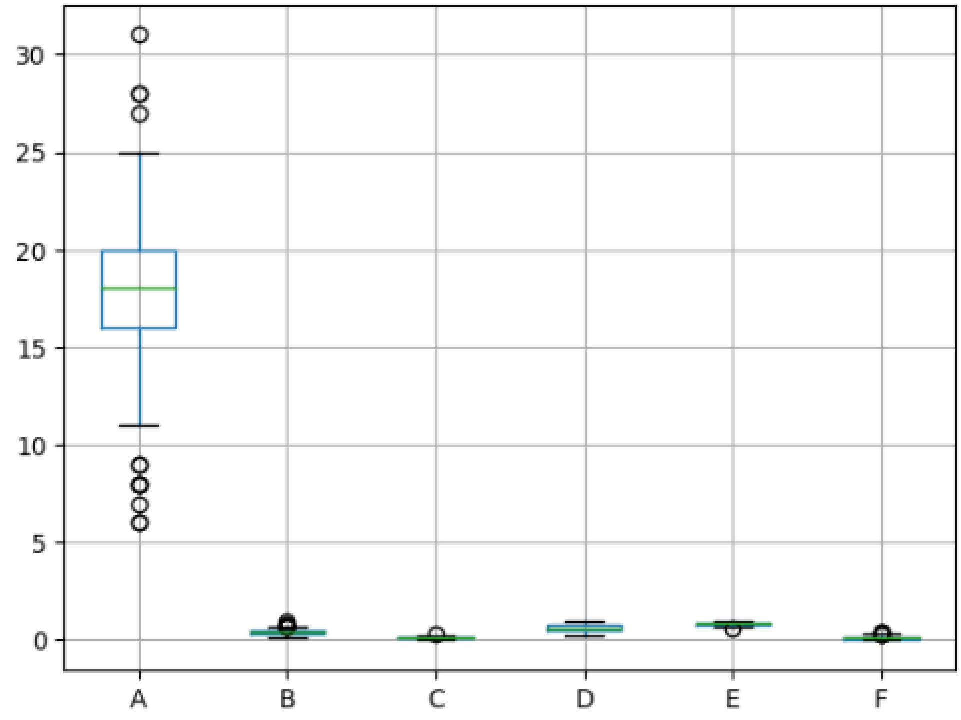
LAB 8

In lab task 1:

```
# 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()
```

Output:

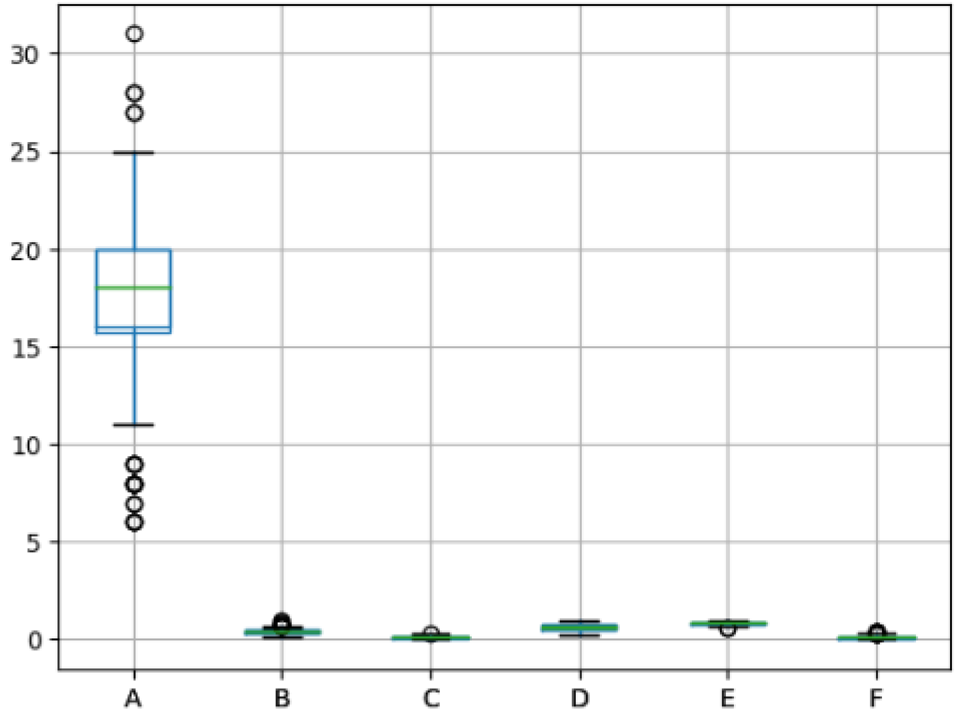


In lab task 2:

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

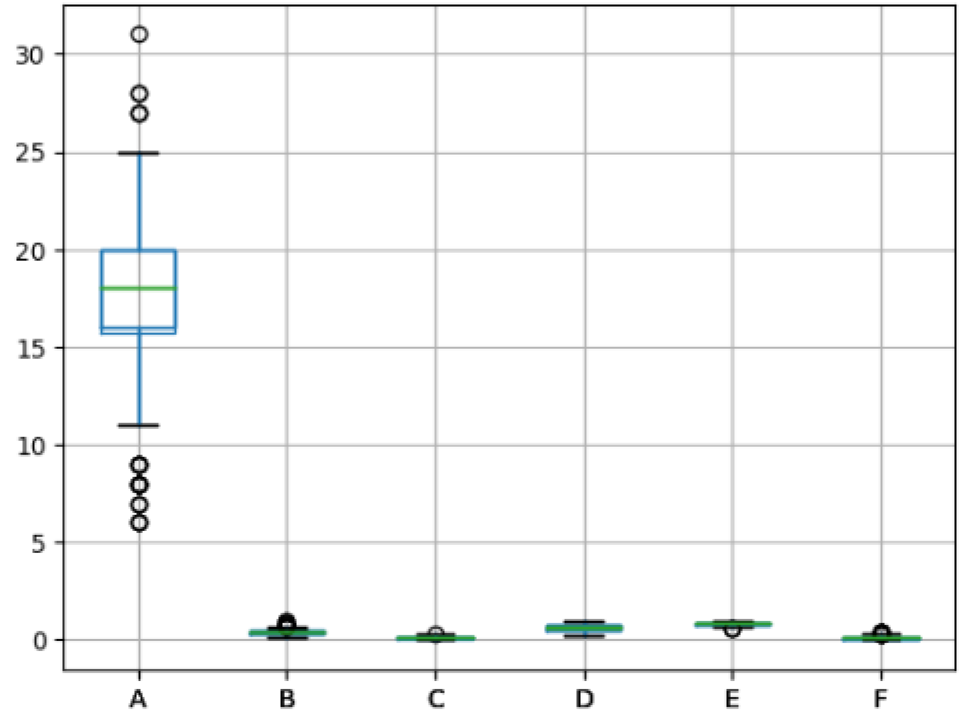
Output:

```
<Axes: >
```



```
# %%
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()
```

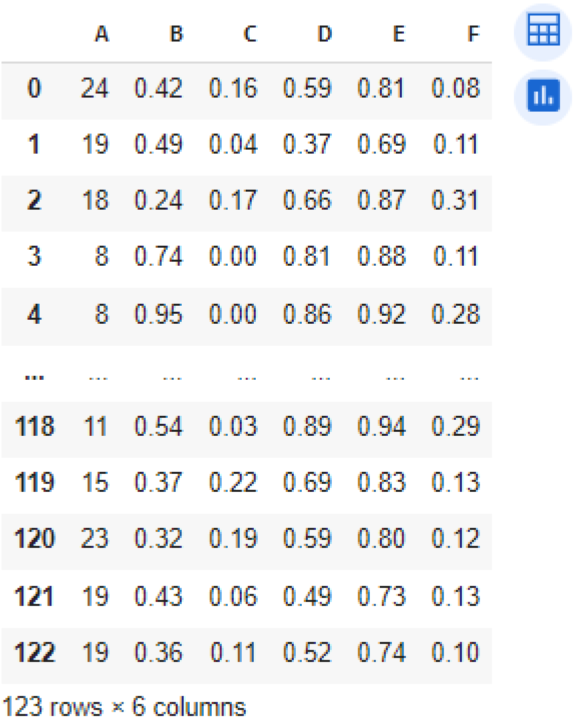
```
<Axes: >
```



Remove NA:

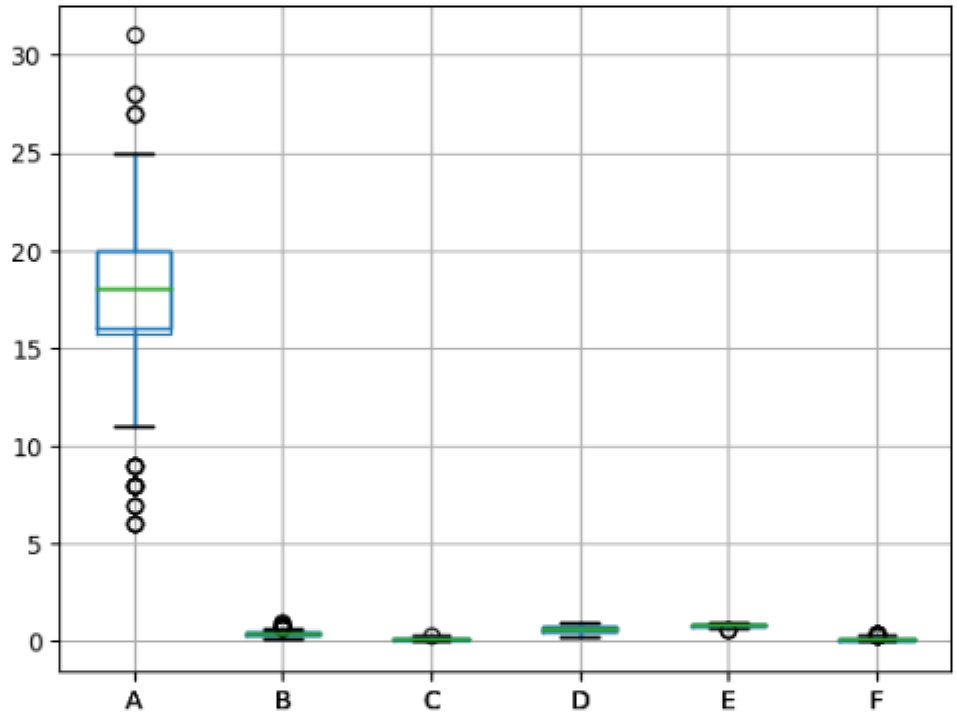
```
# %%
df.dropna()
```

Output:



	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

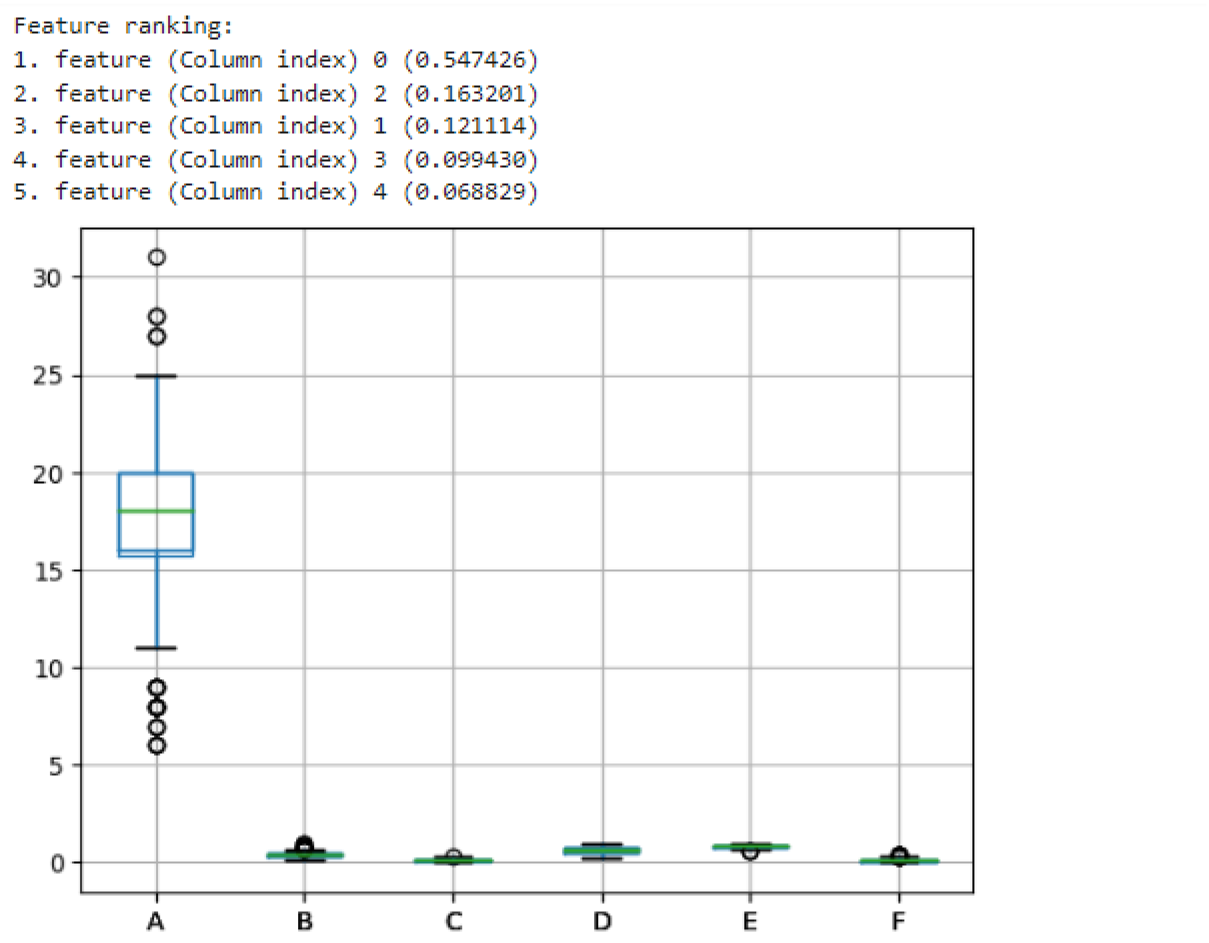
123 rows × 6 columns



Feature Importance:

```
# 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]]))
```

Output:



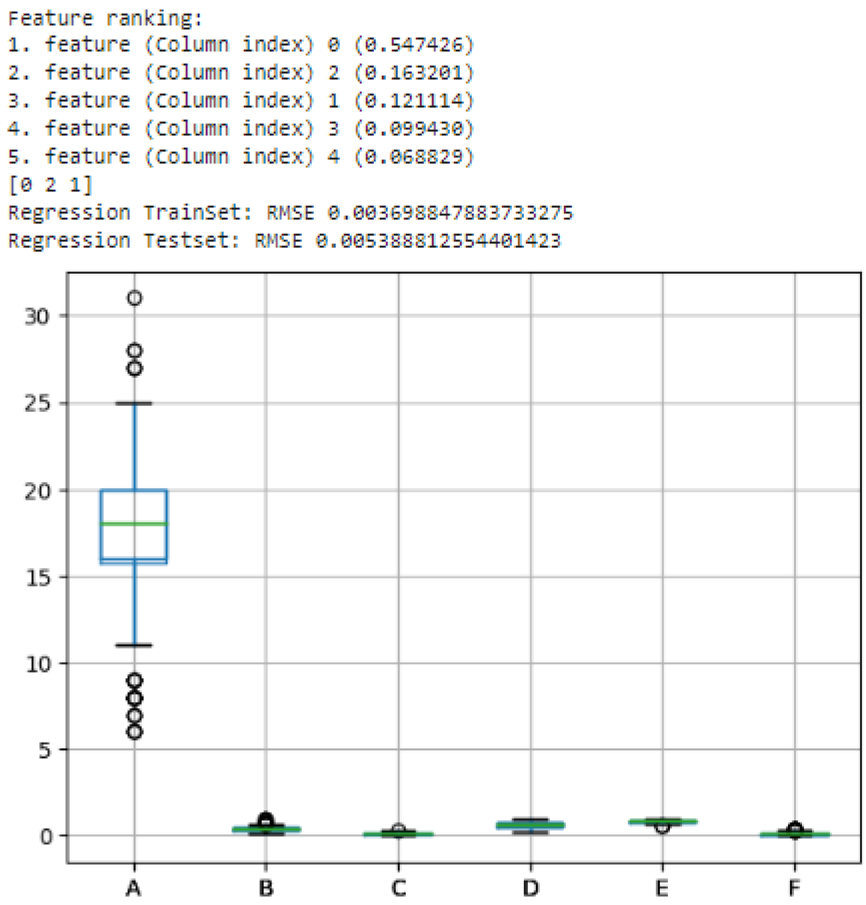
```
Feature ranking:
1. feature (Column index) 0 (0.547426)
2. feature (Column index) 2 (0.163201)
3. feature (Column index) 1 (0.121114)
4. feature (Column index) 3 (0.099430)
5. feature (Column index) 4 (0.068829)
```

In lab task 3:

```
# %%
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("====")
```

Output:



```
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)
[0 2 1]
Regression TrainSet: RMSE 0.003698847883733275
Regression Testset: RMSE 0.005388812554401423
```