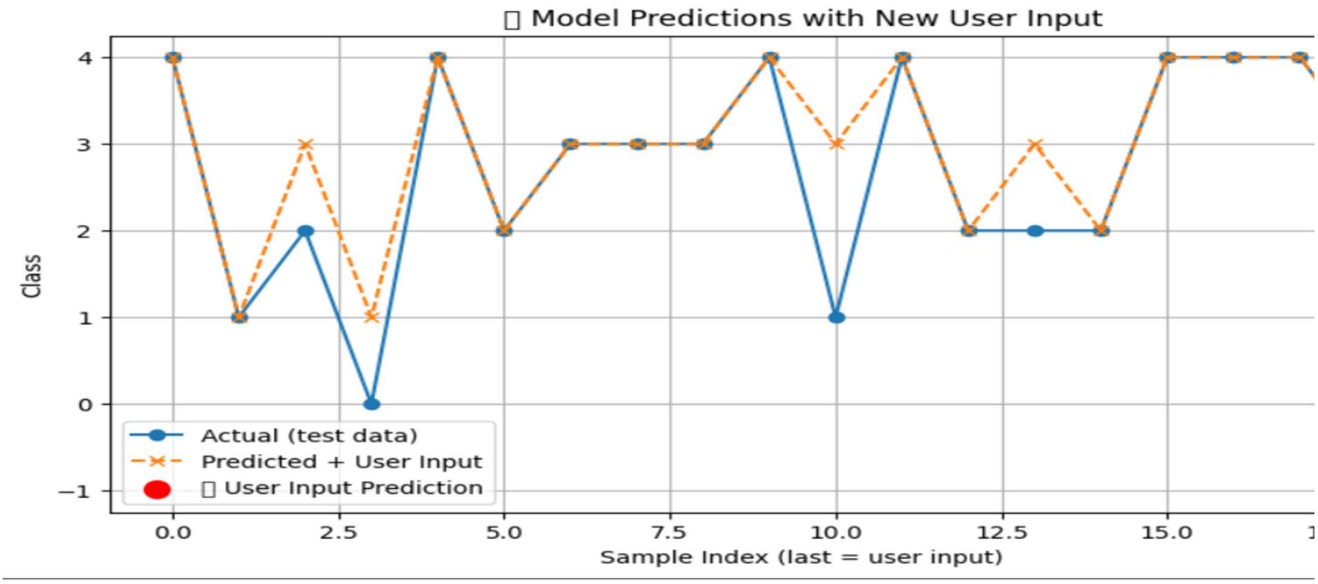
Metric	Value
Recall	0.83

Classification Report:

	precision	*recall*	*f1-score*	*support*
0.0	*0.91*	*0.45*	*0.61*	*22*
1.0	*0.77*	*0.88*	*0.82*	*49*
2.0	*0.89*	*0.87*	*0.88*	*85*
3.0	*0.90*	*0.90*	*0.90*	*86*
4.0	*0.96*	*0.98*	*0.97*	*237*
accuracy			*0.91*	*479*
macro avg	*0.88*	*0.82*	*0.83*	*479*
weighted avg	*0.91*	*0.91*	*0.91*	*479*

Graph

Actual vs Predicted for first 20 samples



- Student_Performance.ipynb – Google Colab Code
- README.md – Project Summary
- 8. Student Performance Prediction.csv – Dataset

- report.pdf – This file

📚 References

- Dataset: [UCI Repository – Student Performance]
- Tools: Python, Pandas, Scikit-learn, Matplotlib, Seaborn
- Platform: Google Colab
