In [1]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.preprocessing import StandardScaler
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.neighbors import KNeighborsRegressor
from sklearn.tree import DecisionTreeRegressor
from sklearn.ensemble import RandomForestRegressor
from sklearn.svm import SVR
from sklearn.metrics import mean_absolute_error,mean_squared_error
from sklearn.model_selection import KFold
from sklearn.model_selection import cross_val_score
import matplotlib.pyplot as plt
```

In [2]:

```
dataset = pd.read_csv("petrol_consumption.csv")
```

In [3]:

```
dataset.head()
```

Out[3]:

	Petrol_tax	Average_income	Paved_Highways	Population_Driver_licence(%)	Petrol_Consumption
0	9.0	3571	1976	0.525	541
1	9.0	4092	1250	0.572	524
2	9.0	3865	1586	0.580	561
3	7.5	4870	2351	0.529	414
4	8.0	4399	431	0.544	410

In [4]:

```
dataset.describe()
```

Out[4]:

	Petrol_tax	Average_income	Paved_Highways	Population_Driver_licence(%)	Petrol_Consumption
count	48.000000	48.000000	48.000000	48.000000	48.000000
mean	7.668333	4241.833333	5565.416667	0.570333	576.770833
std	0.950770	573.623768	3491.507166	0.055470	111.885816
min	5.000000	3063.000000	431.000000	0.451000	344.000000
25%	7.000000	3739.000000	3110.250000	0.529750	509.500000
50%	7.500000	4298.000000	4735.500000	0.564500	568.500000
75%	8.125000	4578.750000	7156.000000	0.595250	632.750000
max	10.000000	5342.000000	17782.000000	0.724000	968.000000

In [5]:

```
dataset.isnull().sum()
```

Out[5]:

```
Petrol_tax                      0
```

```
Average_income                 0
Paved_Highways                 0
Population_Driver_licence(%)    0
Petrol_Consumption             0
dtype: int64
```

In [6]:

```
dataset.corr()
```

Out[6]:

	Petrol_tax	Average_income	Paved_Highways	Population_Driver_licence(%)
Petrol_tax	1.000000	0.012665	-0.522130	-0.288037
Average_income	0.012665	1.000000	0.050163	0.157070
Paved_Highways	-0.522130	0.050163	1.000000	-0.064129
Population_Driver_licence(%)	-0.288037	0.157070	-0.064129	1.000000
Petrol_Consumption	-0.451280	-0.244862	0.019042	0.698965

In [7]:

```
X = dataset.iloc[:,:-1]
y = dataset.Petrol_Consumption

sc = StandardScaler()
sc.fit_transform(X)

cv = KFold(n_splits=10, random_state=1, shuffle=True)
```

Linear Regression

In [8]:

```
scores_lr = cross_val_score(LinearRegression(), X, y, scoring='neg_mean_absolute_error'
mae_lr = np.mean(np.absolute(scores_lr))
rmse_lr = np.sqrt(np.mean(np.absolute(scores_lr)))

print("Linear Regression Results")
print("Mean Absolute Error: ",mae_lr)
print("Root Mean Squared Error:  ",rmse_lr)
```

```
Linear Regression Results
Mean Absolute Error:  52.58831640064451
Root Mean Squared Error:   7.251780222858695
```

K-Neighbors Regressor

In [9]:

```
scores_knn = cross_val_score(KNeighborsRegressor(), X, y, scoring='neg_mean_absolute_er
mae_knn = np.mean(np.absolute(scores_knn))
rmse_knn = np.sqrt(np.mean(np.absolute(scores_knn)))

print("K-Neighbors Results")
print("Mean Absolute Error: ",mae_knn)
print("Root Mean Squared Error:  ",rmse_knn)
```

```
K-Neighbors Results
Mean Absolute Error:  83.92099999999999
```

```
Root Mean Squared Error:   9.160840572785883
```

Decision Tree Regressor

In [10]:

```
scores_dtr = cross_val_score(DecisionTreeRegressor(), X, y, scoring='neg_mean_absolute_
mae_dtr = np.mean(np.absolute(scores_dtr))
rmse_dtr = np.sqrt(np.mean(np.absolute(scores_dtr)))

print("Decision Tree Regressor")
print("Mean Absolute Error: ",mae_dtr)
print("Root Mean Squared Error:  ",rmse_dtr)
```

```
Decision Tree Regressor
Mean Absolute Error:  74.83
Root Mean Squared Error:   8.650433515148244
```

Random Forest Regressor

In [11]:

```
scores_rfr = cross_val_score(RandomForestRegressor(), X, y, scoring='neg_mean_absolute_
mae_rfr = np.mean(np.absolute(scores_rfr))
rmse_rfr = np.sqrt(np.mean(np.absolute(scores_rfr)))

print("Random Forest Regressor")
print("Mean Absolute Error: ",mae_rfr)
print("Root Mean Squared Error:  ",rmse_rfr)
```

```
Random Forest Regressor
Mean Absolute Error:  44.86510000000001
Root Mean Squared Error:   6.698141533291157
```

Support Vector Regressor

In [12]:

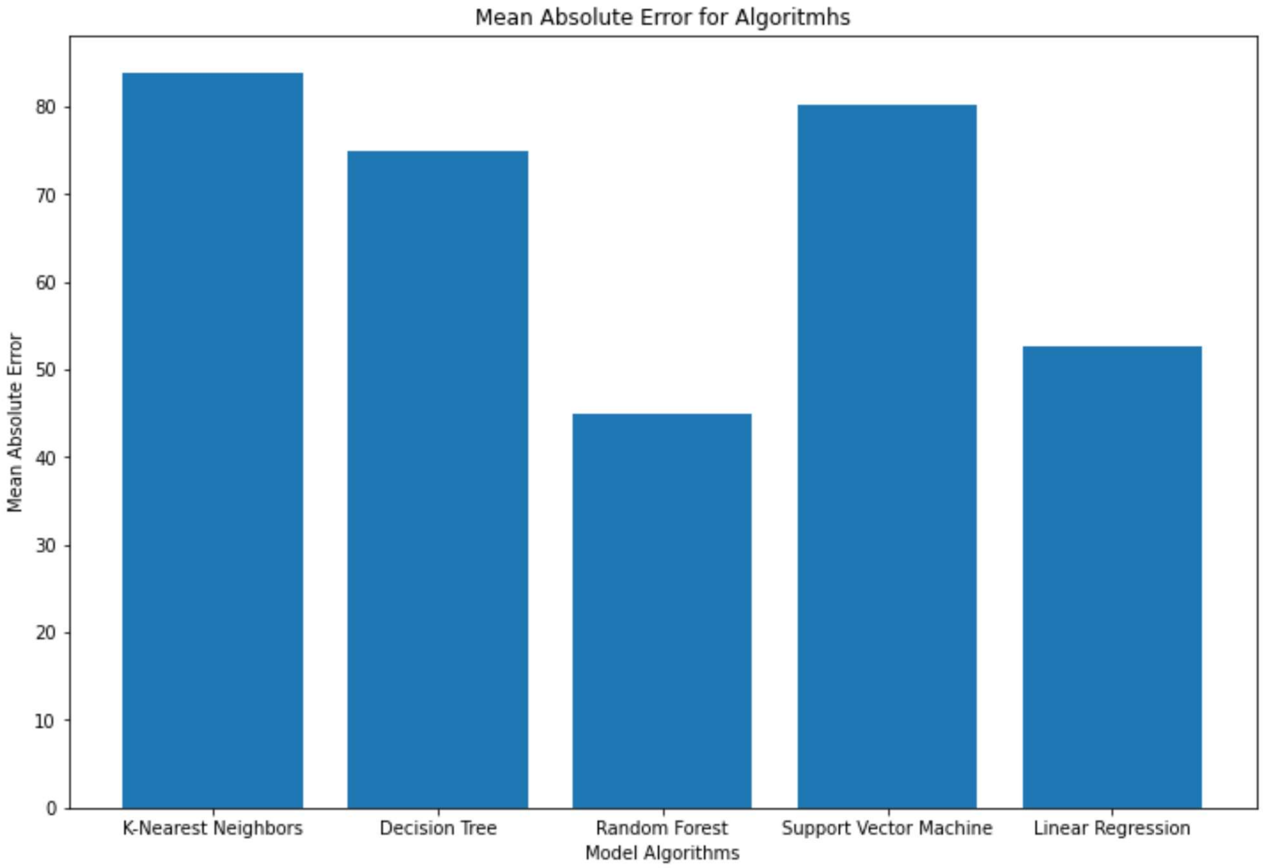
```
scores_svr = cross_val_score(SVR(), X, y, scoring='neg_mean_absolute_error',cv=cv, n_jo
mae_svr = np.mean(np.absolute(scores_svr))
rmse_svr = np.sqrt(np.mean(np.absolute(scores_svr)))

print("Support Vector Regressor")
print("Mean Absolute Error: ",mae_svr)
print("Root Mean Squared Error:  ",rmse_svr)
```

```
Support Vector Regressor
Mean Absolute Error:  80.26898418566797
Root Mean Squared Error:   8.959295964843887
```

Visualization

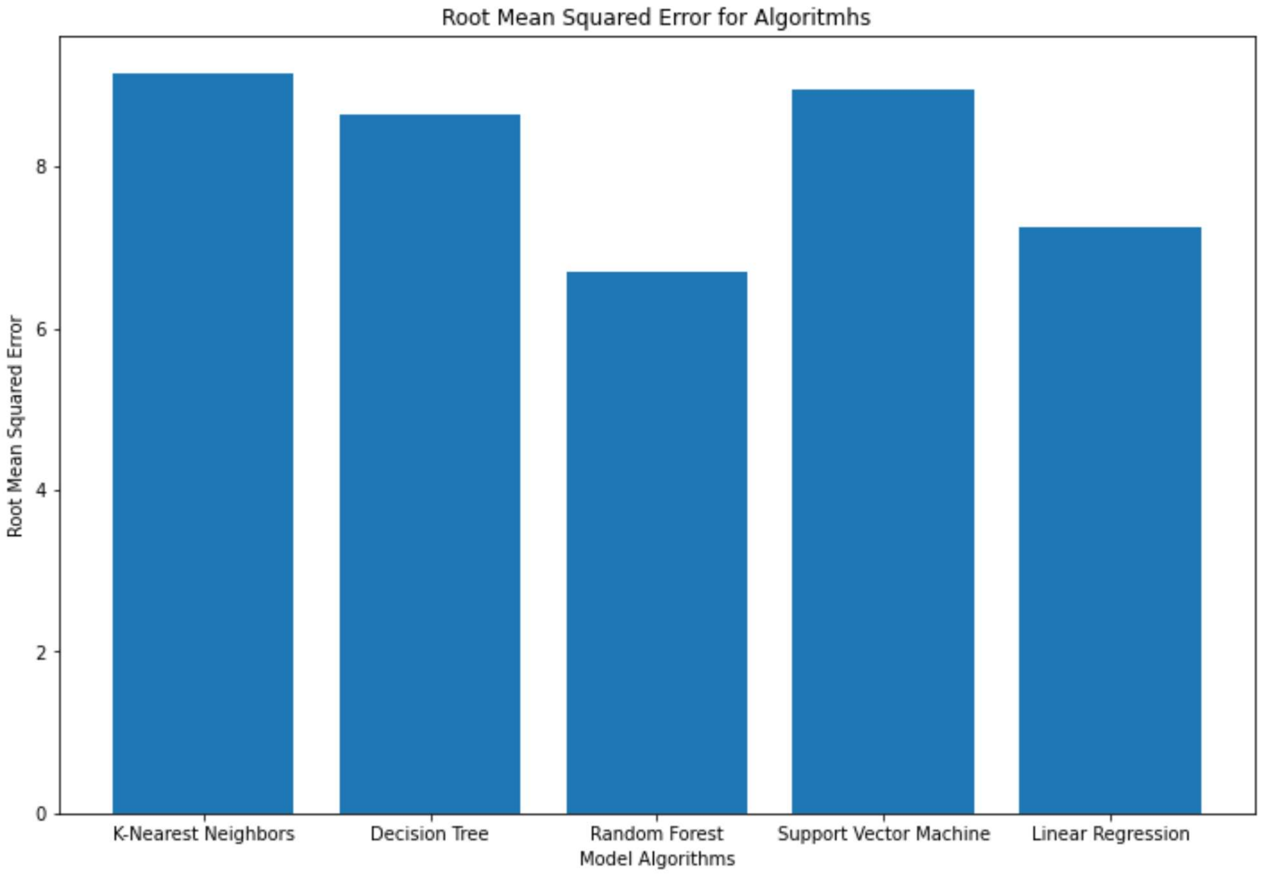
In [13]:

```
plt.figure(figsize=(12,8))
D = {u'K-Nearest Neighbors':mae_knn, u'Decision Tree': mae_dtr, u'Random Forest':mae_rf

plt.bar(range(len(D)), list(D.values()), align='center')
plt.xticks(range(len(D)), list(D.keys()))
plt.xlabel("Model Algorithms")
plt.ylabel("Mean Absolute Error")
plt.title("Mean Absolute Error for Algoritmhs")
plt.show()
```



In [14]:

```
plt.figure(figsize=(12,8))
D = {u'K-Nearest Neighbors':rmse_knn, u'Decision Tree': rmse_dtr, u'Random Forest':rmse_

plt.bar(range(len(D)), list(D.values()), align='center')
plt.xticks(range(len(D)), list(D.keys()))
plt.xlabel("Model Algorithms")
plt.ylabel("Root Mean Squared Error")
plt.title("Root Mean Squared Error for Algoritmhs")
plt.show()
```


Root Mean Squared Error for Algoritmhs
Root Mean Squared Error
0
2
4
6
8
K-Nearest Neighbors
Decision Tree
Random Forest
Support Vector Machine
Linear Regression
Model Algorithms

In [ ]: