KBTG x MeowCode

Say “Hello” Machine Learning

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Class Overview

- What is Machine Learning (ML)
- Main types of Machine Learning
- Steps in a full ML project
- Machine Learning Framework

Scikit-Learn (sklearn)

- Scikit-Learn is a python machine learning library.
- Built on NumPy and Matplotlib (and Python).
- Has many in-built machine learning models.
- Methods to evaluate your machine learning models.

https://scikit-learn.org/stable/

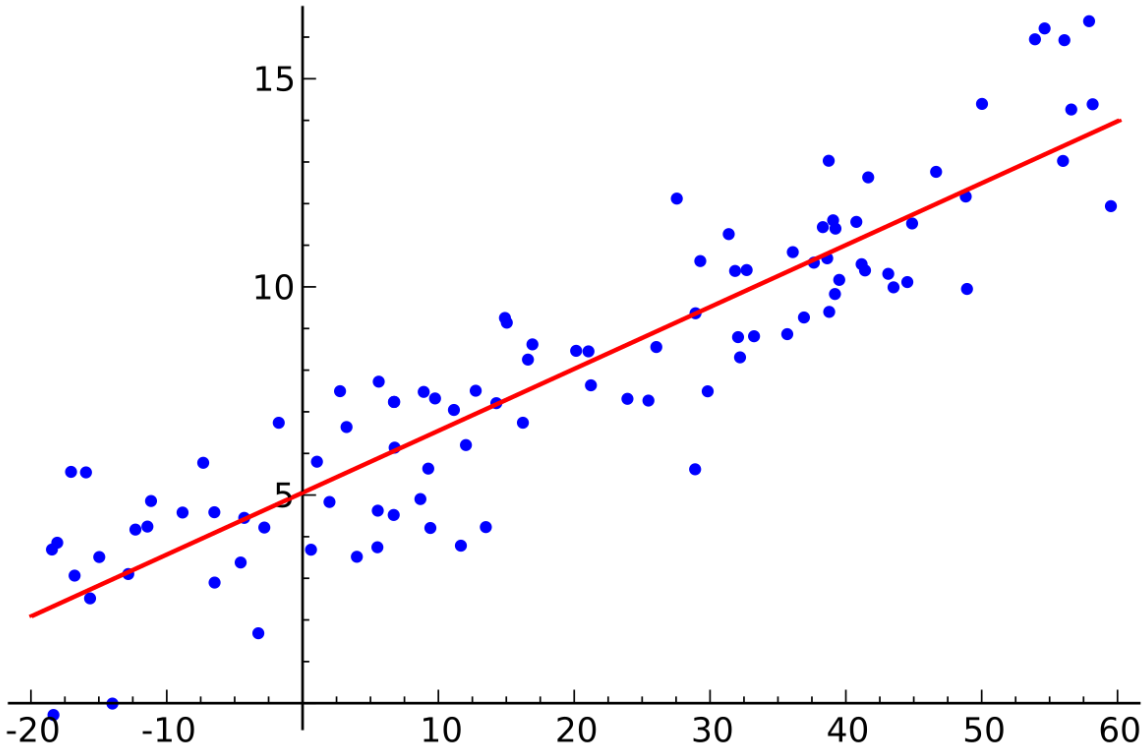
Linear Regression

Simple Linear Regression

$$y' = wx + b$$

Multiple Linear Regression

$$y' = w_1x_1 + w_2x_2 + \cdots + w_nx_n + b$$



y': is the raw prediction.

w : is a weight (slop)

x : is a feature (attribute)

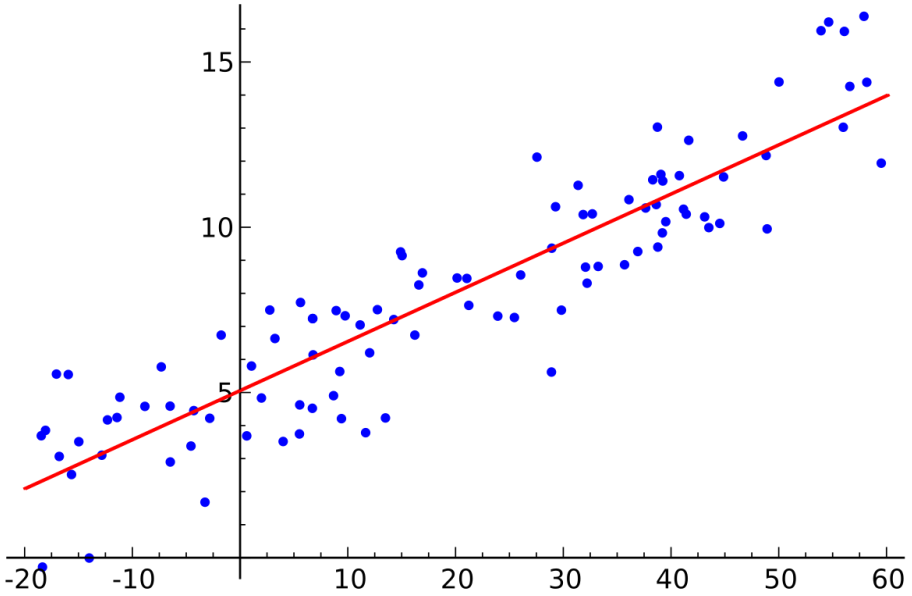
b : is the bias.

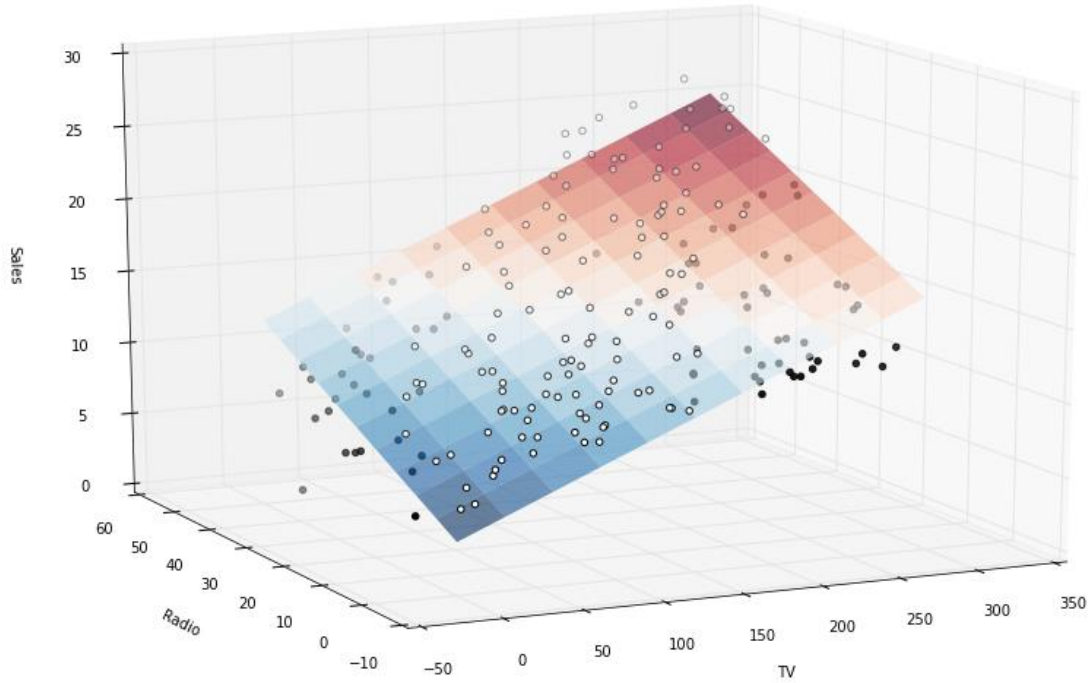
Understanding Linear Regression Algorithm

$$h(X) = \theta_0 + \theta_1 X_1 + \theta_2 X_2 + \theta_3 X_3 + \cdots + \theta_n X_n$$

$$h(X) = \sum_{i}^{n} \theta_i X_i$$

** n features -> (n+1) features*





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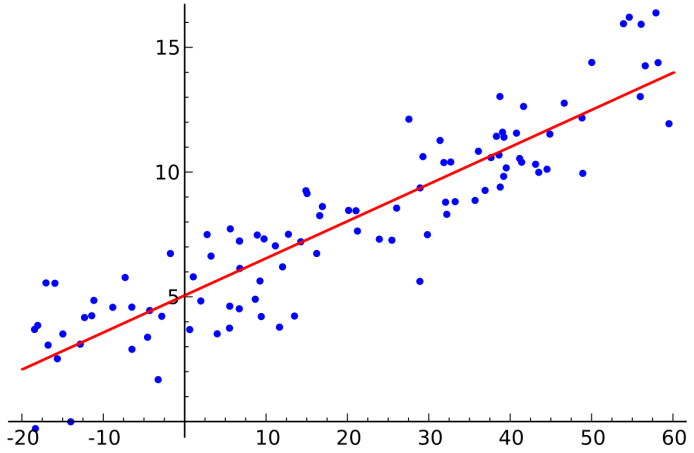
Vector Form of Linear Regression

$$\boldsymbol{\theta} = \begin{bmatrix} \theta_0 \\ \theta_1 \\ \cdots \\ \theta_n \end{bmatrix} \qquad \boldsymbol{X} = \begin{bmatrix} X_0 \\ X_1 \\ \cdots \\ X_n \end{bmatrix}$$

$$h(X) = [\theta_0 \ \theta_1 \ \theta_2 \ \ldots \ \theta_3 \ ] \cdot \begin{bmatrix} X_0 \\ X_1 \\ X_2 \\ \cdots \\ X_n \end{bmatrix} = \boldsymbol{\theta}^T \boldsymbol{X}$$



Regression

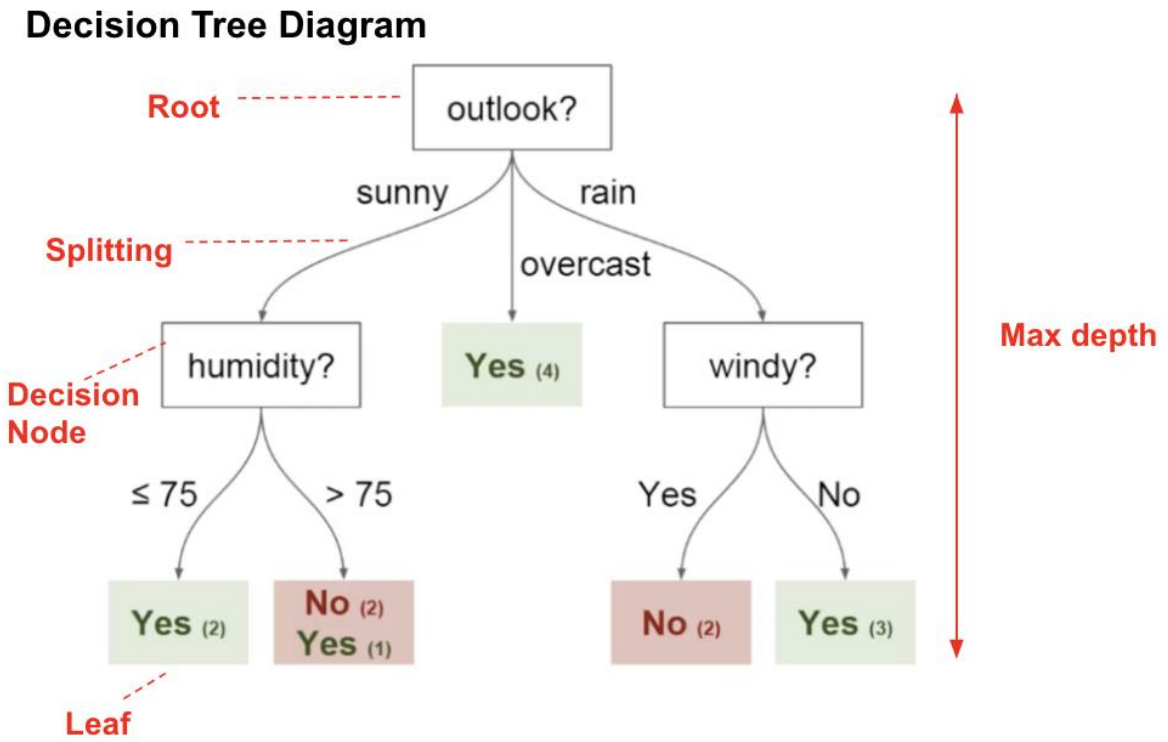
Mean absolute error (MAE)

Mean squared error (MSE)

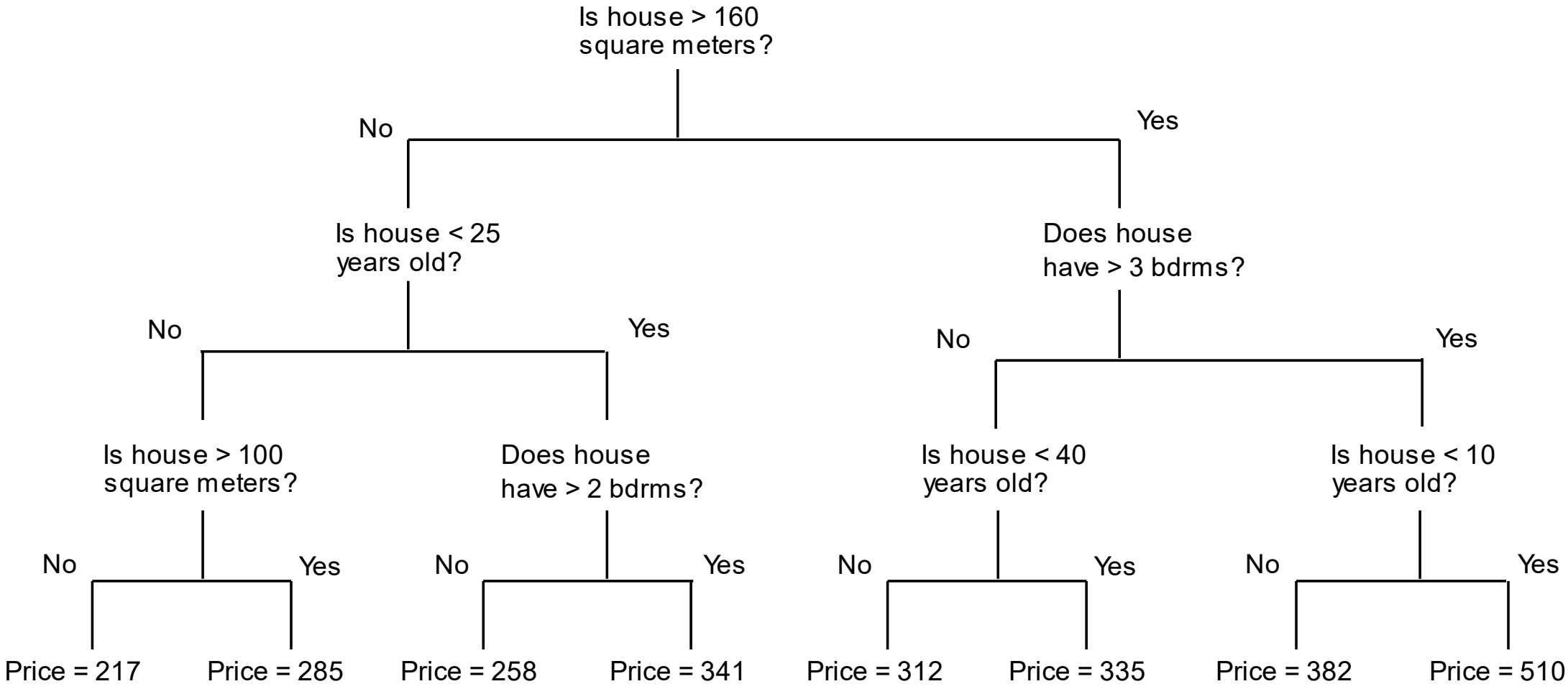
Root mean squared error (RMSE)

Decision tree

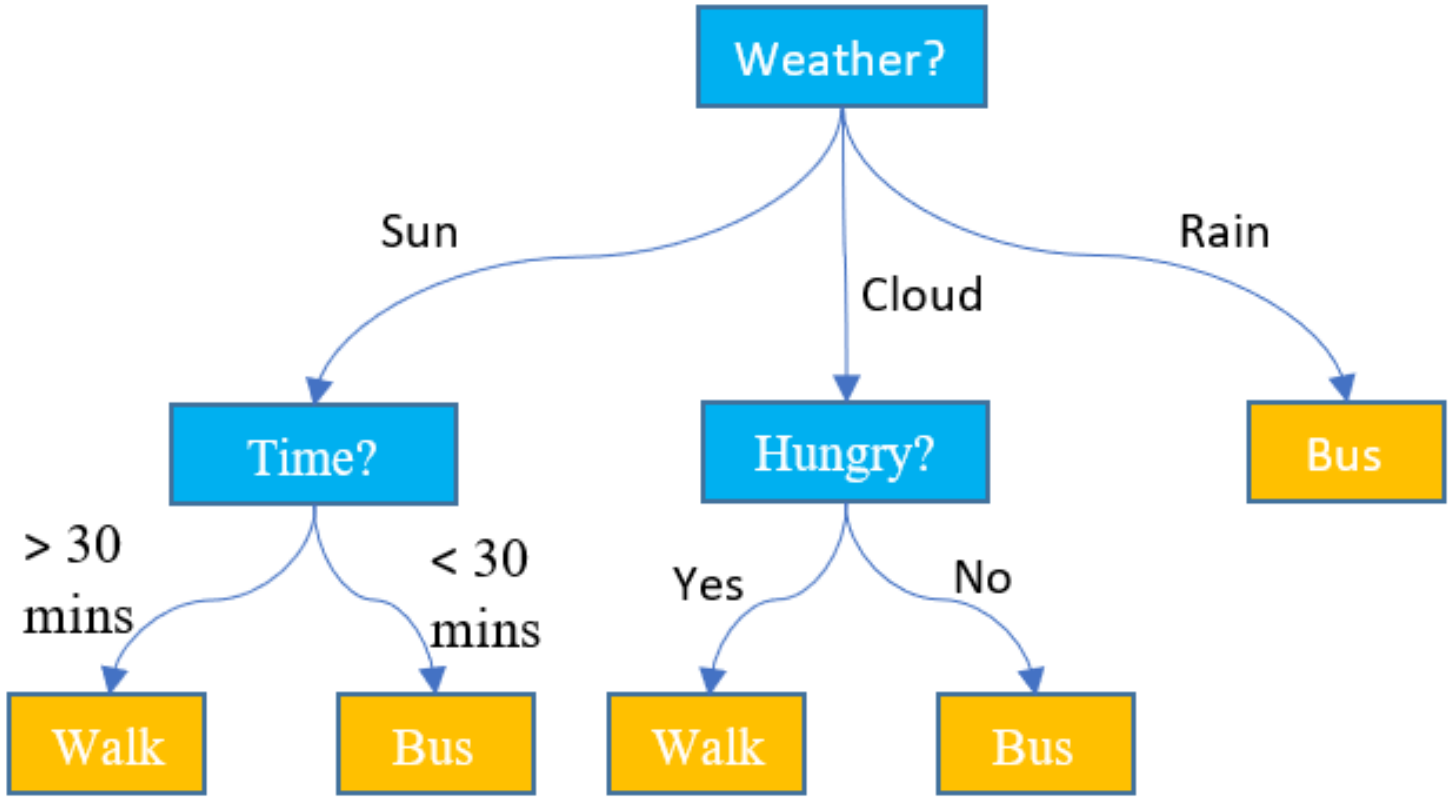
- Decision tree is a very old and simple idea. But it is most popular ML algorithm
  1. Easy to understand
  2. Easy to implement
  3. Can be used for both classification and regression problems



Decision tree: Regression



Decision tree: classification



Reference

- Machine Learning Glossary
- zero-to-mastery-ml
- machinelearning-datascience
- Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow
- handson-ml2
- scikit-learn: Save and Restore Models
- Introduction to Machine Learning Algorithms: Linear Regression