Module-04, Python for Machine Learning

Supervised Machine Learning

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Table of Contents

Supervised Learning

- Supervised learning is where you have input variables (x) and an output variable (Y) and you use an algorithm to learn the mapping function from the input to the output.
- The goal is to approximate the mapping function so well that when you have new input data (x) that you can predict the output variables (Y) for that data.

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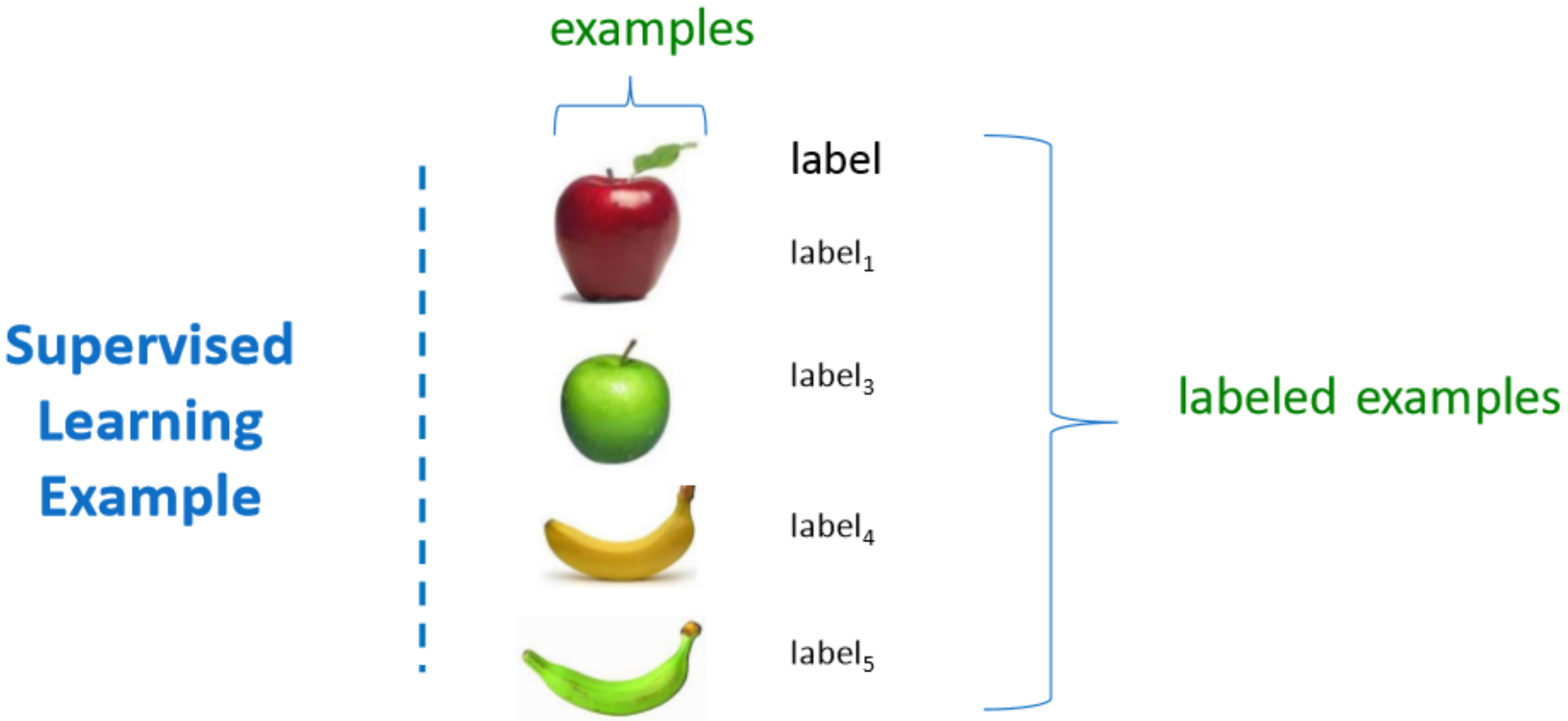
Supervised Learning: Example



Start-Tech Academ

Supervised Learning: Example

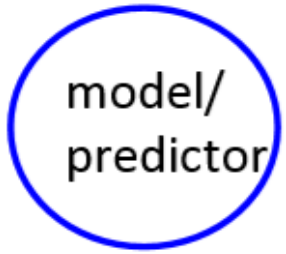
Supervised Learning Example

Category	Weight
Apple	100 gm

Category	Weight
Apple	80 gm

Category	Weight
Banana	40 gm

Category	Weight
Banana	60 gm



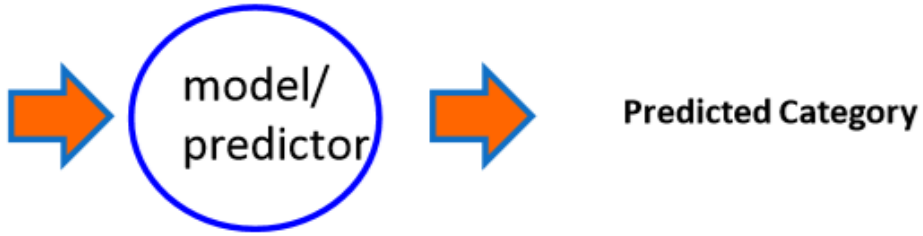
Supervised Learning Algorithms

The supervised Learning algorithms are dividing into two algorithms,

- Classification
  - Categorizing data into classes.
  - Example: Fruit detection, spam detection
- Regression
  - Predicting a continuous value.
  - Example: Weight prediction, house price prediction.

Supervised Learning: classification

Supervised Learning Example (classification)



Supervised Learning: classification

Supervised Learning (classification)

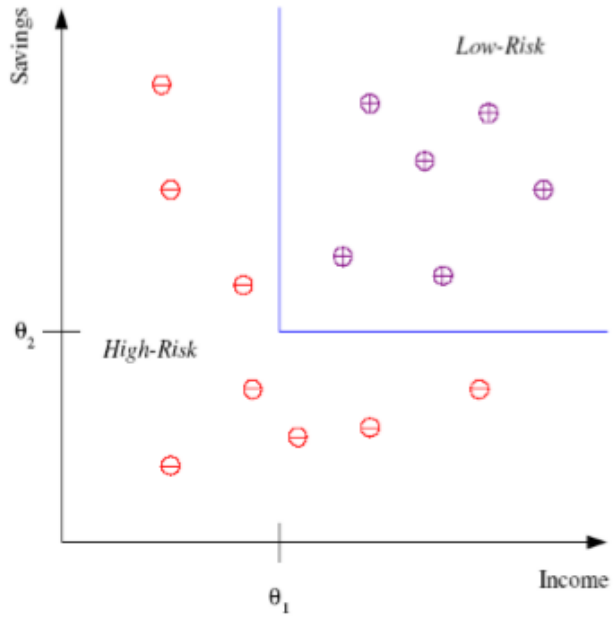
Classification:

- Example: Credit scoring
- Differentiating between low-risk and high-risk customers from their income and savings
- Model - Discriminant

IF *income* $> \theta_1$ AND *savings* $> \theta_2$
THEN low-risk ELSE high-risk

Applications :

- Pattern recognition
- Face recognition
- Character recognition
- Medical diagnosis
- Web Advertising



Supervised Learning: classification

- Logistic Regression
- Decision Trees
- Random Forest
- Support Vector Machines (SVM)
- K-Nearest Neighbors (KNN)
- Naive Bayes
- Gradient Boosting Algorithms (e.g., XGBoost, LightGBM)
- AdaBoost
- Linear Discriminant Analysis (LDA)
- Quadratic Discriminant Analysis (QDA)
- Ensemble methods

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Supervised Learning: Regression

Supervised Learning Example (Regression)

Predicted Weight

Supervised Learning: Regression

- Linear Regression
- Multi Regression
- Ridge Regression
- Lasso Regression

Machine Learning Model

- Steps in Building ML Model
  - Problem formulation
  - Data frame
  - Pre-Processing
  - Train-Test Split
  - Model Building
  - Validation and Model Accuracy
  - Prediction

Great Job
Thank yo