Supervised and Unsupervised Learning

Type of ML-Algorithms

Supervised

Labels associated with the training data is used to correct the algorithm

Unsupervised

The model has to be set up right to learn structure in the data

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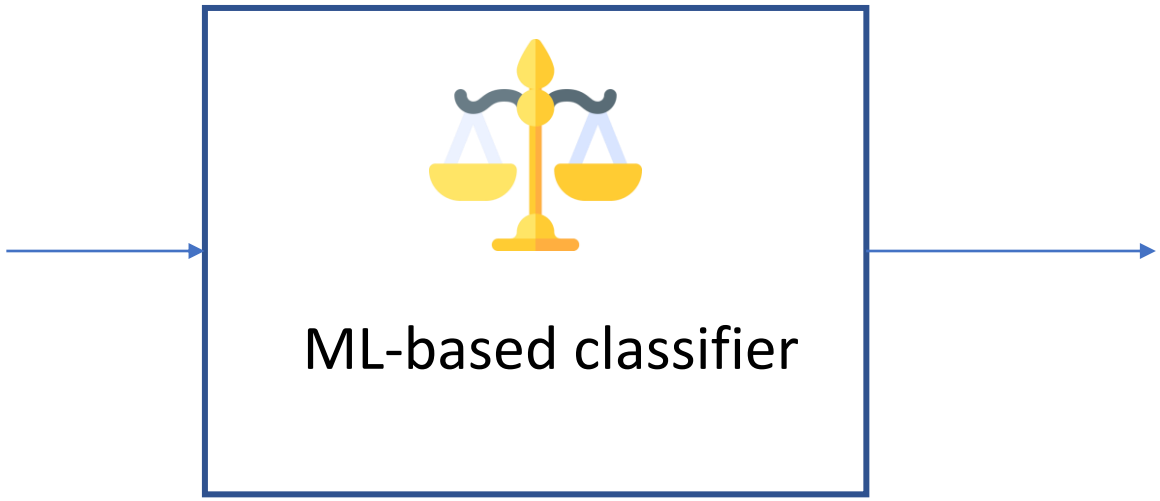
Whales: Fish or Mammals?



ML-based Classifier

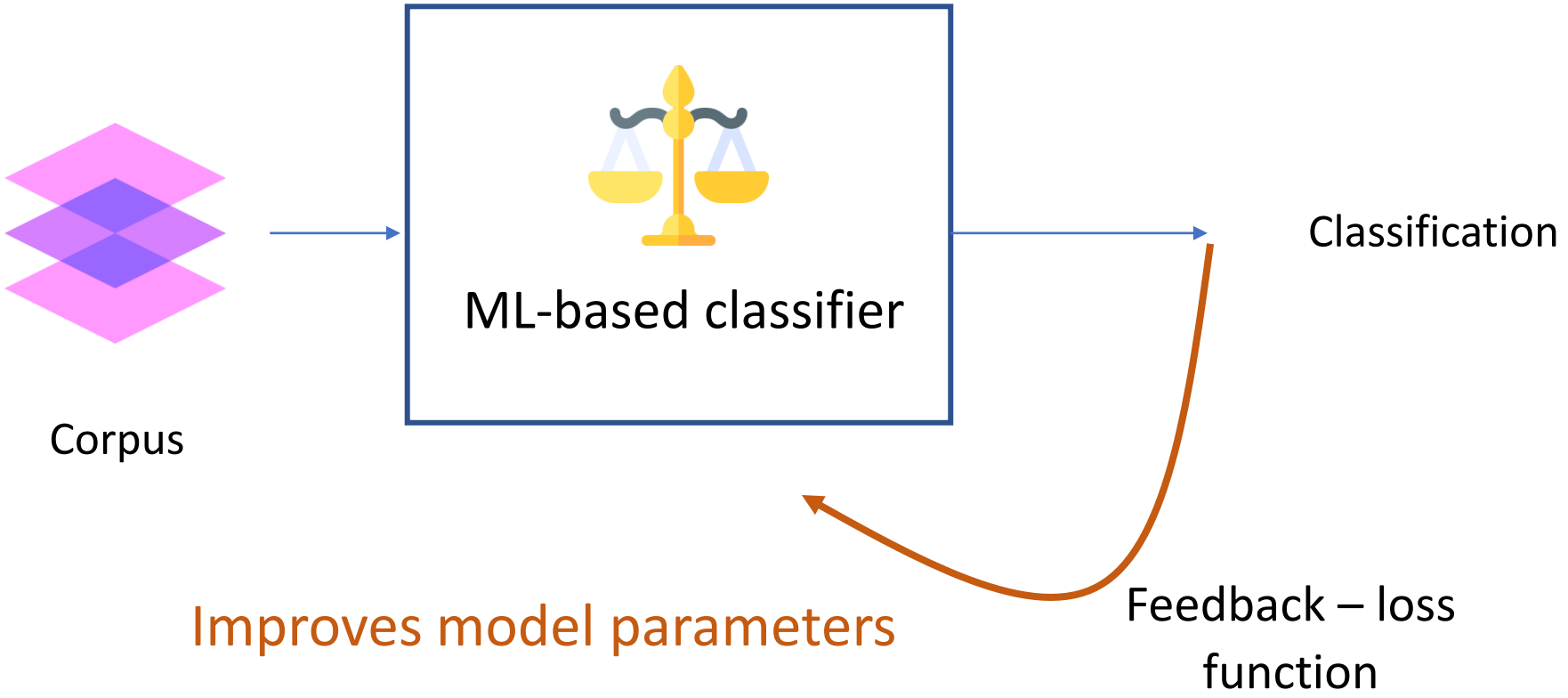
Training

Feed in large corpus of data classified correctly

Prediction

Use it to classify new instances which it has not seen before

Training the ML-based Classifier



x Variables

The attributes that the ML algorithm focuses on are called features

Each data point is a list or vector or such features

Thus, the input into an ML algorithm is a feature vector

Feature vectors are usually called the

x variables

y Variables

The attributes that the ML algorithm tries to predict are called labels

Types of labels

- Categorical (Classification)
- Continuous (regression)

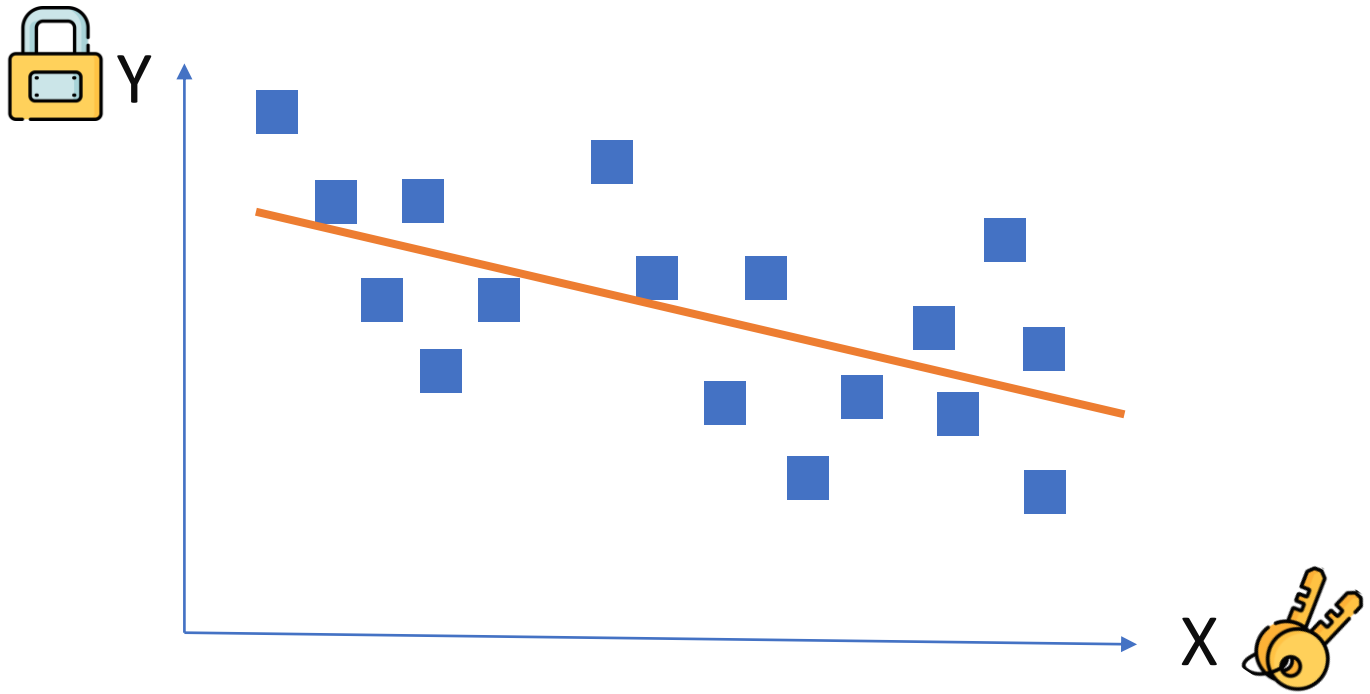
Labels are usually called the y variables

$$y = f(x)$$

Supervised Machine Learning

Most machine learning algorithms seek to “learn” the function f that links the features and the labels

The “Best” Regression Line



Linear regression involves finding the “best fit” line

Via a training process

$$y = Wx + b$$

$$f(x) = Wx + b$$

Linear regression specific, up-front, that the function f is linear

```
def   doSomethingReallyComplicated (x1 , x2 …) :
    …
    …
    …
    return  complicatedResult
```

f(x) = doSomethingReallyComplicated(x)

ML Algorithms such as neural network can “learn” (reverse-engineer) pretty much anything given the right training data

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Unsupervised learning does **not** have:

- **y** variables
- **A labeled** corpus

Unsupervised Learning

Only have input data x - no output data

Model the underlying structure to learn more about data

Algorithms self-discover the patterns and structure in the data

Unsupervised ML Algorithms

Clustering

Identify patterns in data items e.g. K-means clustering

Dimensionality Reduction

Identify significant factors that drive data e.g. PCA