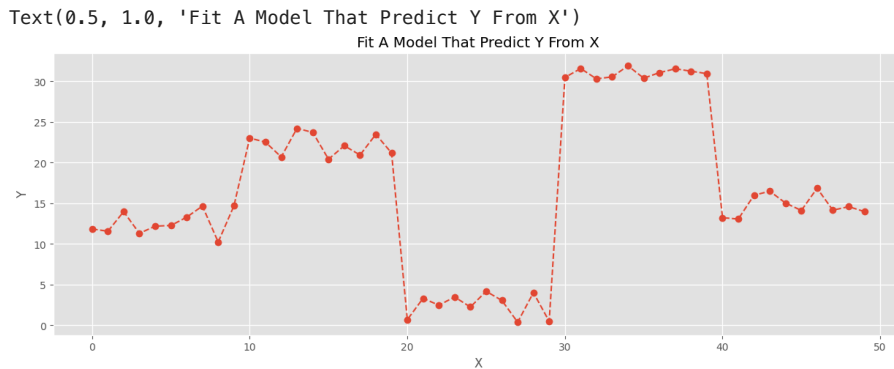


```
%matplotlib inline
import numpy as np
import matplotlib.pyplot as plt
plt.style.use('ggplot')

x=np.arange(0,50)
y1 = np.random.uniform(10,15,10)
y2 = np.random.uniform(20,25,10)
y3 = np.random.uniform(0,5,10)
y4 = np.random.uniform(30,32,10)
y5 = np.random.uniform(13,17,10)
y = np.concatenate((y1,y2,y3,y4,y5))
y

array([11.84974771, 11.56692537, 13.97570257, 11.30784966, 12.19394906,
       12.2741212 , 13.29931238, 14.66468311, 10.233239 , 14.7022601 ,
       23.03228252, 22.52284932, 20.70436679, 24.22326824, 23.72751803,
       20.42590739, 22.08474293, 20.94240384, 23.48506736, 21.19894728,
       0.69534647,  3.3204567 ,  2.46847938,  3.48334524,  2.24648862,
       4.17583854,  3.05915413,  0.37802288,  4.01604073,  0.49321336,
       30.48198988, 31.58524512, 30.31239168, 30.55326123, 31.9172354 ,
       30.39316416, 31.07847443, 31.54450348, 31.25958654, 30.9513489 ,
       13.23865968, 13.07022481, 16.00210233, 16.48921608, 15.03134416,
       14.12439797, 16.8552058 , 14.15650999, 14.59238164, 13.99216308])
```

```
plt.figure(figsize = (15,5))
plt.plot(x,y,'o--')
plt.xlabel('X')
plt.ylabel('Y')
plt.title('Fit A Model That Predict Y From X')
```



```
from sklearn.tree import DecisionTreeRegressor
```

```
X = x.reshape(-1,1)
plt.rcParams['figure.figsize'] = 20,50
trees = []
err = y
plot_num = 1
for i in range(100):
    est = DecisionTreeRegressor(max_leaf_nodes=2)
    est.fit(X,err)
    trees.append(est)
    y_pred = np.sum([tree.predict(X) for tree in trees],axis=0)
    err = y - y_pred
    if i%10 == 0:
        plt.subplot(10,1,plot_num)
        plot_num +=1
        tx = np.linspace(0,50,100)
        ty = np.sum([tree.predict(tx.reshape(-1,1)) for tree in trees],axis = 0)
        plt.plot(x,y,'o--',label = 'data')
        plt.plot(tx,ty,label = 'model')
        plt.plot(X,err,'o--',label = 'error')
        plt.xlabel('X')
        plt.ylabel('Y')
        plt.title('tree %d' %(i+1))
        _ = plt.legend()
plt.tight_layout()
```

