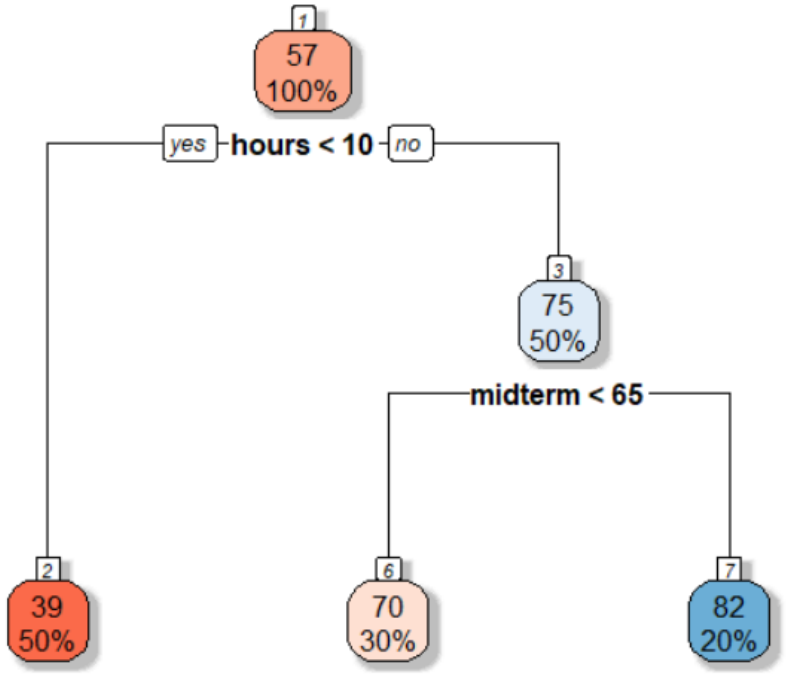
Start-Tech Academy

# Steps



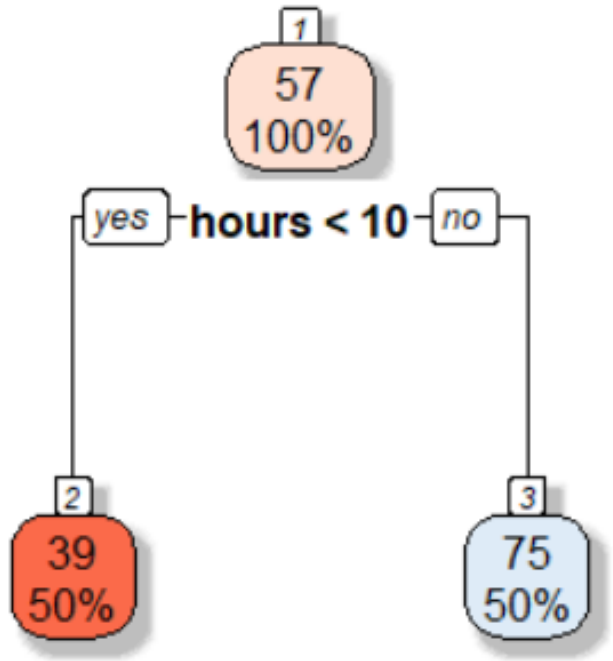

1. We divide the predictor space—that is, the set of possible values for X1,X2, . . .,Xp—into J distinct and non-overlapping regions, R1,R2, . . . , RJ .

2. For every observation that falls into the region Rj, we make the same prediction, which is simply the mean of the response values for the training observations in Rj .

Goal is to minimize RSS

$$\sum_{j=1}^{J} \sum_{i \in R_j} (y_i - \hat{y}_{R_j})^2$$

# Building tree



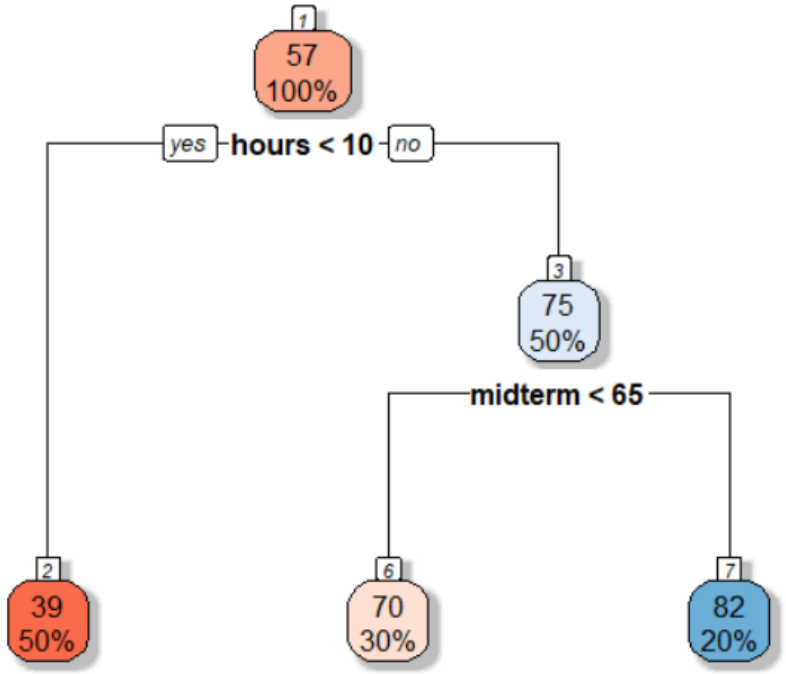

| | score | hours | midterm |
|---|---|---|---|
| 1 | 35 | 6 | 42 |
| 2 | 38 | 5 | 65 |
| 3 | 40 | 7 | 35 |
| 4 | 45 | 6 | 75 |
| 5 | 35 | 8 | 60 |
| 6 | 65 | 11 | 50 |
| 7 | 70 | 12 | 45 |
| 8 | 75 | 18 | 40 |
| 9 | 80 | 14 | 80 |
| 10 | 85 | 12 | 82 |

Mean score 39

Mean score 75

$$\sum_{j=1}^{J} \sum_{i \in R_j} (y_i - \hat{y}_{R_j})^2$$

# Approach




- Top-down, greedy approach that is known as recursive binary splitting.
- Top-down because it begins at the top of the tree and then successively splits the predictor space
- Each split is indicated via two new branches further down on the tree.
- It is greedy because at each step of the tree-building process, the best split is made at that particular step, rather than looking ahead and picking a split that will lead to a better tree in some future step.

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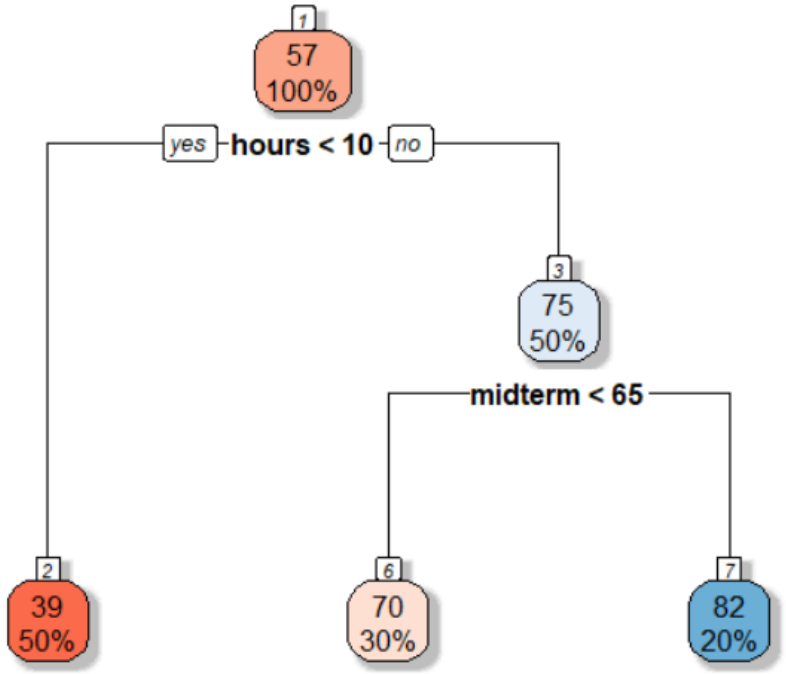


1. Considers all predictors and all possible cut point values
2. Calculates RSS for each possibility
3. Selects the one with least RSS
4. Continues till stopping criteria is reached