DECISION TREE REGRESSION

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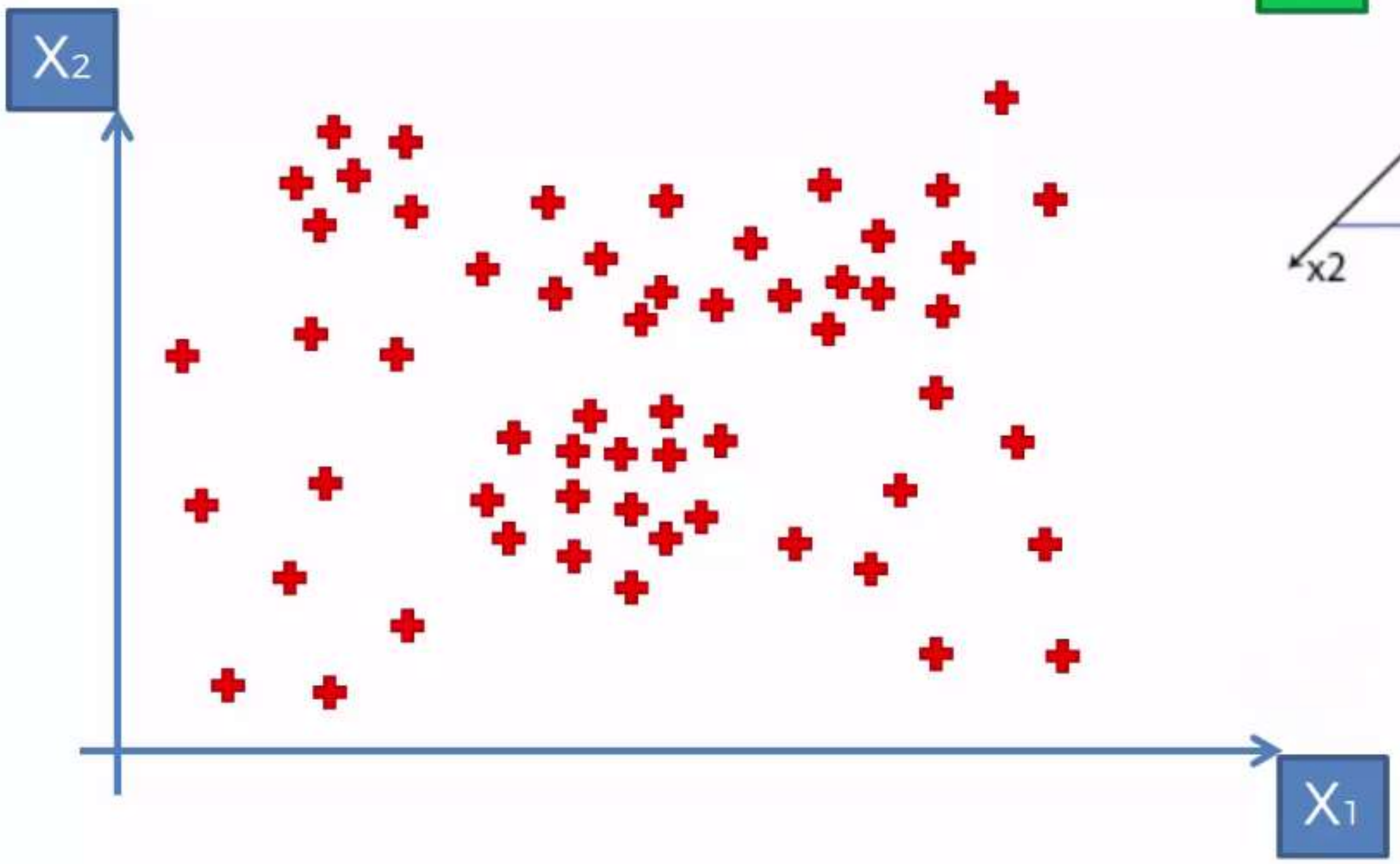
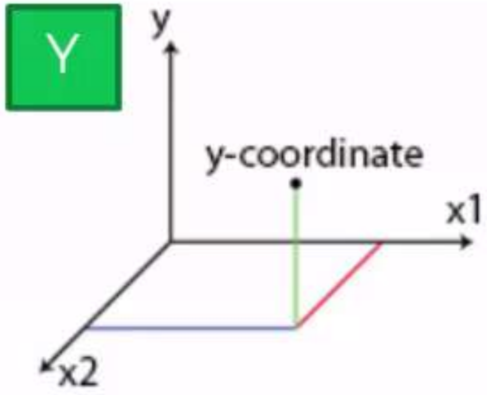
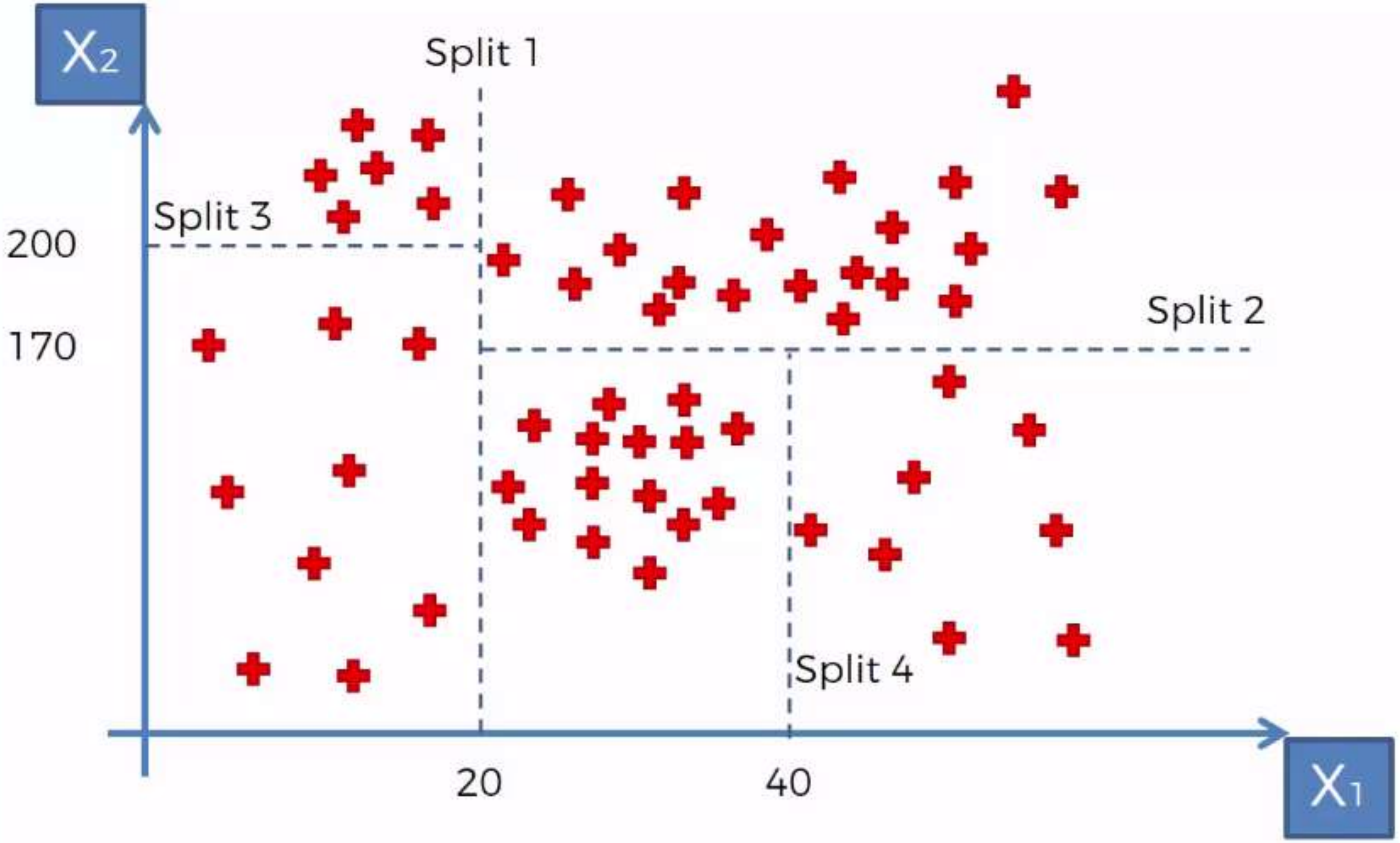
Decision Tree Intuition

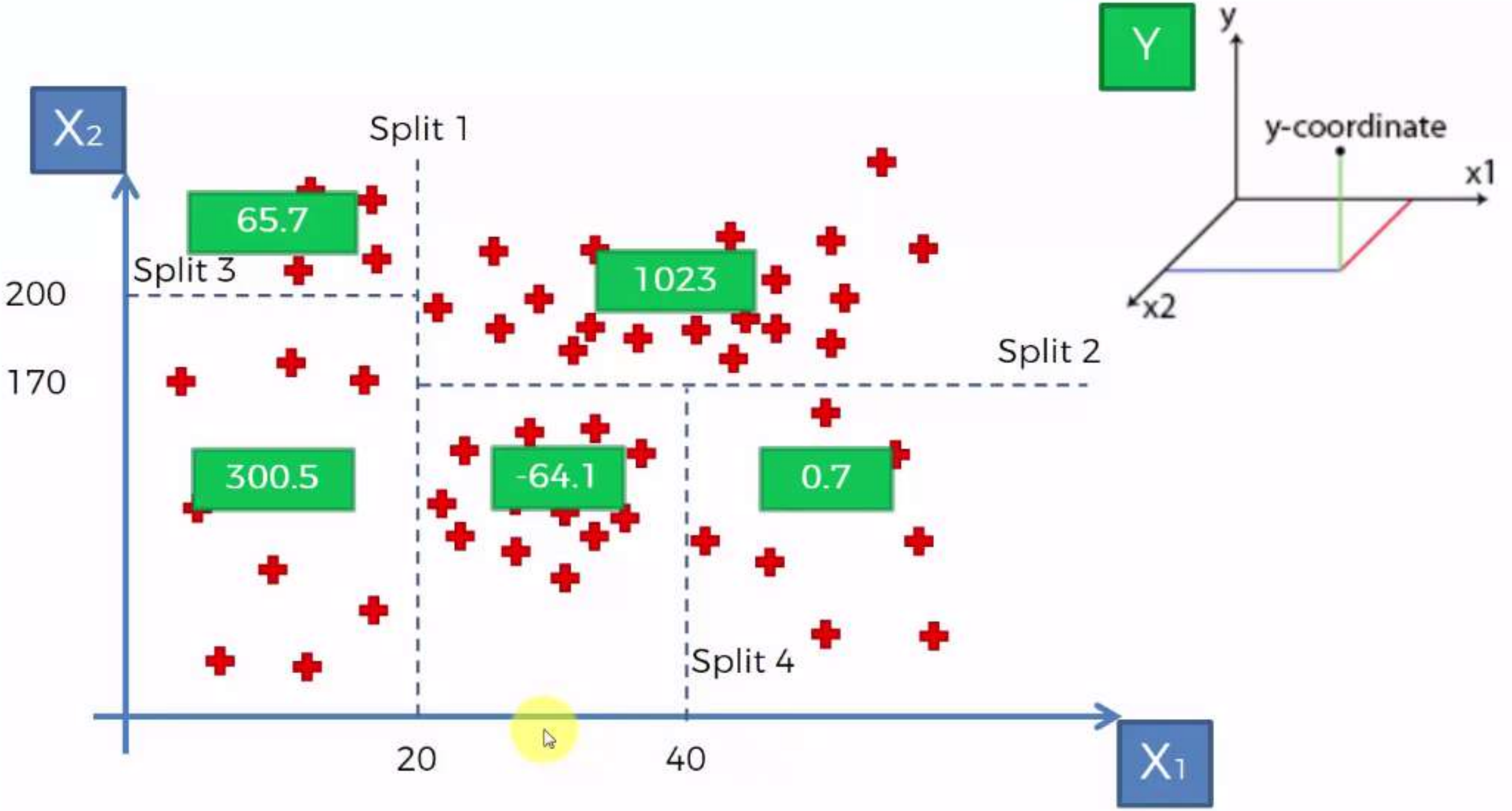




Decision Tree Intuition

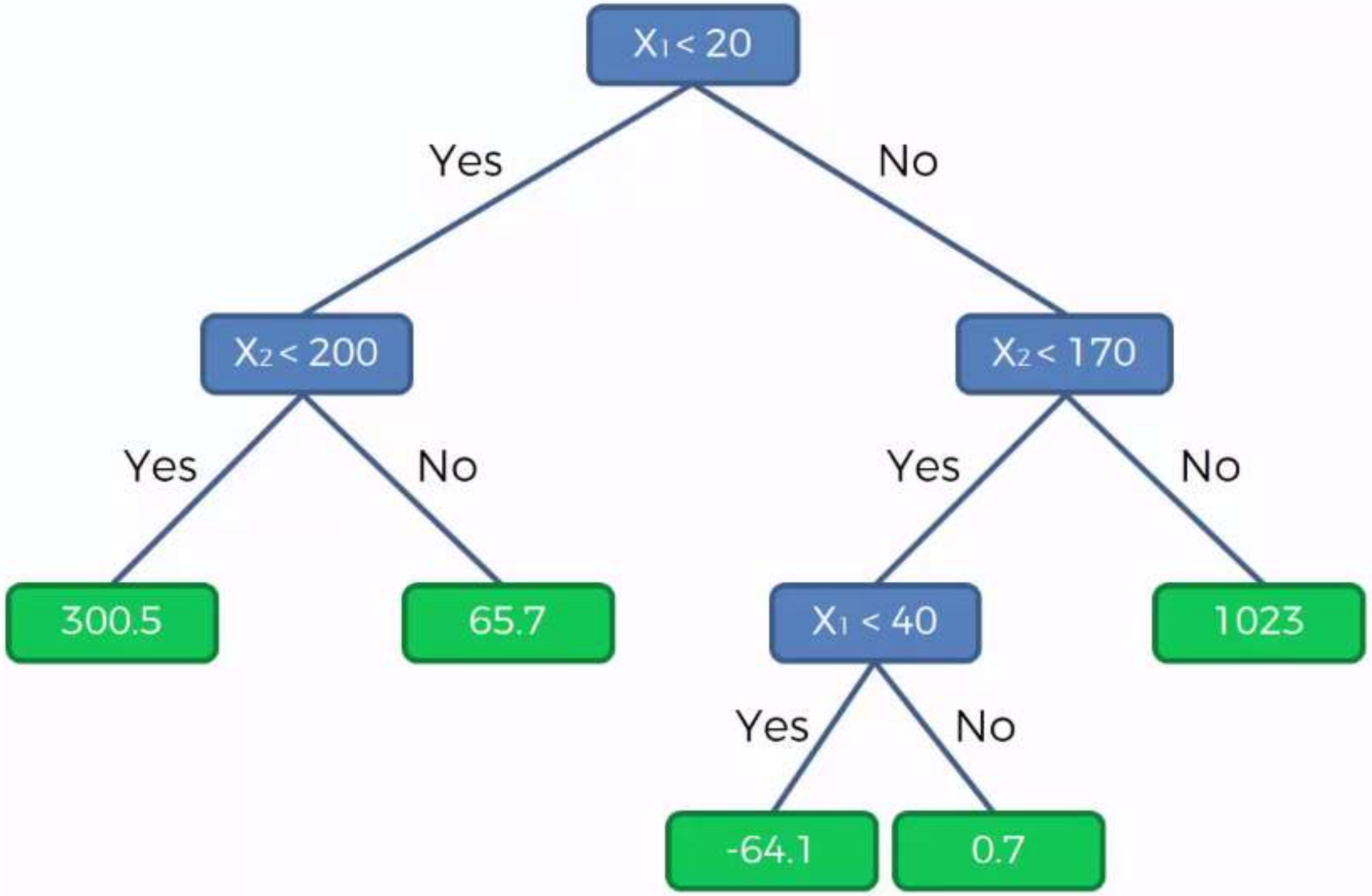


Decision Tree Intuition



The value in green box represents the average of data points in that split

Decision Tree Intuition



$X_1 < 20$

Yes

No

$X_2 < 200$

$X_2 < 170$

Yes

No

Yes

No

300.5

65.7

$X_1 < 40$

1023

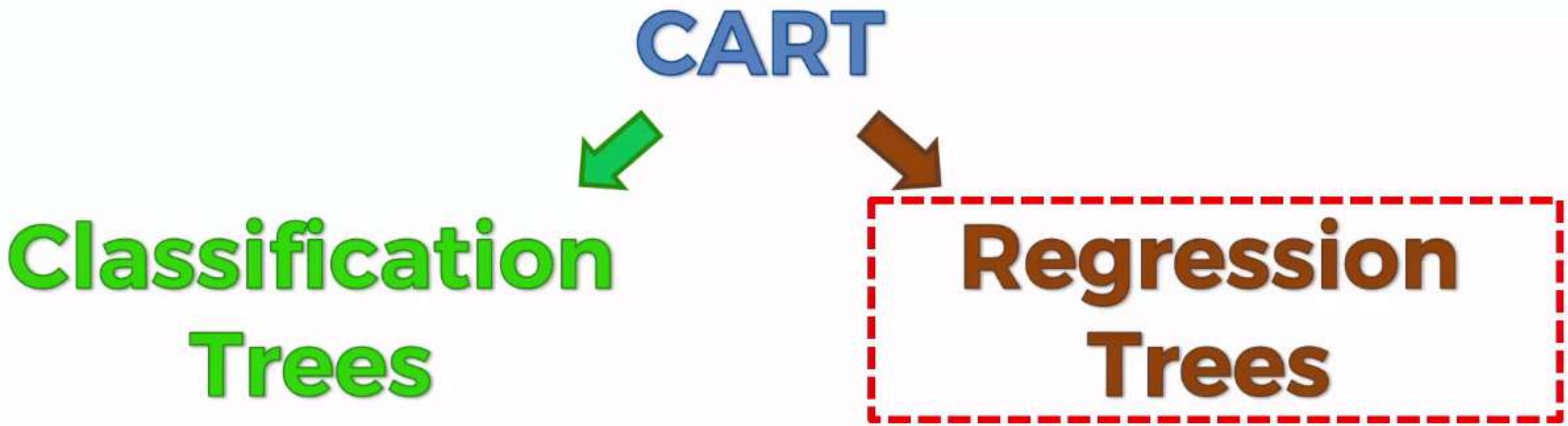
Yes

No

-64.1

0.7

Decision Tree Intuition



CART

Classification Trees

Regression Trees

PYTHON

READING FILE DYNAMICALLY

```
from tkinter import *
from tkinter.filedialog import askopenfilename

root = Tk()
root.withdraw()
root.update()
file_path = askopenfilename()
root.destroy()
```

IMPORTING LIBRARIES

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
```

IMPORTING DATASET

```
dataset = pd.read_csv(file_path)

X= dataset.iloc[:,1:2].values
y= dataset.iloc[:,2:3].values
```

DECISION TREE REGRESSOR

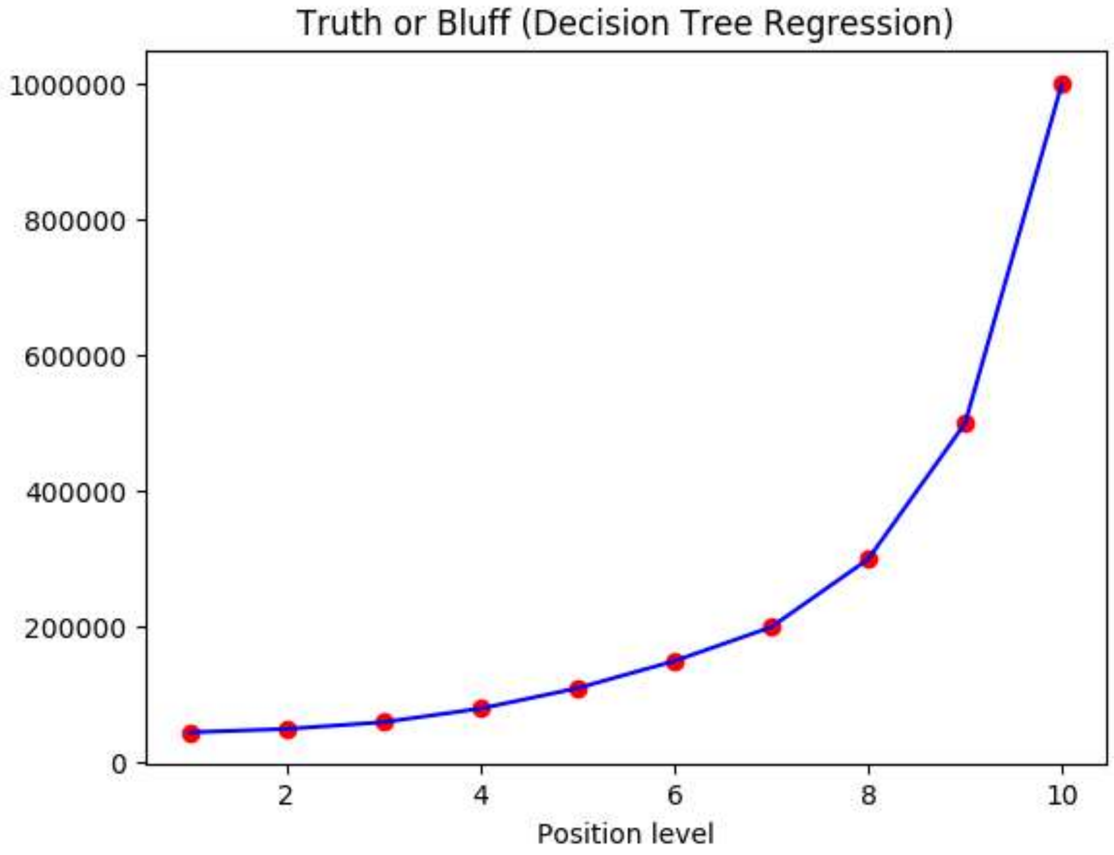
```
from sklearn.tree import DecisionTreeRegressor
regressor = DecisionTreeRegressor(random_state=42)

model = regressor.fit(X,y)
```

PREDICTION

```
model.predict(6.5)
```

SIMPLE PLOT

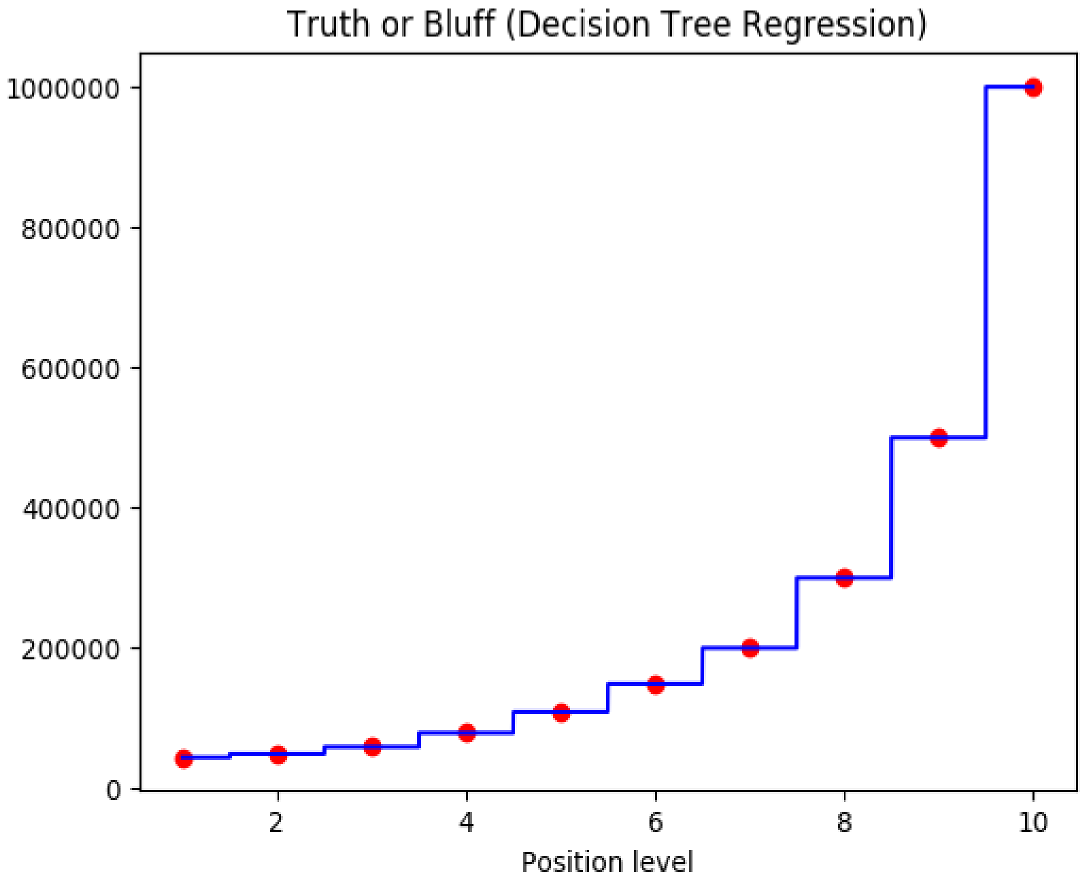
```
plt.scatter(X,y,color="red")
plt.plot(X,model.predict(X),color="blue")
plt.title('Truth or Bluff (Decision Tree Regression)')
plt.xlabel('Position level')
plt.ylabel('Salary')
plt.show()
```



NOTE : Whats wrong here ? Well in the simple plot the Decision Tree Regressor model is treated as a c
But it is not a continuous model. Decision Tree Regressor is a discrete model hence it should be treate
FIX : plotting the same graph with grid with small step size say 0.01 will help us visualize better

UPDATED PLOT

```
X_grid = np.arange(min(X), max(X), 0.001)
X_grid = X_grid.reshape((len(X_grid), 1))
plt.scatter(X, y, color = 'red')
plt.plot(X_grid, regressor.predict(X_grid), color = 'blue')
plt.title('Truth or Bluff (Decision Tree Regression)')
plt.xlabel('Position level')
plt.ylabel('Salary')
plt.show()
```



Note : Here the graph that is plotted gives us the clear discrete structure

R

READ DATASET

```
library(readr)

dataset <- read_csv("D:/machine learning AZ/Machine Learning A-Z Template Folder/Part 2 - Regression/Section 7 - Support Vector Regression (SVR)/SVR/Position_Salaries.csv")


dataset= dataset[2:3]
```

LIBRARY REQUIRED - RPART

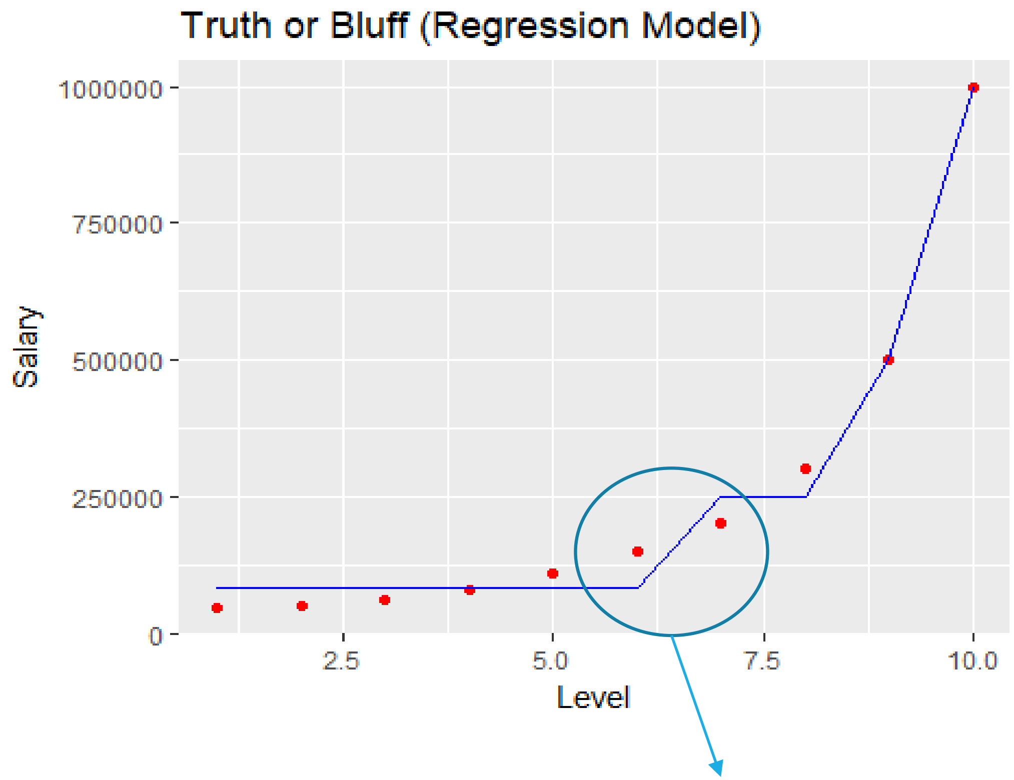
```
library('rpart')
```

```
regressor = rpart(Salary ~ . , data= dataset , control =
rpart.control(minsplit = 1))
```

NOTE : do not forget to include control parameter as it decides the number of splits in your model.

PLOT

```
# Visualising the Regression Model results
# install.packages('ggplot2')
library(ggplot2)
ggplot() +
  geom_point(aes(x = dataset$Level, y = dataset$Salary),
             colour = 'red') +
  geom_line(aes(x = dataset$Level, y = predict(regressor, newdata =
dataset)),
            colour = 'blue') +
  ggtitle('Truth or Bluff (Regression Model)') +
  xlab('Level') +
  ylab('Salary')
```

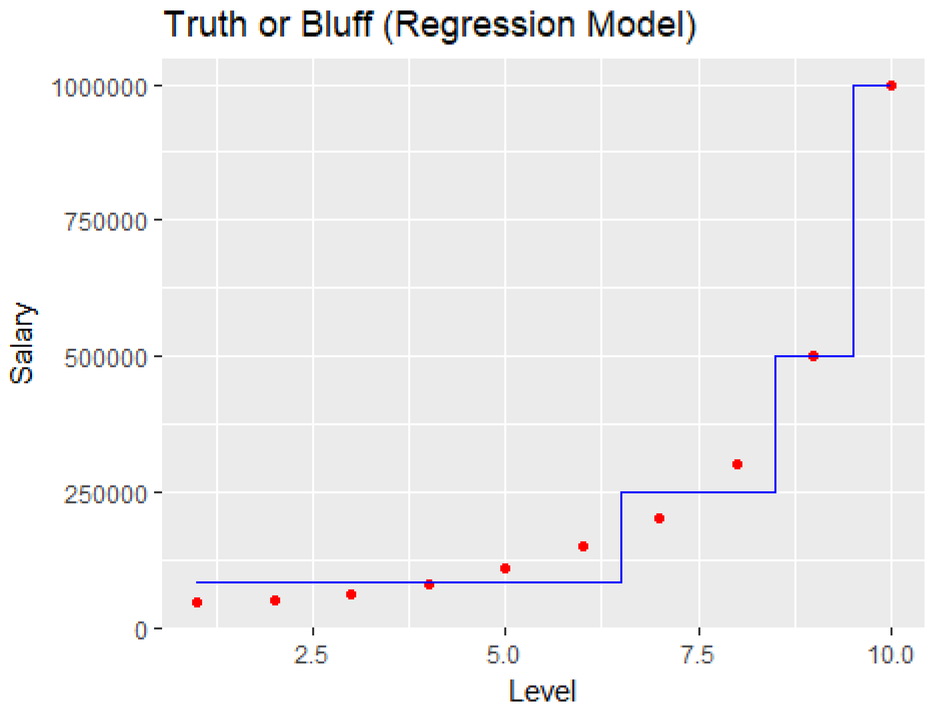


Here model is not treated as discrete hence plot simply joins the prediction points since we don’t have any predictions for this interval.

Solution : plot Level as grid with step size as small as 0.01 or whatever you want it to be

SMOOTHER PLOT

```
# install.packages('ggplot2')

library(ggplot2)

x_grid = seq(min(dataset$Level), max(dataset$Level), 0.001)

ggplot() +

  geom_point(aes(x = dataset$Level, y = dataset$Salary),

             colour = 'red') +

  geom_line(aes(x = x_grid, y = predict(regressor, newdata =
data.frame(Level = x_grid))),

            colour = 'blue') +

  ggtitle('Truth or Bluff (Regression Model)') +

  xlab('Level') +

  ylab('Salary')
```



PERFECT PLOT

PREDICTIONS

```
prediction = predict(regressor,data.frame(Level=6.5))
```