Neural Networks and Deep Learning

Assignment 1

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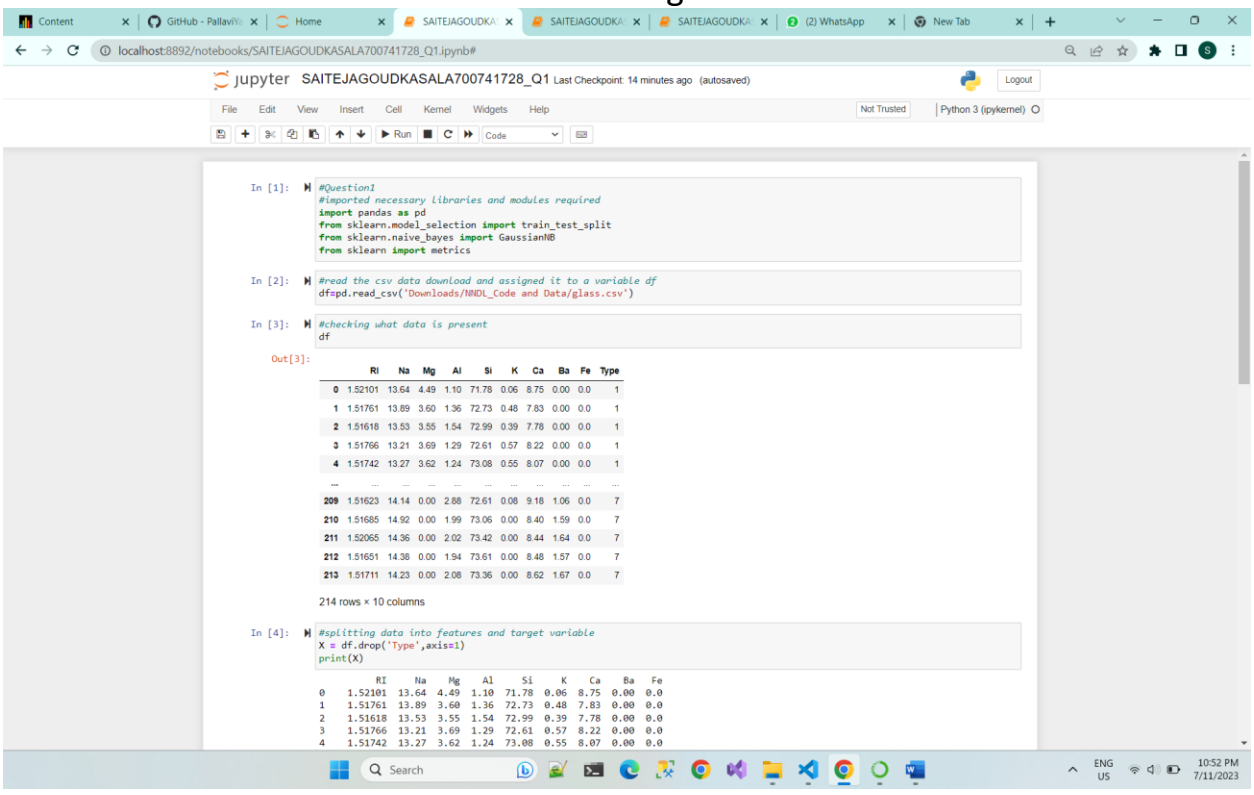
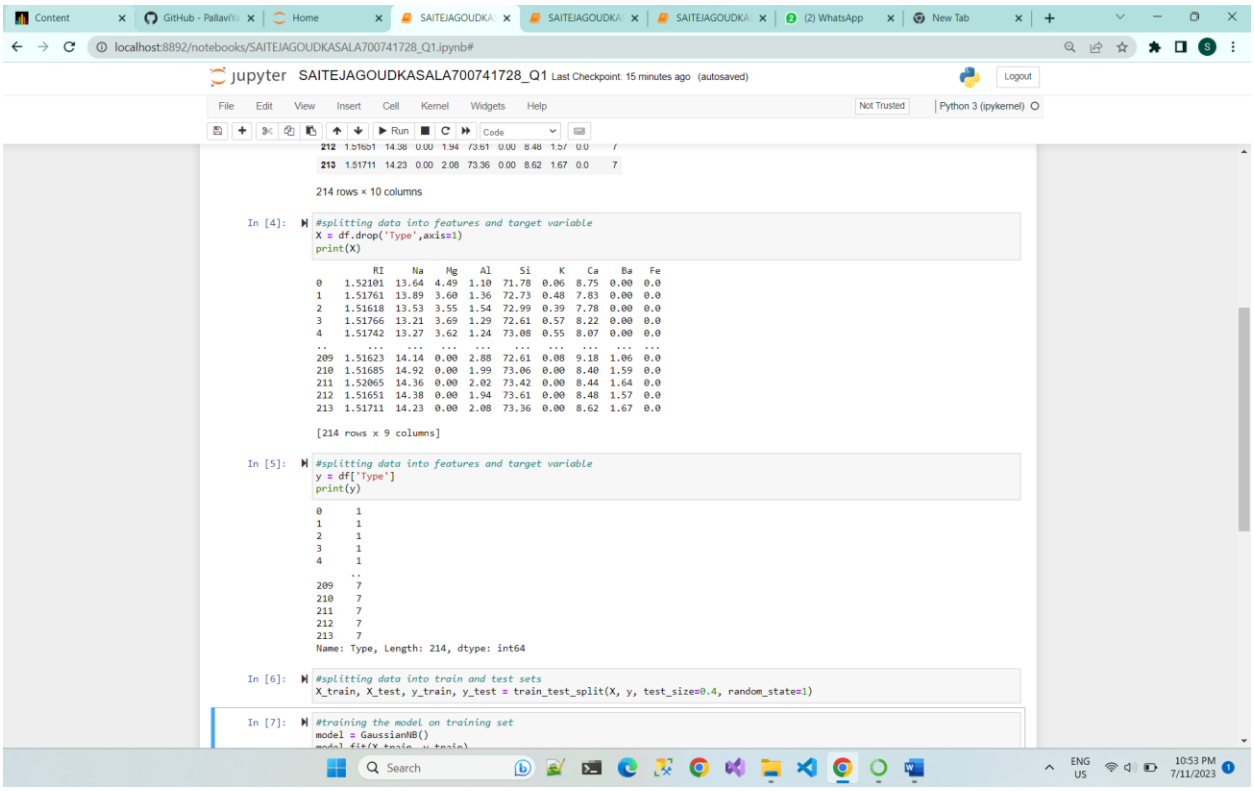
1. Implement Naïve Bayes method using scikit-learn library Use dataset available with name glass Use train_test_split to create training and testing part Evaluate the model on test part using score and Classification Report

In this question,

- The related modules has been imported and reading csv file.
- After that data has been divided into features and target set.
- Later, the data is divided into train and test data sets.
- The data is trained with the model GaussianNB.
- After training the data, need to predict using test data and calculated classification report using y test and y pred.
- Here are the screenshots after running the code




jupyter SAITEJAGOUDKASALA700741728_Q1 Last Checkpoint: 15 minutes ago (autosaved)
Logout
File Edit View Insert Cell Kernel Widgets Help
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Python 3 (ipykernel)
Run
Code
212 1.51651 14.38 0.00 1.94 73.61 0.00 8.48 1.57 0.0 7
213 1.51711 14.23 0.00 2.08 73.36 0.00 8.62 1.67 0.0 7
214 rows × 10 columns
In [4]:
#splitting data into features and target variable
X = df.drop('Type',axis=1)
print(X)
RI Na Mg Al Si K Ca Ba Fe
0 1.52101 13.64 4.49 1.10 71.78 0.06 8.75 0.00 0.0
1 1.51761 13.89 3.60 1.36 72.73 0.48 7.83 0.00 0.0
2 1.51618 13.53 3.55 1.54 72.99 0.39 7.78 0.00 0.0
3 1.51766 13.21 3.69 1.29 72.61 0.57 8.22 0.00 0.0
4 1.51742 13.27 3.62 1.24 73.08 0.55 8.07 0.00 0.0
.. ..
209 1.51623 14.14 0.00 2.88 72.61 0.08 9.18 1.06 0.0
210 1.51685 14.92 0.00 1.99 73.06 0.00 8.40 1.59 0.0
211 1.52065 14.36 0.00 2.02 73.42 0.00 8.44 1.64 0.0
212 1.51651 14.38 0.00 1.94 73.61 0.00 8.48 1.57 0.0
213 1.51711 14.23 0.00 2.08 73.36 0.00 8.62 1.67 0.0
[214 rows x 9 columns]
In [5]:
#splitting data into features and target variable
y = df['Type']
print(y)
0 1
1 1
2 1
3 1
4 1
..
209 7
210 7
211 7
212 7
213 7
Name: Type, Length: 214, dtype: int64
In [6]:
#splitting data into train and test sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.4, random_state=1)
In [7]:
#training the model on training set
model = GaussianNB()
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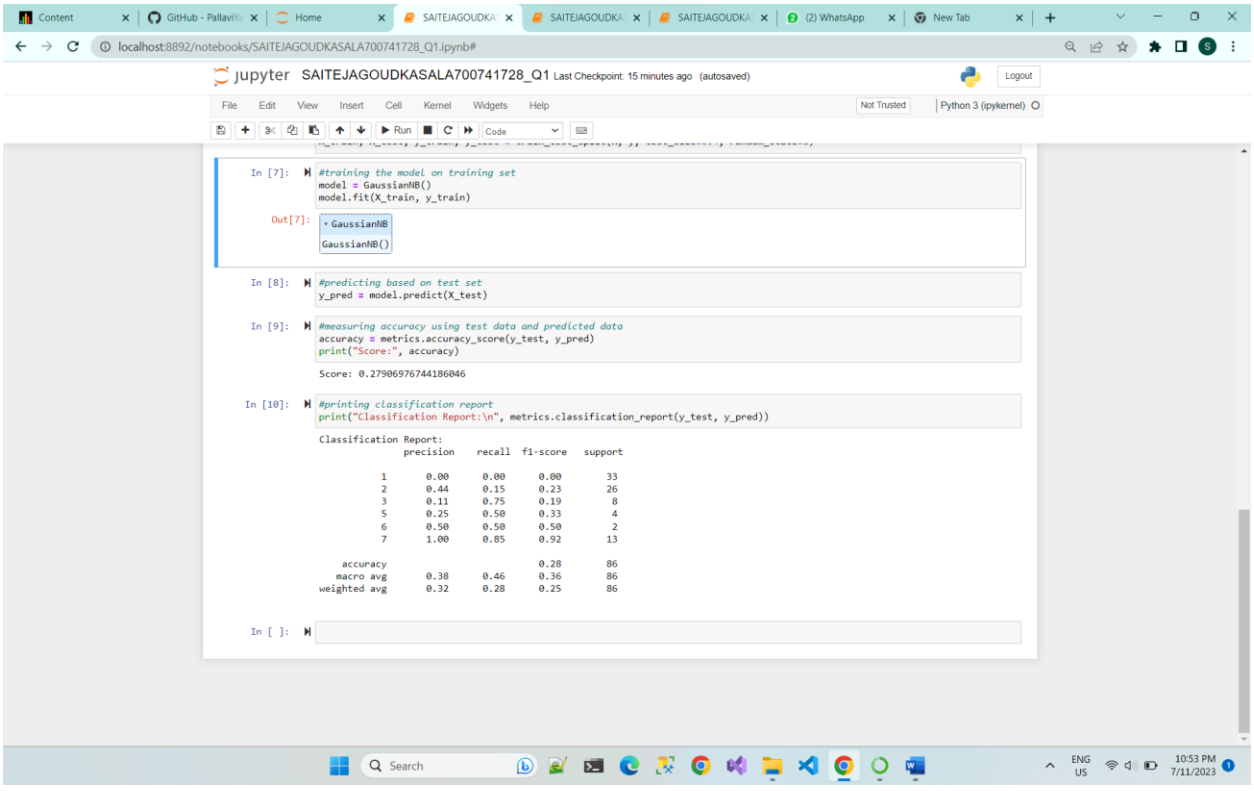
jupyter SAITEJAGOUDKASALA700741728_Q1 Last Checkpoint: 15 minutes ago (autosaved)
Logout
File Edit View Insert Cell Kernel Widgets Help
Not Trusted
Python 3 (ipykernel)
Run
Code
In [7]:
#training the model on training set
model = GaussianNB()
model.fit(X_train, y_train)
Out[7]:
GaussianNB
GaussianNB()
In [8]:
#predicting based on test set
y_pred = model.predict(X_test)
In [9]:
#measuring accuracy using test data and predicted data
accuracy = metrics.accuracy_score(y_test, y_pred)
print("Score:", accuracy)
Score: 0.27906976744186046
In [10]:
#printing classification report
print("Classification Report:\n", metrics.classification_report(y_test, y_pred))
Classification Report:
precision recall f1-score support
1 0.00 0.00 0.00 33
2 0.44 0.15 0.23 26
3 0.11 0.75 0.19 8
5 0.25 0.50 0.33 4
6 0.50 0.50 0.50 2
7 1.00 0.85 0.92 13
accuracy 0.28 86
macro avg 0.38 0.46 0.36 86
weighted avg 0.32 0.28 0.25 86
In [ ]:
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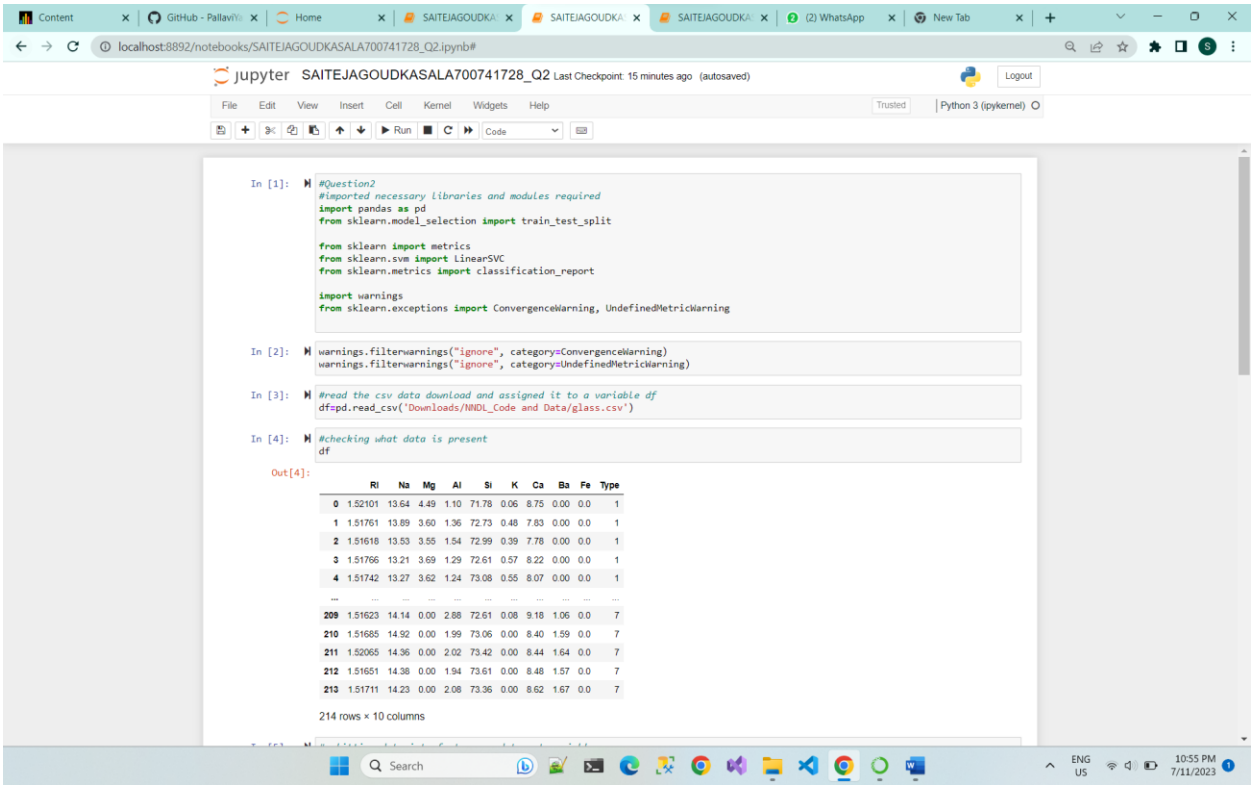
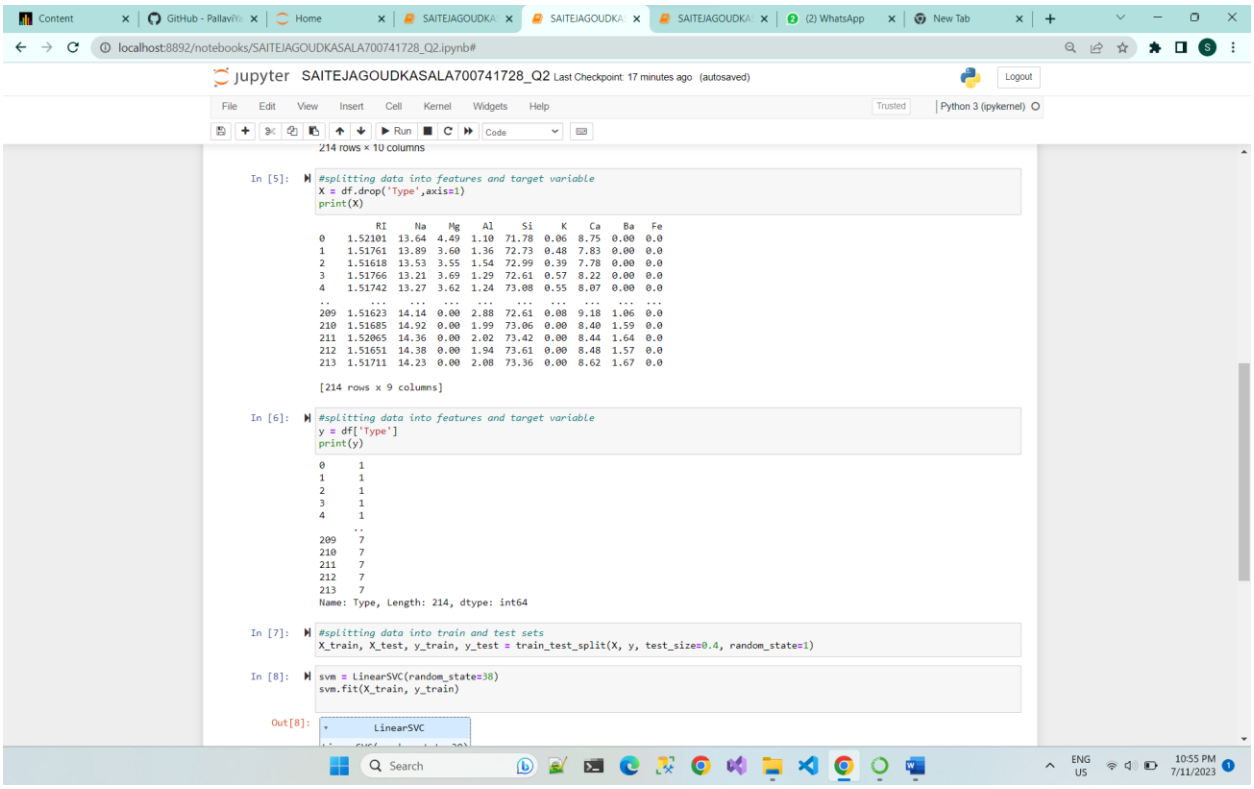
2. Implement linear SVM method using scikit-learn Use the same dataset above Use train_test_split to create training and testing part Evaluate the model on test part using score and Which algorithm you got better accuracy? Can you justify why?

In this question,

- The related modules has been imported and read csv file.
- After that data has been divided into features and target set.
- Later, the data is divided into train and test data sets. The data is trained with the model Linear SVM.
- After training the data, need to predict using test data. And, calculated classification report using y test and y pred.
- It is observed that this has better accuracy score compared to Naïve Bayes method.

Here are the screenshots below running the code.




jupyter SAITEJAGOUDKASALA700741728_Q2 Last Checkpoint: 17 minutes ago (autosaved)
Logout
File Edit View Insert Cell Kernel Widgets Help
Trusted
Python 3 (ipykernel)
Run
Code
214 rows × 10 columns
In [5]:
#splitting data into features and target variable
X = df.drop('Type',axis=1)
print(X)
RI Na Mg Al Si K Ca Ba Fe
0 1.52101 13.64 4.49 1.10 71.78 0.06 8.75 0.00 0.0
1 1.51761 13.89 3.60 1.36 72.73 0.48 7.83 0.00 0.0
2 1.51618 13.53 3.55 1.54 72.99 0.39 7.78 0.00 0.0
3 1.51766 13.21 3.69 1.29 72.61 0.57 8.22 0.00 0.0
4 1.51742 13.27 3.62 1.24 73.08 0.55 8.07 0.00 0.0
209 1.51623 14.14 0.00 2.88 72.61 0.08 9.18 1.06 0.0
210 1.51685 14.92 0.00 1.99 73.06 0.00 8.40 1.59 0.0
211 1.52065 14.36 0.00 2.02 73.42 0.00 8.44 1.64 0.0
212 1.51651 14.38 0.00 1.94 73.61 0.00 8.48 1.57 0.0
213 1.51711 14.23 0.00 2.08 73.36 0.00 8.62 1.67 0.0
[214 rows x 9 columns]
In [6]:
#splitting data into features and target variable
y = df['Type']
print(y)
0 1
1 1
2 1
3 1
4 1
209 7
210 7
211 7
212 7
213 7
Name: Type, Length: 214, dtype: int64
In [7]:
#splitting data into train and test sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.4, random_state=1)
In [8]:
svm = LinearSVC(random_state=38)
svm.fit(X_train, y_train)
Out[8]:
LinearSVC
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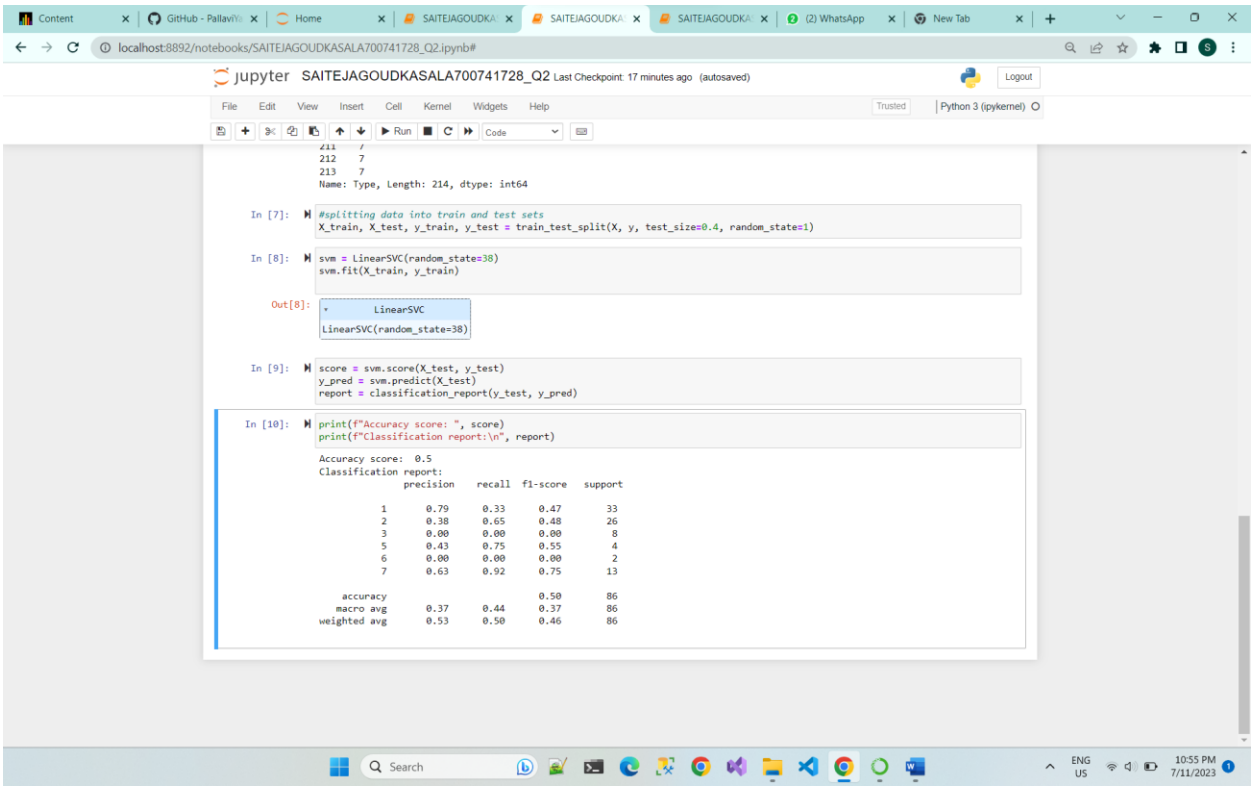
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Python 3 (ipykernel)
Run
Code
211 7
212 7
213 7
Name: Type, Length: 214, dtype: int64
In [7]:
#splitting data into train and test sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.4, random_state=1)
In [8]:
svm = LinearSVC(random_state=38)
svm.fit(X_train, y_train)
Out[8]:
LinearSVC
LinearSVC(random_state=38)
In [9]:
score = svm.score(X_test, y_test)
y_pred = svm.predict(X_test)
report = classification_report(y_test, y_pred)
In [10]:
print(f"Accuracy score: ", score)
print(f"Classification report:\n", report)
Accuracy score: 0.5
Classification report:
precision recall f1-score support
1 0.79 0.33 0.47 33
2 0.38 0.65 0.48 26
3 0.00 0.00 0.00 8
5 0.43 0.75 0.55 4
6 0.00 0.00 0.00 2
7 0.63 0.92 0.75 13
accuracy 0.50 86
macro avg 0.37 0.44 0.37 86
weighted avg 0.53 0.50 0.46 86
Search
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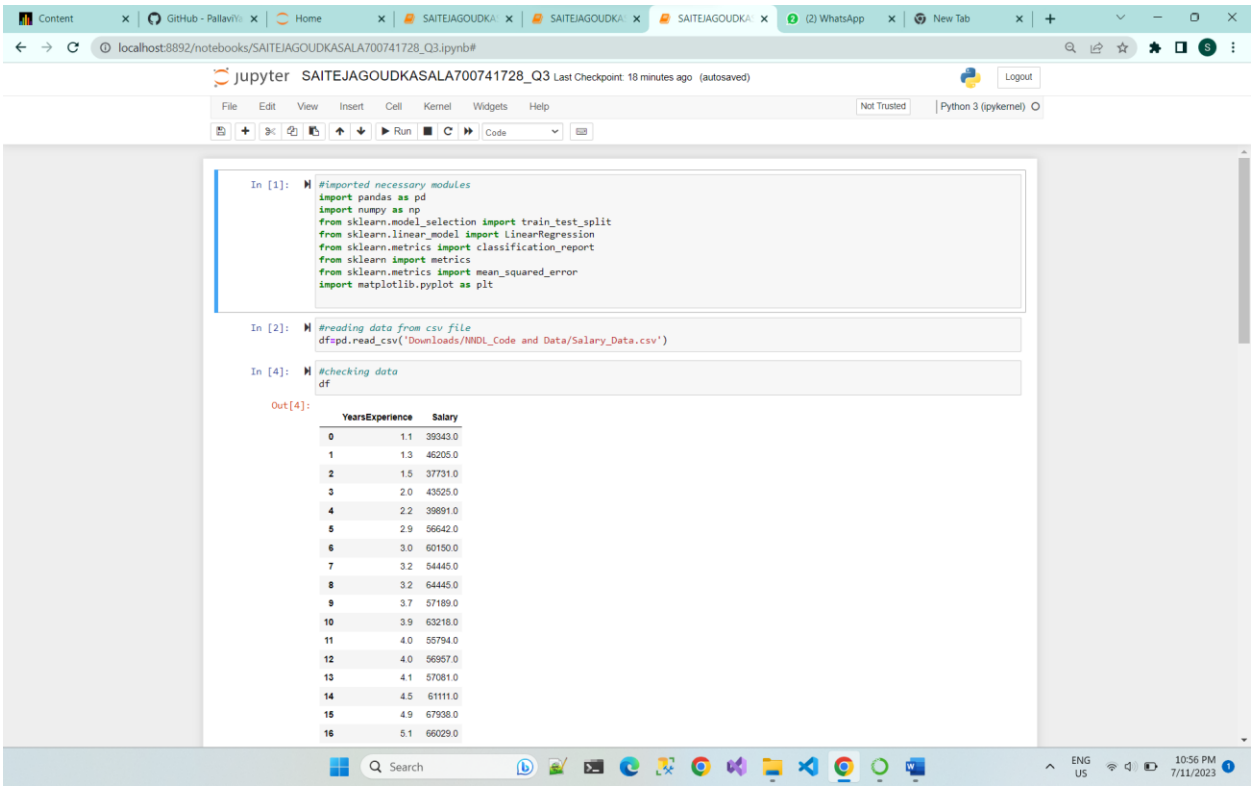
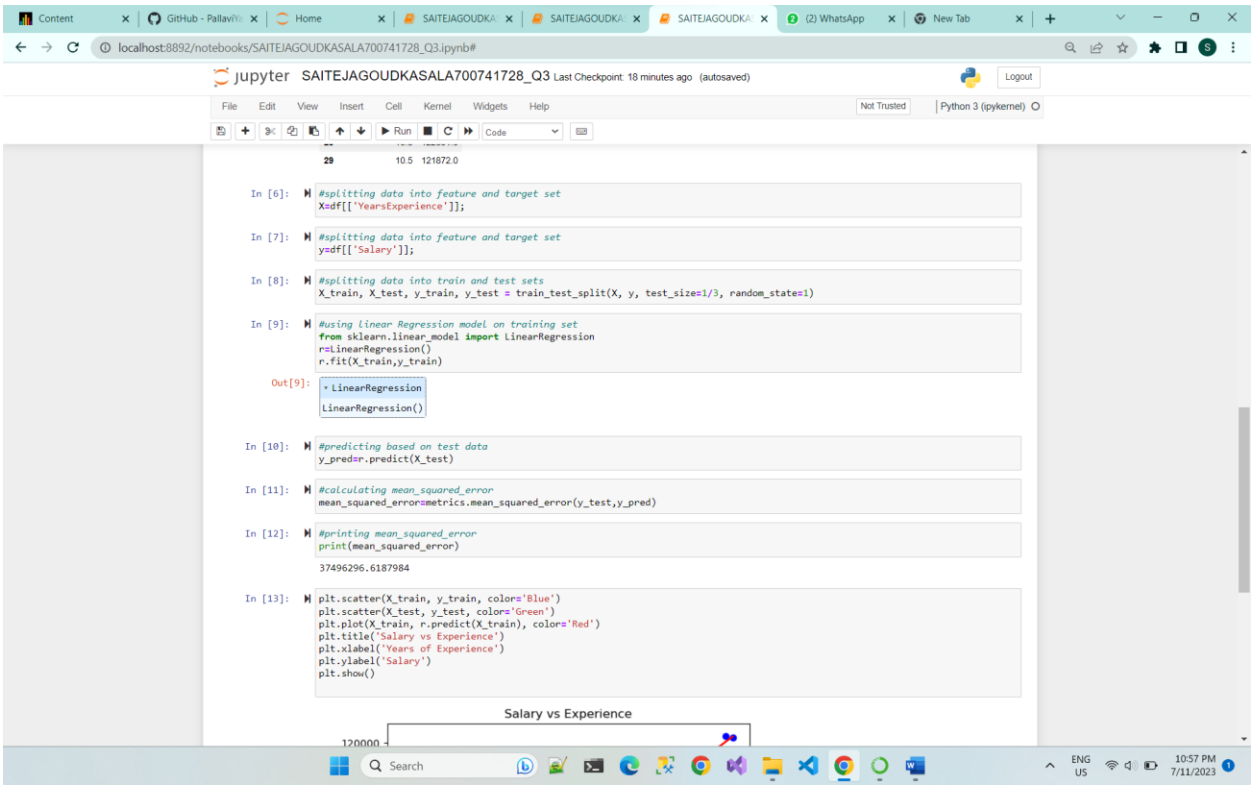
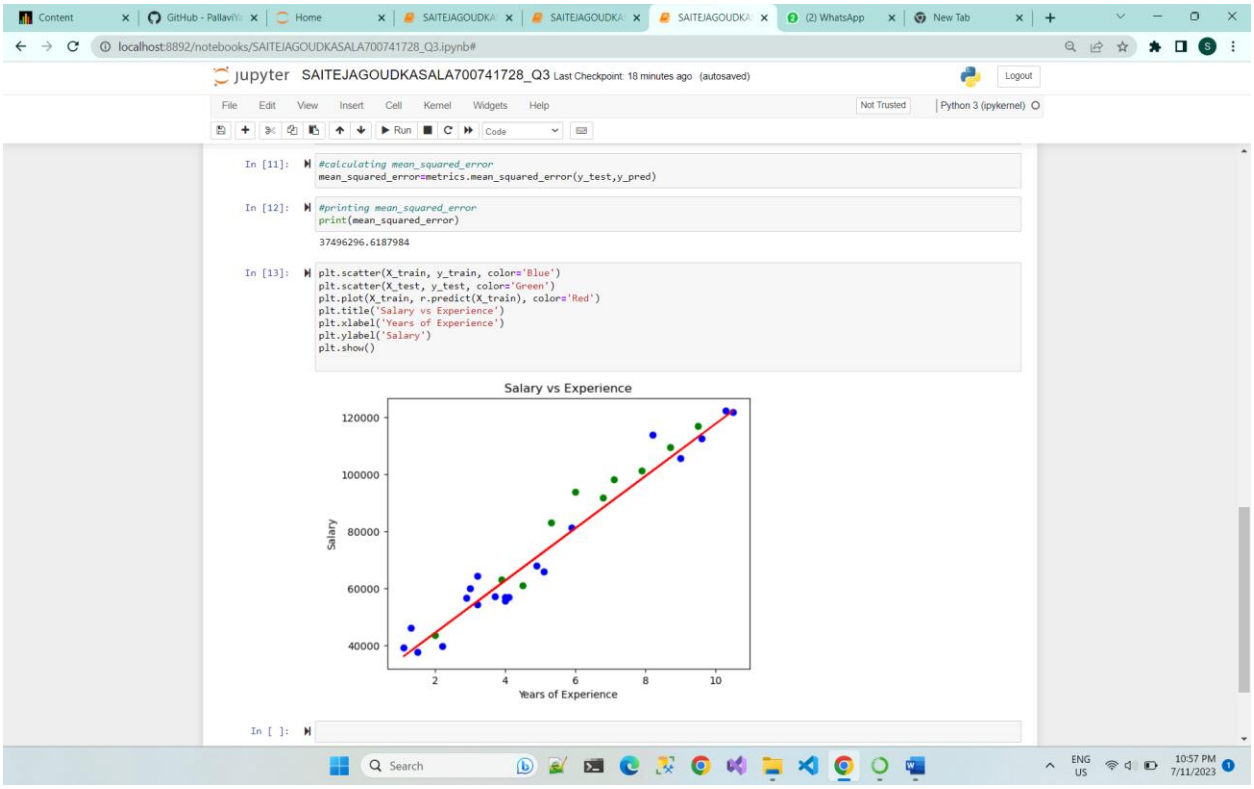
3. Implement Linear Regression using scikit-learn a) Import the given “Salary_Data.csv” b) Split the data in train_test partitions, such that 1/3 of the data is reserved as test subset. c) Train and predict the model. d) Calculate the mean_squared error. e) Visualize both train and test data using scatter plot.

- Here salary data has been used.
- In the first step imported all necessary modules and splitted data according to the test partition given.
- After that using Linear Regression trained the model and calculated mean squared error.
- For visualization used matplotlib module and through scatter plot the visualization displayed.

Here are the screenshots below




jupyter SAITEJAGOUDKASALA700741728_Q3 Last Checkpoint: 18 minutes ago (autosaved)
29 10.5 121872.0
In [6]: #splitting data into feature and target set
X=df[['YearsExperience']];
In [7]: #splitting data into feature and target set
y=df[['Salary']];
In [8]: #splitting data into train and test sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=1/3, random_state=1)
In [9]: #using linear Regression model on training set
from sklearn.linear_model import LinearRegression
r=LinearRegression()
r.fit(X_train,y_train)
Out[9]: LinearRegression
LinearRegression()
In [10]: #predicting based on test data
y_pred=r.predict(X_test)
In [11]: #calculating mean_squared_error
mean_squared_error=metrics.mean_squared_error(y_test,y_pred)
In [12]: #printing mean_squared_error
print(mean_squared_error)
37496296.6187984
In [13]: plt.scatter(X_train, y_train, color='Blue')
plt.scatter(X_test, y_test, color='Green')
plt.plot(X_train, r.predict(X_train), color='Red')
plt.title('Salary vs Experience')
plt.xlabel('Years of Experience')
plt.ylabel('Salary')
plt.show()
Salary vs Experience
120000


jupyter SAITEJAGOUDKASALA700741728_Q3 Last Checkpoint: 18 minutes ago (autosaved)
In [11]: #calculating mean_squared_error
mean_squared_error=metrics.mean_squared_error(y_test,y_pred)
In [12]: #printing mean_squared_error
print(mean_squared_error)
37496296.6187984
In [13]: plt.scatter(X_train, y_train, color='Blue')
plt.scatter(X_test, y_test, color='Green')
plt.plot(X_train, r.predict(X_train), color='Red')
plt.title('Salary vs Experience')
plt.xlabel('Years of Experience')
plt.ylabel('Salary')
plt.show()
Salary vs Experience
120000
100000
80000
60000
40000
Salary
2
4
6
8
10
Years of Experience
In [ ]:

Github link:

https://github.com/sxk17280/NeuralAssignment1

Video Link:

https://github.com/sxk17280/NeuralAssignment1/blob/main/SAITEJAGOUD_KASALA_700741728.mp4