import libraries

In [1]:
```
import pandas as pd
import numpy as np
```

import dataset

In [18]:
```
data_df = pd.read_csv("H:\Level 4 Information Systems\Plastikat\Plastikat Data\companiesPlastic-data-ML.csv")
data_df.head()
```

Out[18]:

	status	number_of_delegates	number_of_offers	number_of_users	company_rateing	years_of_experince	plastic_quantity
0	IN_APPROVAL	18	0	90	0	0	0
1	SUSPENDED	11	17	55	1	6	113
2	APPROVED	1	25	5	5	10	86
3	SUSPENDED	7	43	35	1	4	275
4	APPROVED	9	17	45	4	7	99

Define x and y

In [3]:
```
x = data_df.drop(['status','plastic_quantity'], axis=1).values
y = data_df['plastic_quantity'].values
```

split the data into teaining and testing data

In [4]:
```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test = train_test_split(x,y,test_size=0.25,random_state=0)
```

train the model on the training data

In [5]:
```
from sklearn.linear_model import LinearRegression
ml=LinearRegression()
ml.fit(x_train,y_train)
```

Out[5]:
```
LinearRegression()
```

In [6]:
```

from sklearn.tree import DecisionTreeRegressor
from sklearn.metrics import mean_squared_error as MSE
dt = DecisionTreeRegressor(max_depth=4,min_samples_leaf=0.1,random_state=3)
dt.fit(x_train,y_train)
```

Out[6]:
```
DecisionTreeRegressor(max_depth=4, min_samples_leaf=0.1, random_state=3)
```

predict the test result

In [7]:
```
y_pred = ml.predict(x_test)
ml.predict([[11,17,55,1,6]])

y_pred_2 = dt.predict(x_test)
mse_dt = MSE(y_test,y_pred)
rmse_dt = mse_dt**(1/2)
print(y_pred_2)
```

```
[110.03333333   2.48888889 258.66666667 110.03333333 157.89795918
  69.32653061   7.7        258.66666667  69.32653061   3.8125
   7.7        157.89795918 258.66666667 157.89795918   7.7
  69.32653061 110.03333333   3.8125       3.8125       2.48888889
   2.48888889   7.7          7.7         97.05714286   7.7
   3.8125      69.32653061   2.48888889   2.48888889   2.48888889
   2.48888889 110.03333333 110.03333333  97.05714286   7.7
157.89795918   2.48888889 157.89795918 258.66666667 258.66666667
110.03333333   7.7          2.48888889  97.05714286 157.89795918
110.03333333 157.89795918   3.8125       2.48888889   3.8125
   2.48888889   3.8125     157.89795918   3.8125      97.05714286
  69.32653061 69.32653061 258.66666667   2.48888889 157.89795918
   3.8125       3.8125      97.05714286   7.7        97.05714286
   7.7        110.03333333 157.89795918 157.89795918   2.48888889
157.89795918   7.7        157.89795918 110.03333333 110.03333333
110.03333333 157.89795918   3.8125       3.8125     157.89795918
110.03333333   2.48888889  69.32653061   2.48888889  69.32653061
157.89795918  69.32653061 110.03333333  97.05714286 157.89795918
157.89795918  69.32653061 157.89795918  69.32653061   7.7
 97.05714286  69.32653061   3.8125       3.8125      69.32653061]
```

Evaluate the model

In [8]:
```
from sklearn.metrics import r2_score
r2_score(y_test,y_pred)
```

Out[8]:
```
0.9533303352626061
```

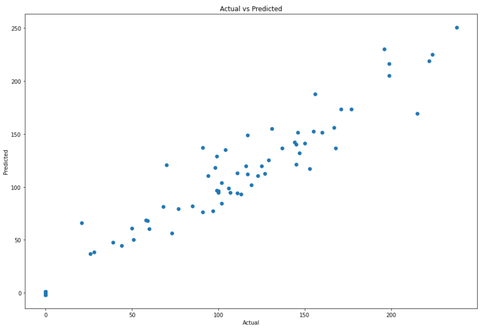
In [9]:
```
r2_score(y_test,y_pred_2)
```

Out[9]:
```
0.8967251807385168
```

plot the results

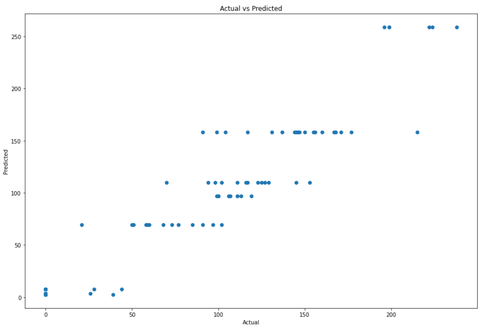
In [12]:
```
import matplotlib.pyplot as plt
plt.figure(figsize=(15,10))
plt.scatter(y_test,y_pred, label="Actual test data")
plt.xlabel('Actual')
plt.ylabel('Predicted')
plt.title('Actual vs Predicted')
```

Out[12]:
```
Text(0.5, 1.0, 'Actual vs Predicted')
```



In [13]:
```
plt.figure(figsize=(15,10))
plt.scatter(y_test,y_pred_2, label="Actual test data")
plt.xlabel('Actual')
plt.ylabel('Predicted')
plt.title('Actual vs Predicted')
```

Out[13]:
```
Text(0.5, 1.0, 'Actual vs Predicted')
```



predicted values

In [14]:
```
pred_y_df = pd.DataFrame({'Actual Value' : y_test, 'predicted value' : y_pred, "Difference" : y_test-y_pred})
pred_y_df[0:20]
```

Out[14]:

	Actual Value	predicted value	Difference
0	94	110.574126	-16.574126
1	0	0.678293	-0.678293
2	224	225.253363	-1.253363
3	98	118.139431	-20.139431
4	150	141.395486	8.604514
5	85	82.008536	2.991464
6	0	-0.873214	0.873214
7	222	218.838004	3.161996
8	60	60.160399	-0.160399
9	0	-1.842906	1.842906
10	0	-0.485337	0.485337
11	171	173.403533	-2.403533
12	199	205.303425	-6.303425
13	104	135.008312	-31.008312
14	0	-0.291399	0.291399
15	59	67.853770	-8.853770
16	145	121.157346	23.842654
17	0	-1.648967	1.648967
18	0	-1.455029	1.455029
19	0	1.260108	-1.260108

In [16]:
```
pred_y_df_2 = pd.DataFrame({'Actual Value' : y_test, 'predicted value' : y_pred_2, "Difference" : y_test-y_pred_2})
pred_y_df_2[0:20]
```

Out[16]:

	Actual Value	predicted value	Difference
0	94	110.033333	-16.033333
1	0	2.488889	-2.488889
2	224	258.666667	-34.666667
3	98	110.033333	-12.033333
4	150	157.897959	-7.897959
5	85	69.326531	15.673469
6	0	7.700000	-7.700000
7	222	258.666667	-36.666667
8	60	69.326531	-9.326531
9	0	3.812500	-3.812500
10	0	7.700000	-7.700000
11	171	157.897959	13.102041
12	199	258.666667	-59.666667
13	104	157.897959	-53.897959
14	0	7.700000	-7.700000
15	59	69.326531	-10.326531
16	145	110.033333	34.966667
17	0	3.812500	-3.812500
18	0	3.812500	-3.812500
19	0	2.488889	-2.488889