Decision Tree Regression

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I will be building a decision tree regression model based off the ‘Position_Salaries’ data to determine 1.) determine if the model fits the data and 2.) to determine if a particuilar new hire’s past salary was possibly $160,000 as a region manager. In this dataset there are three columns *Position*, *Level*, and *Salary*. Salary is our dependent variable while the other two are our independent variables.

Preparing the Data

```
# Set the seed
set.seed(1)

# Importing the data
positions <- read.csv('../../data/Position_Salaries.csv')

# Examine the Data
dim(positions)

## [1] 10  3

positions

##             Position Level  Salary
## 1   Business Analyst     1   45000
## 2  Junior Consultant     2   50000
## 3  Senior Consultant     3   60000
## 4            Manager     4   80000
## 5    Country Manager     5  110000
## 6     Region Manager     6  150000
## 7            Partner     7  200000
## 8     Senior Partner     8  300000
## 9            C-level     9  500000
## 10               CEO    10 1000000
```

From the table we can see there is some redundancy between the *Position* and *Level* column. Therefor it would make sense to drop the *Position* column and just use the numeric *Level* and *Salary* columns. Since we only have 10 observations, it would not be useful to split the data into a training and test set.

```
# Saving the dataset with only the two necessary columns
positions <- positions[, 2:3]
```

Decision Tree Regressor

```
regressor <- rpart(formula = Salary ~ Level,
                   data = positions,
                   control = rpart.control(minsplit = 1))
```

Predicting a Result

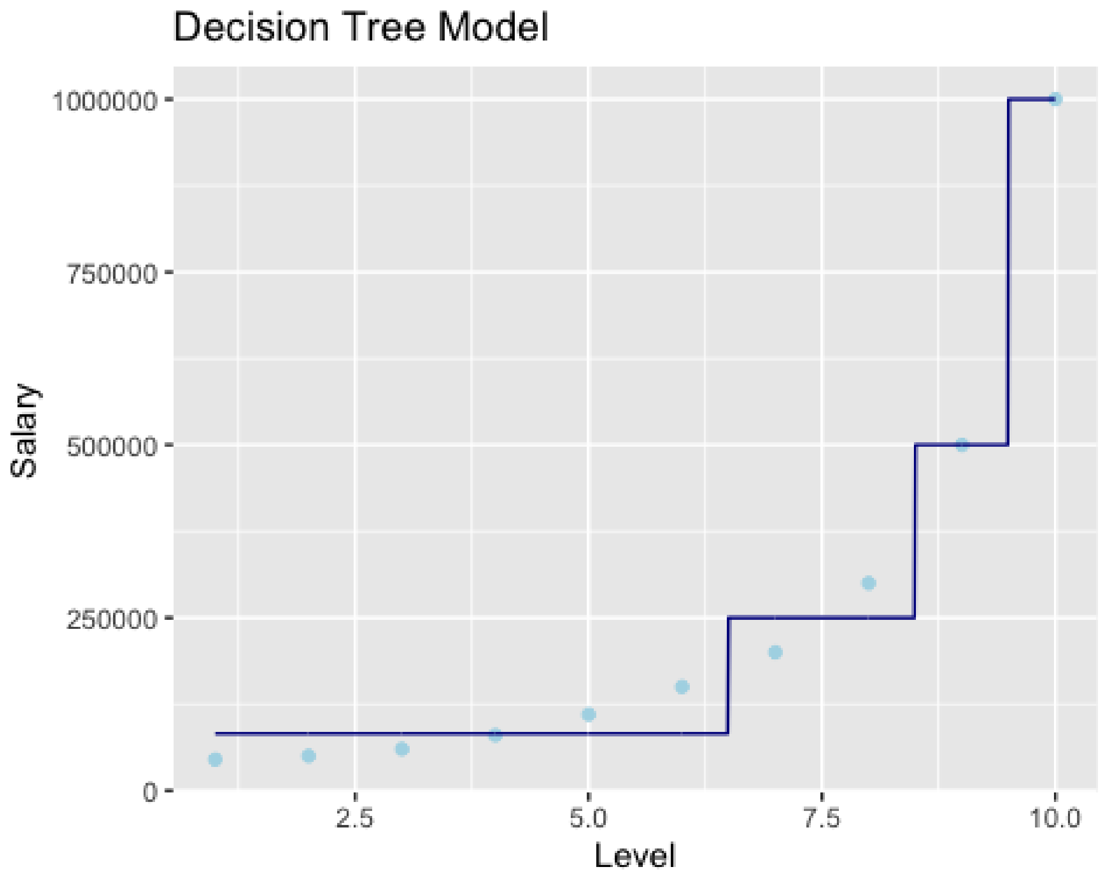
Is it likely that the new hire's past salary was actually $160,000 as a level 6.5?

```
y.pred <- predict(regressor, data.frame(Level = 6.5))
y.pred

##      1
## 250000
```

Visualizing the Decision Tree Model

Visualizing the data will allow us to see if the decision tree regression is a good model for the data. It is important to note this is a non-continuos model.

```
# Increase the resolution
x_grid = seq(min(positions$Level), max(positions$Level), 0.01)

# Visualizing the Decision Tree Regression
ggplot() +
  geom_point(data = positions, aes(x = Level, y = Salary), col = 'lightblue')
+
  geom_line(aes(x = x_grid, y = predict(regressor, newdata = data.frame(Level
= x_grid))), col = 'darkblue') +
  ggtitle('Decision Tree Model') +
  xlab('Level') +
  ylab('Salary')
```



Conclusion

The decision tree regression model is considering the average in each of the split intervals.