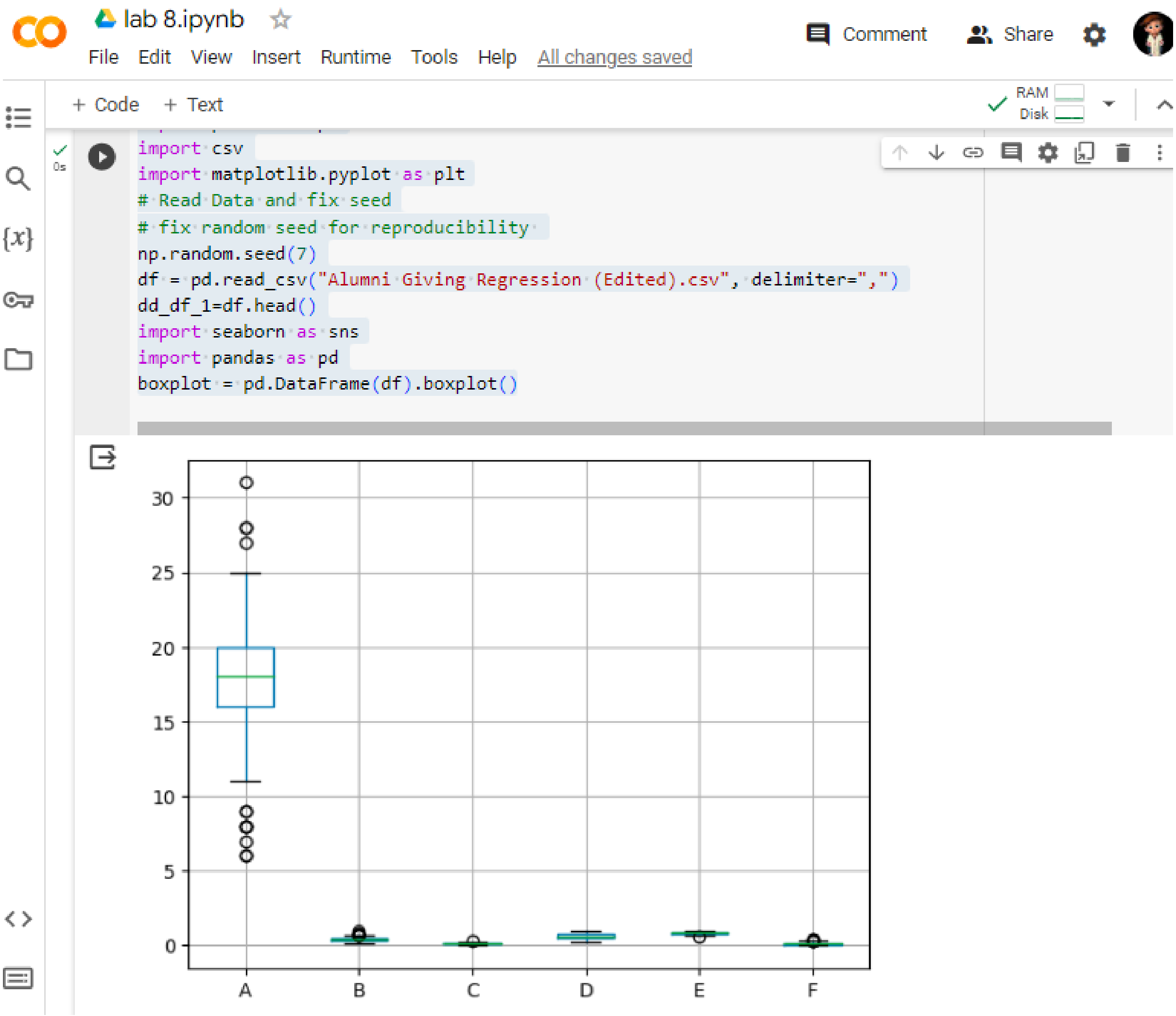
IN LAB

LAB TASK 1 :

Imports necessary libraries for machine learning and data visualization.

Reads a CSV file into a DataFrame and sets a random seed for reproducibility.

```
# Importing libraries needed
# Note that keras is generally used for deep learning as well from
keras.models import Sequential
from keras.layers import Dense, Dropout
from sklearn.metrics import classification_report, confusion_matrix
from sklearn.model_selection import train_test_split
from sklearn.metrics import mean_squared_error
import numpy as np
from sklearn import linear_model
from sklearn import preprocessing
from sklearn import tree
from sklearn.ensemble import RandomForestRegressor,
GradientBoostingRegressor
import pandas as pd
import csv
import matplotlib.pyplot as plt
# Read Data and fix seed
# fix random seed for reproducibility
np.random.seed(7)
df = pd.read_csv("Alumni Giving Regression (Edited).csv",
delimiter=",")
dd_df_1=df.head()
import seaborn as sns
import pandas as pd
boxplot = pd.DataFrame(df).boxplot()
```



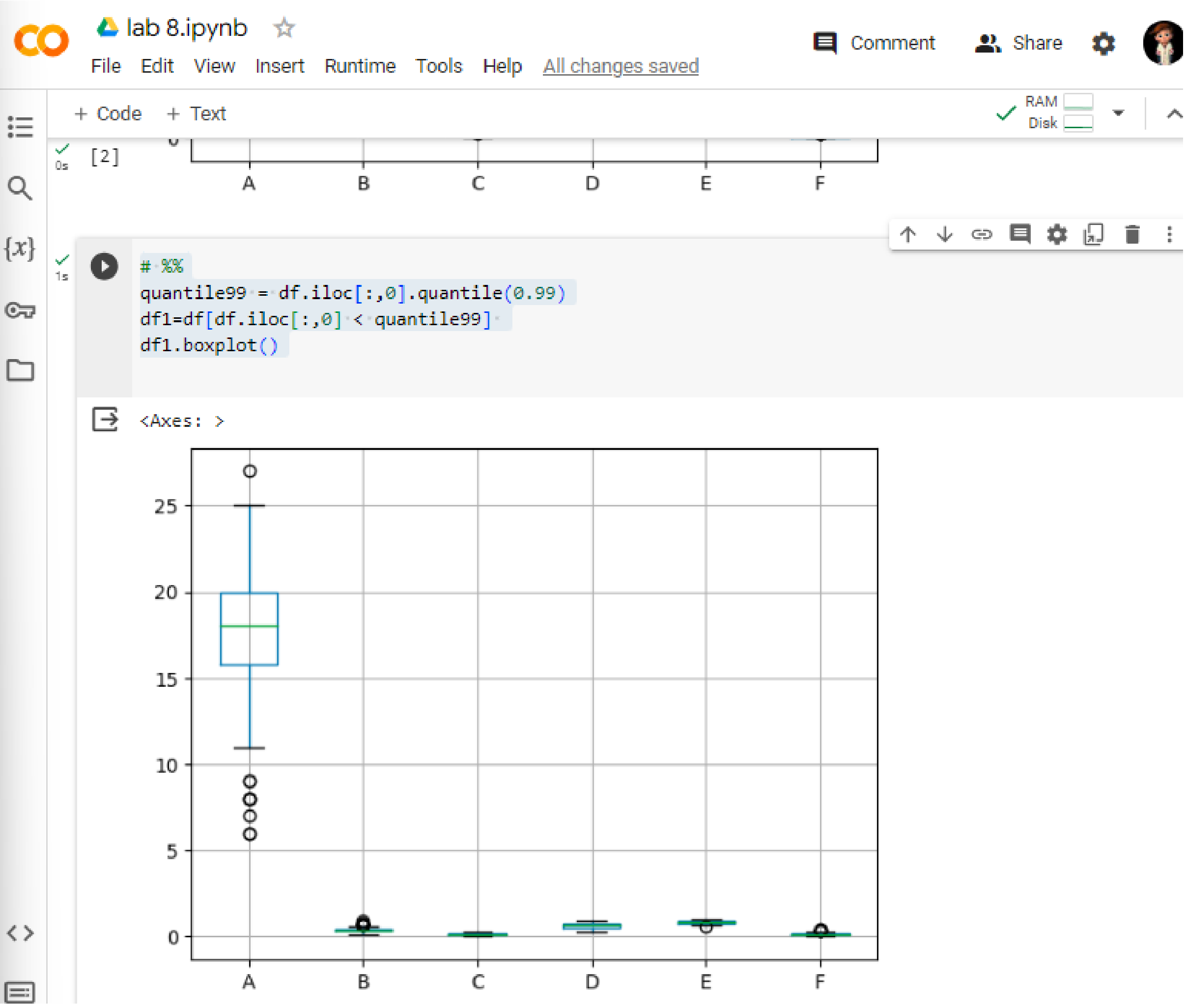
```
import csv
import matplotlib.pyplot as plt
# Read Data and fix seed
# fix random seed for reproducibility
np.random.seed(7)
df = pd.read_csv("Alumni Giving Regression (Edited).csv", delimiter=",")
dd_df_1=df.head()
import seaborn as sns
import pandas as pd
boxplot = pd.DataFrame(df).boxplot()
```

LAB TASK 2:

Filters data points above the 99th percentile, creating a new DataFrame (df1).

Visualizes the filtered data using a boxplot.

```
# %%
quantile99 = df.iloc[:,0].quantile(0.99)
df1=df[df.iloc[:,0] < quantile99]
df1.boxplot()
```



```
# %%
quantile99 = df.iloc[:,0].quantile(0.99)
df1=df[df.iloc[:,0] < quantile99]
df1.boxplot()
```

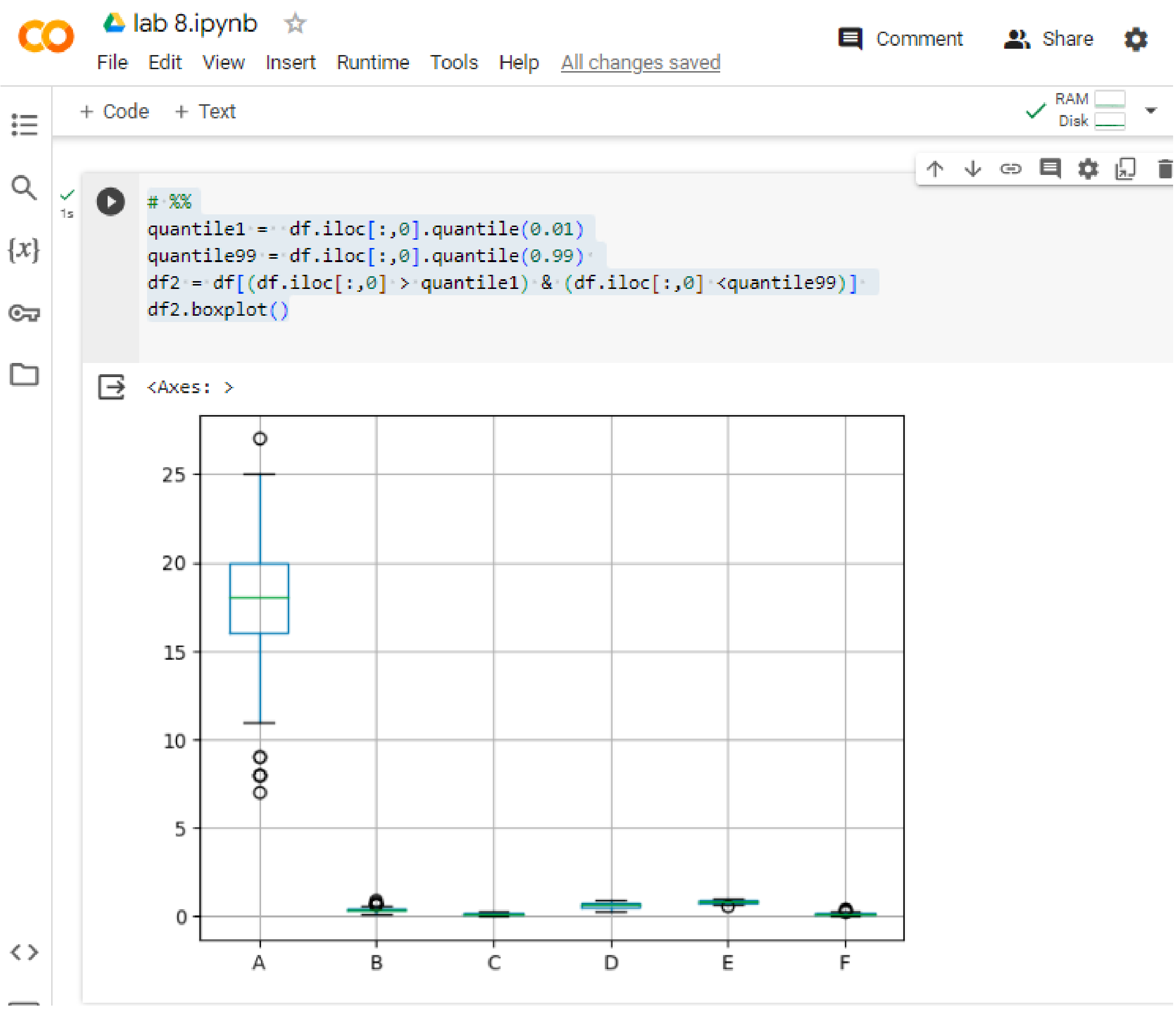
```
<Axes: >
```

LAB TASK 3:

Filters data points between the 1st and 99th percentiles, creating a new DataFrame (df2).

Visualizes the filtered data using a boxplot.

```
# %%
quantile1 =  df.iloc[:,0].quantile(0.01)
quantile99 = df.iloc[:,0].quantile(0.99)
df2 = df[(df.iloc[:,0] > quantile1) & (df.iloc[:,0] <quantile99)]
df2.boxplot()
```



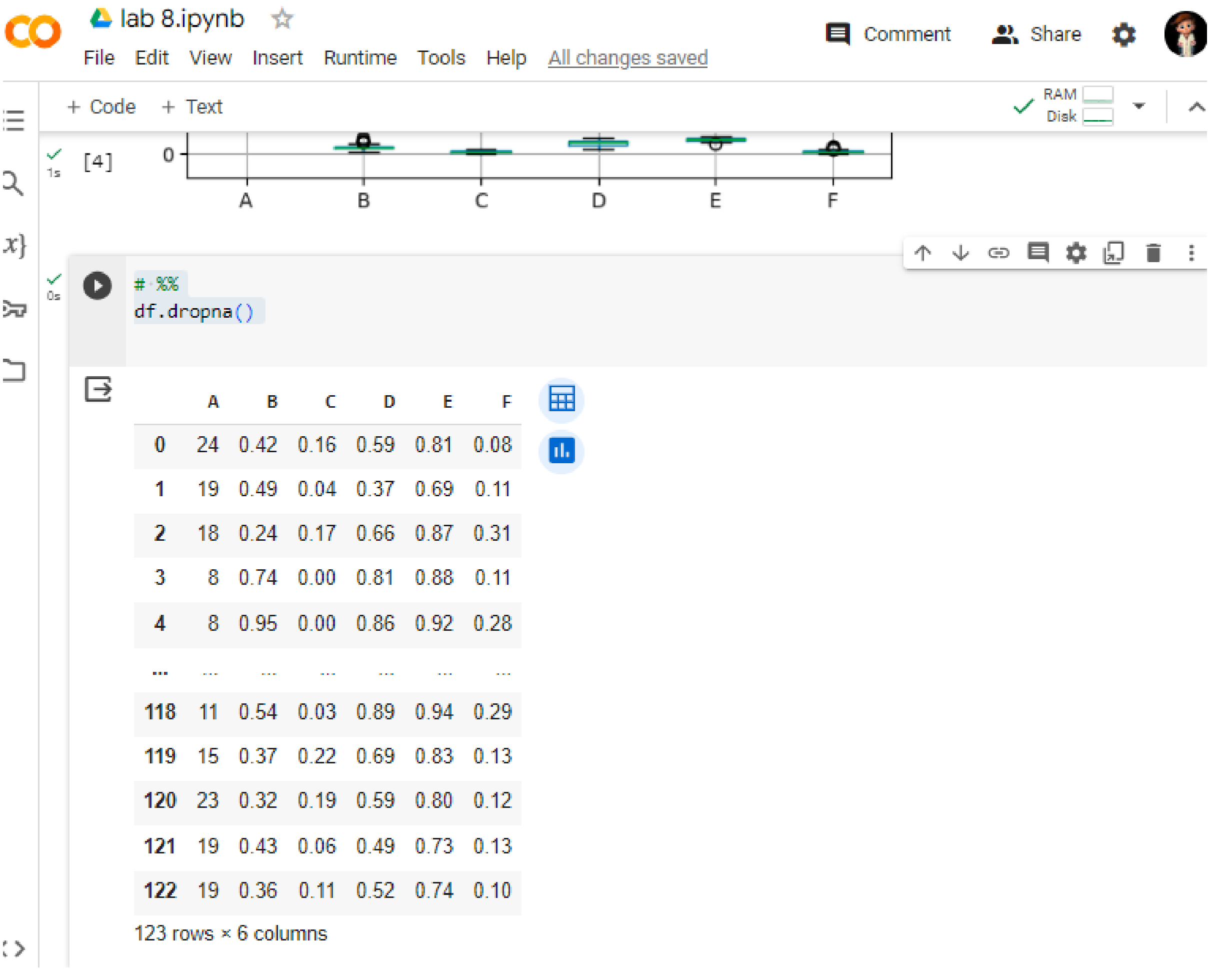
```
# %%
quantile1 =  df.iloc[:,0].quantile(0.01)
quantile99 = df.iloc[:,0].quantile(0.99)
df2 = df[(df.iloc[:,0] > quantile1) & (df.iloc[:,0] <quantile99)]
df2.boxplot()
```

```
<Axes: >
```

LAB TASK 4:

Drops rows with missing values from the DataFrame.

```
# %%
df.dropna()
```



```
# %%
df.dropna()
```

	A	B	C	D	E	F
0	24	0.42	0.16	0.59	0.81	0.08
1	19	0.49	0.04	0.37	0.69	0.11
2	18	0.24	0.17	0.66	0.87	0.31
3	8	0.74	0.00	0.81	0.88	0.11
4	8	0.95	0.00	0.86	0.92	0.28
...	...	...	...	...	...	...
118	11	0.54	0.03	0.89	0.94	0.29
119	15	0.37	0.22	0.69	0.83	0.13
120	23	0.32	0.19	0.59	0.80	0.12
121	19	0.43	0.06	0.49	0.73	0.13
122	19	0.36	0.11	0.52	0.74	0.10

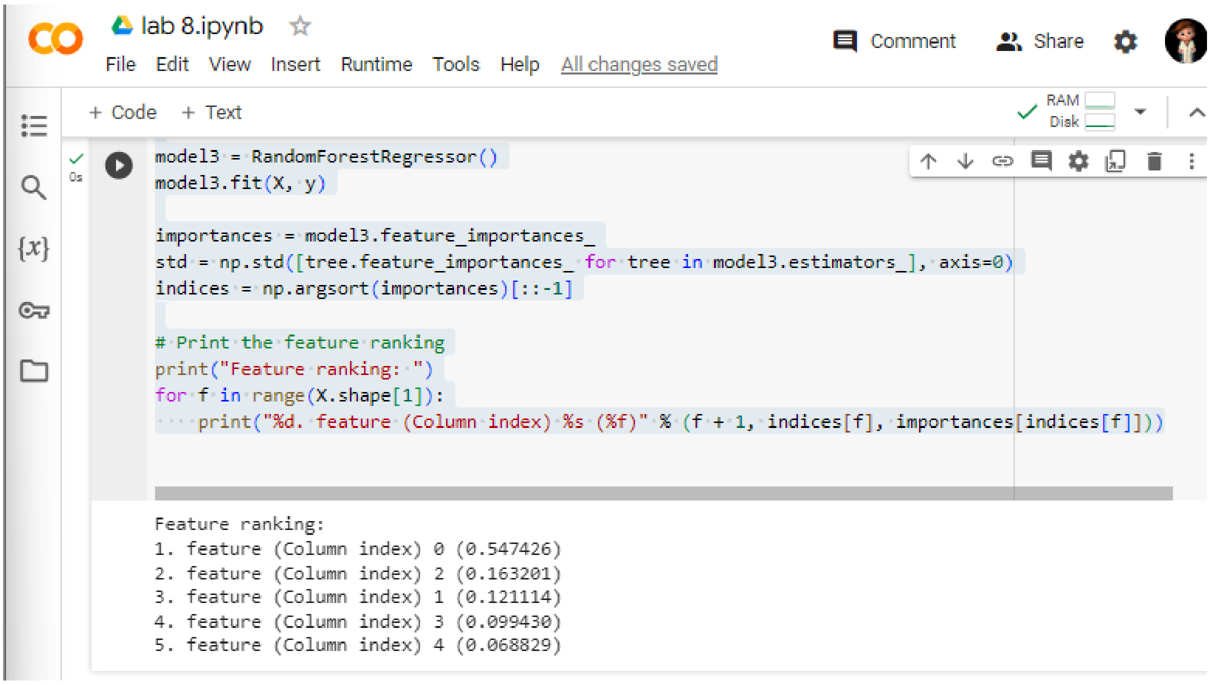
123 rows × 6 columns

LAB TASK 5:

Drops missing values and separates features (X) and target variable (y).
Ranks features based on importance using a Random Forest Regressor.

```
# Assuming you have already loaded the data into the 'df' DataFrame

# Dropping missing values
df = df.dropna()

# Feature Ranking
X = df.iloc[:, 1:]
y = df.iloc[:, 0]

model3 = RandomForestRegressor()
model3.fit(X, y)

importances = model3.feature_importances_
std = np.std([tree.feature_importances_ for tree in
model3.estimators_], axis=0)
indices = np.argsort(importances)[::-1]
```

```
# Print the feature ranking
print("Feature ranking: ")
for f in range(X.shape[1]):
    print("%d. feature (Column index) %s (%f)" % (f + 1, indices[f],
importances[indices[f]]))
```



```
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importances = model3.feature_importances_
std = np.std([tree.feature_importances_ for tree in model3.estimators_], axis=0)
indices = np.argsort(importances)[::-1]

# Print the feature ranking
print("Feature ranking: ")
for f in range(X.shape[1]):
    print("%d. feature (Column index) %s (%f)" % (f + 1, indices[f], importances[indices[f]]))
```

```
Feature ranking:
1. feature (Column index) 0 (0.547426)
2. feature (Column index) 2 (0.163201)
3. feature (Column index) 1 (0.121114)
4. feature (Column index) 3 (0.099430)
5. feature (Column index) 4 (0.068829)
```

LAB TASK 6

Selects top 3 important features based on the ranking.

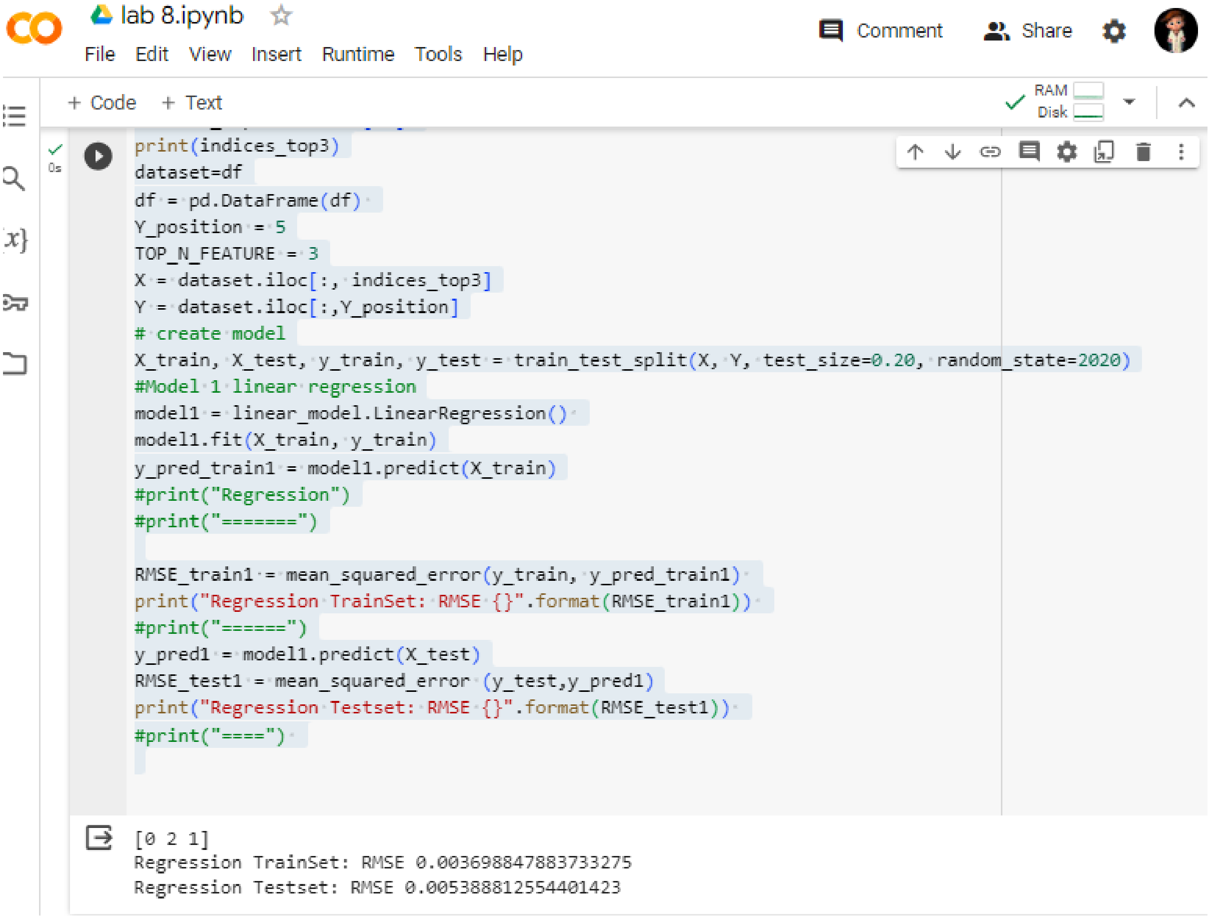
Builds a linear regression model, evaluates on training and testing sets using RMSE.

```

# %%
indices_top3= indices[:3]
print(indices_top3)
dataset=df
df = pd.DataFrame(df)
Y_position = 5
TOP_N_FEATURE = 3
X = dataset.iloc[:, indices_top3]
Y = dataset.iloc[:,Y_position]
# create model
X_train, X_test, y_train, y_test = train_test_split(X, Y,
test_size=0.20, random_state=2020)
#Model 1 linear regression
model1 = linear_model.LinearRegression()
```

```
model1.fit(X_train, y_train)
y_pred_train1 = model1.predict(X_train)
#print("Regression")
#print("=======")

RMSE_train1 = mean_squared_error(y_train, y_pred_train1)
print("Regression TrainSet: RMSE {}".format(RMSE_train1))
#print("======")
y_pred1 = model1.predict(X_test)
RMSE_test1 = mean_squared_error (y_test,y_pred1)
print("Regression Testset: RMSE {}".format(RMSE_test1))
#print("====")
```



```
print(indices_top3)
dataset=df
df = pd.DataFrame(df)
Y_position = 5
TOP_N_FEATURE = 3
X = dataset.iloc[:, indices_top3]
Y = dataset.iloc[:,Y_position]
# create model
X_train, X_test, y_train, y_test = train_test_split(X, Y, test_size=0.20, random_state=2020)
#Model 1 linear regression
model1 = linear_model.LinearRegression()
model1.fit(X_train, y_train)
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RMSE_train1 = mean_squared_error(y_train, y_pred_train1)
print("Regression TrainSet: RMSE {}".format(RMSE_train1))
#print("======")
y_pred1 = model1.predict(X_test)
RMSE_test1 = mean_squared_error (y_test,y_pred1)
print("Regression Testset: RMSE {}".format(RMSE_test1))
#print("====")
```

```
[0 2 1]
Regression TrainSet: RMSE 0.0036988478837333275
Regression Testset: RMSE 0.005388812554401423
```