

A Closer Look at Machine Learning



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Machine Learning Concepts



Training data

Supervised and unsupervised learning

Classifying machine learning problems and algorithms

Training a model

Testing a model

Using a model



Terminology



Training Data

The prepared data used to create a model

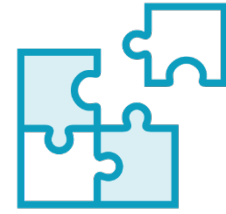
Creating a model is called *training* a model



Supervised Learning

The value you want to predict is in the training data

The data is *labeled*



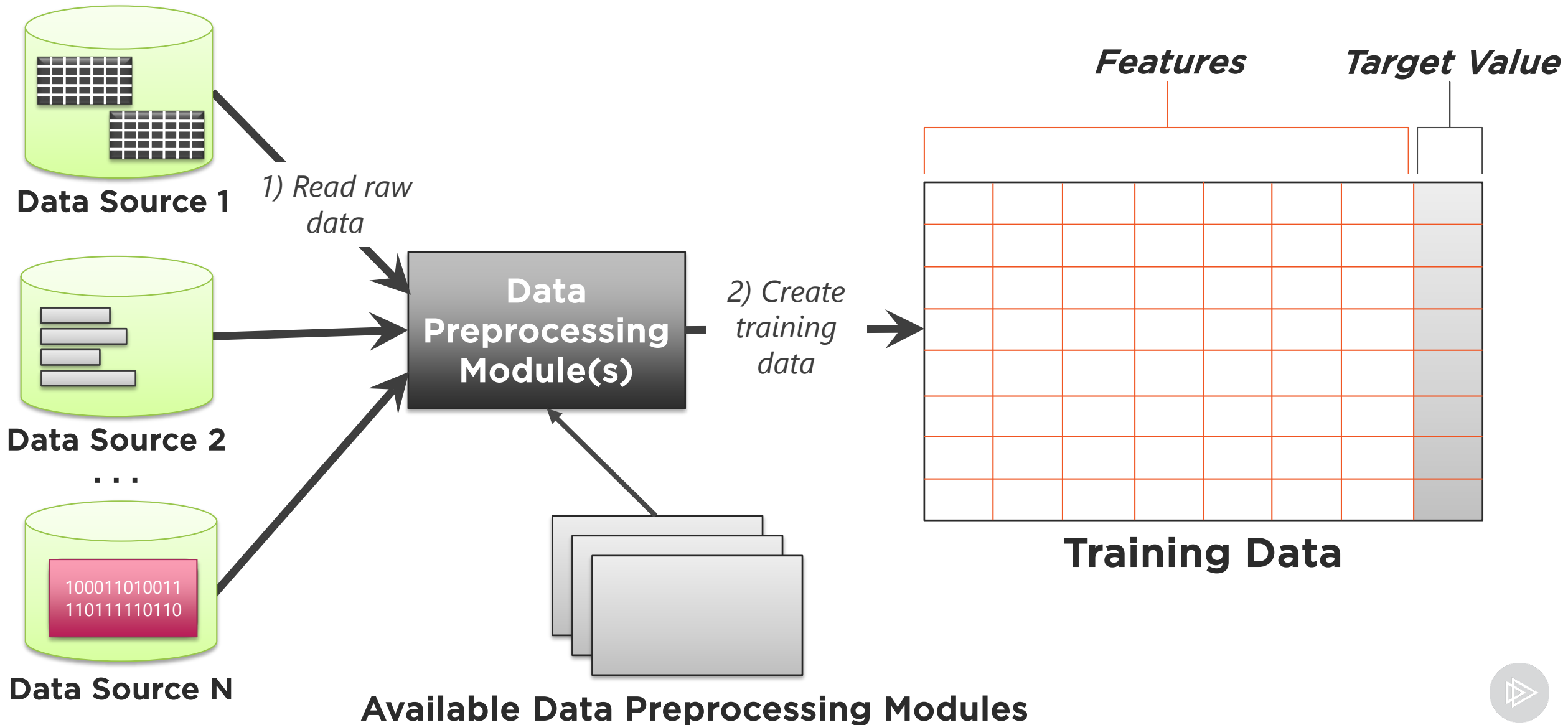
Unsupervised Learning

The value you want to predict is not in the training data

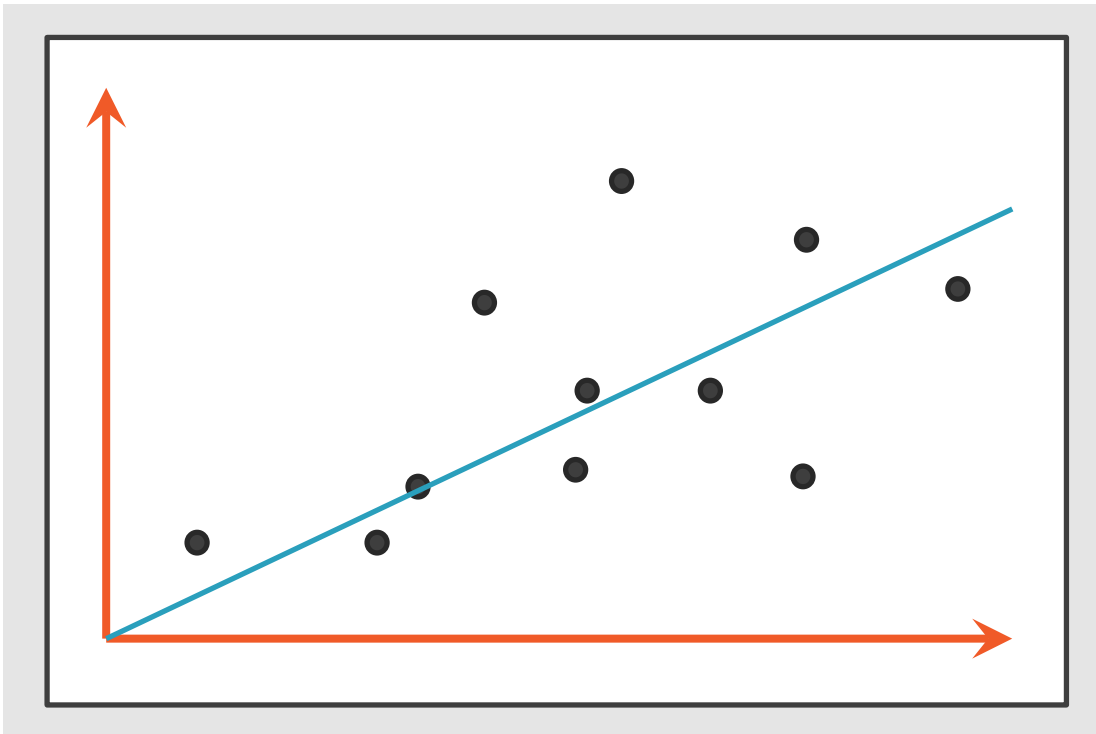
The data is *unlabeled*



Data Preprocessing with Supervised Learning



Categorizing Machine Learning Problems: Regression



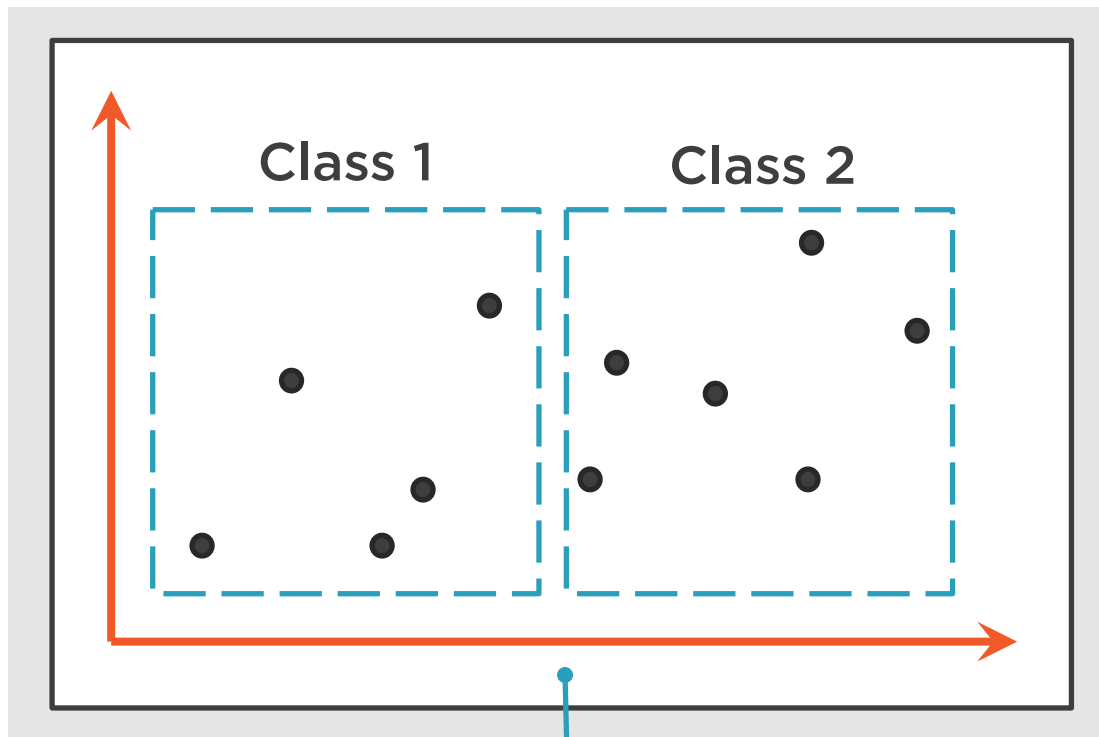
For *supervised* learning

Example question:

- How many units of this product will we sell next month?



Categorizing Machine Learning Problems: Classification



Can be more than
two classes

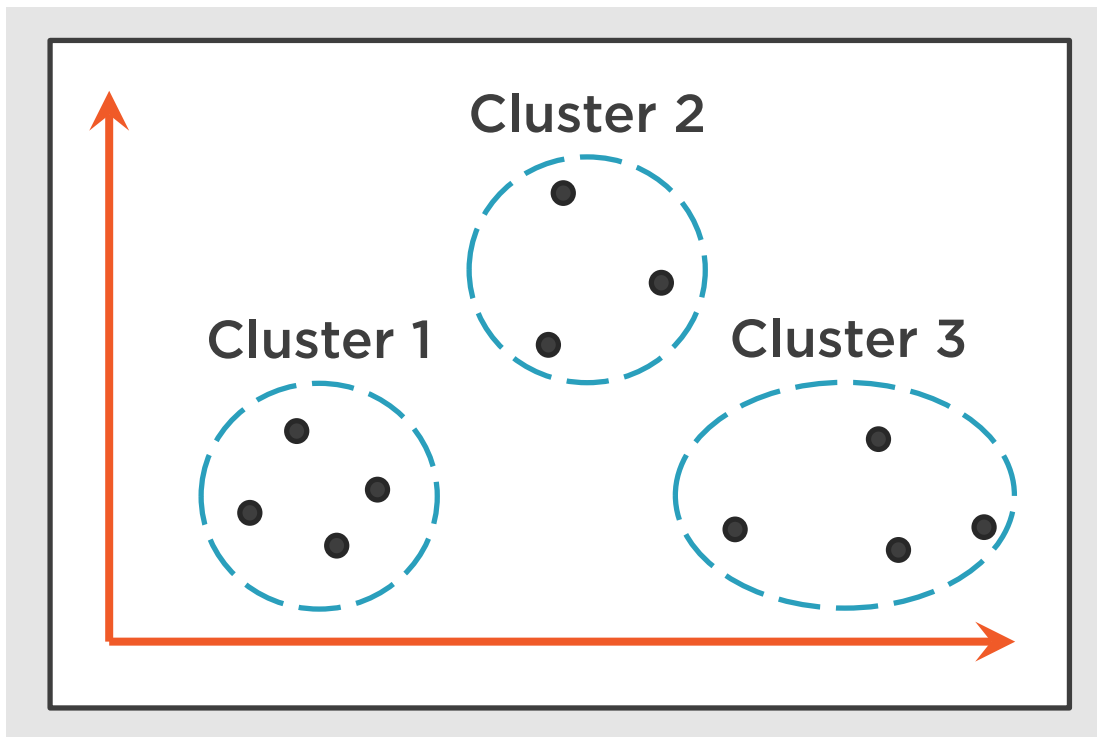
For *supervised* learning

Example question:

- Is this credit card transaction fraudulent?



Categorizing Machine Learning Problems: Clustering

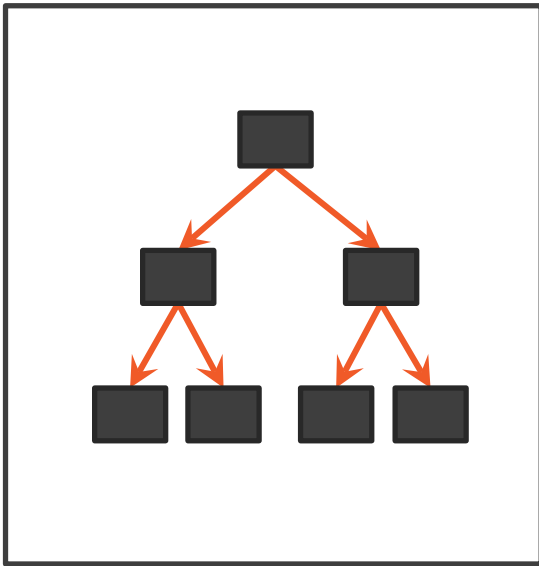


For *unsupervised* learning

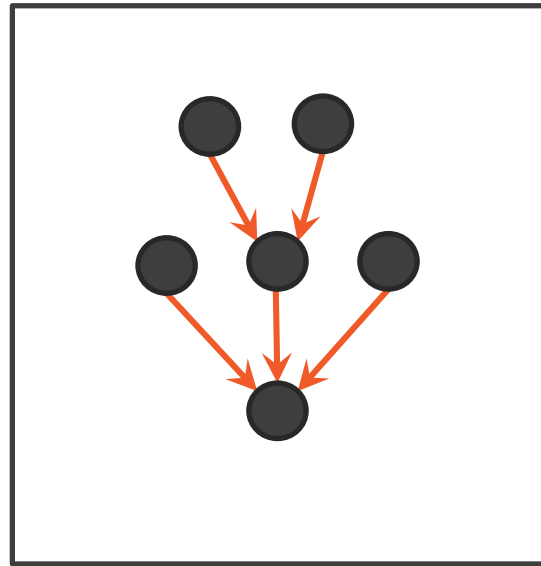
Example question:

- What are our customer segments?

Styles of Machine Learning Algorithms: Examples



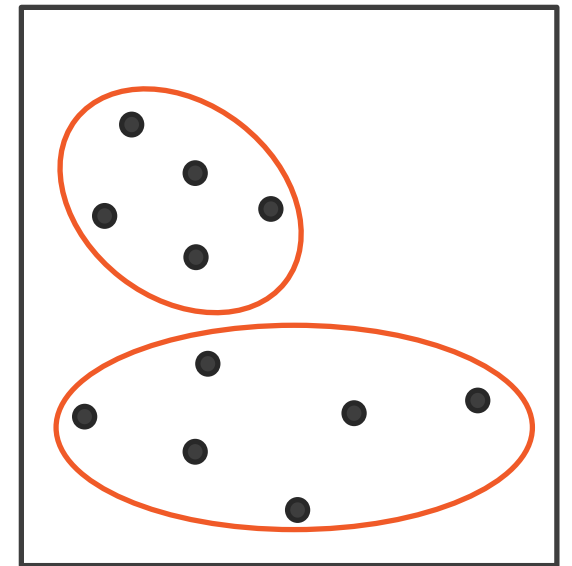
Decision tree



Neural network

$$P(A|B) = \frac{P(A) P(B|A)}{P(B)}$$

Bayesian



K-means

Training a Model with Supervised Learning

1) Choose features

Target Value

<i>Feature 1</i>	<i>Feature 3</i>	<i>Feature 6</i>	

Training Data

2) Input training data
(75% of all data for
features 1, 3, and 6)

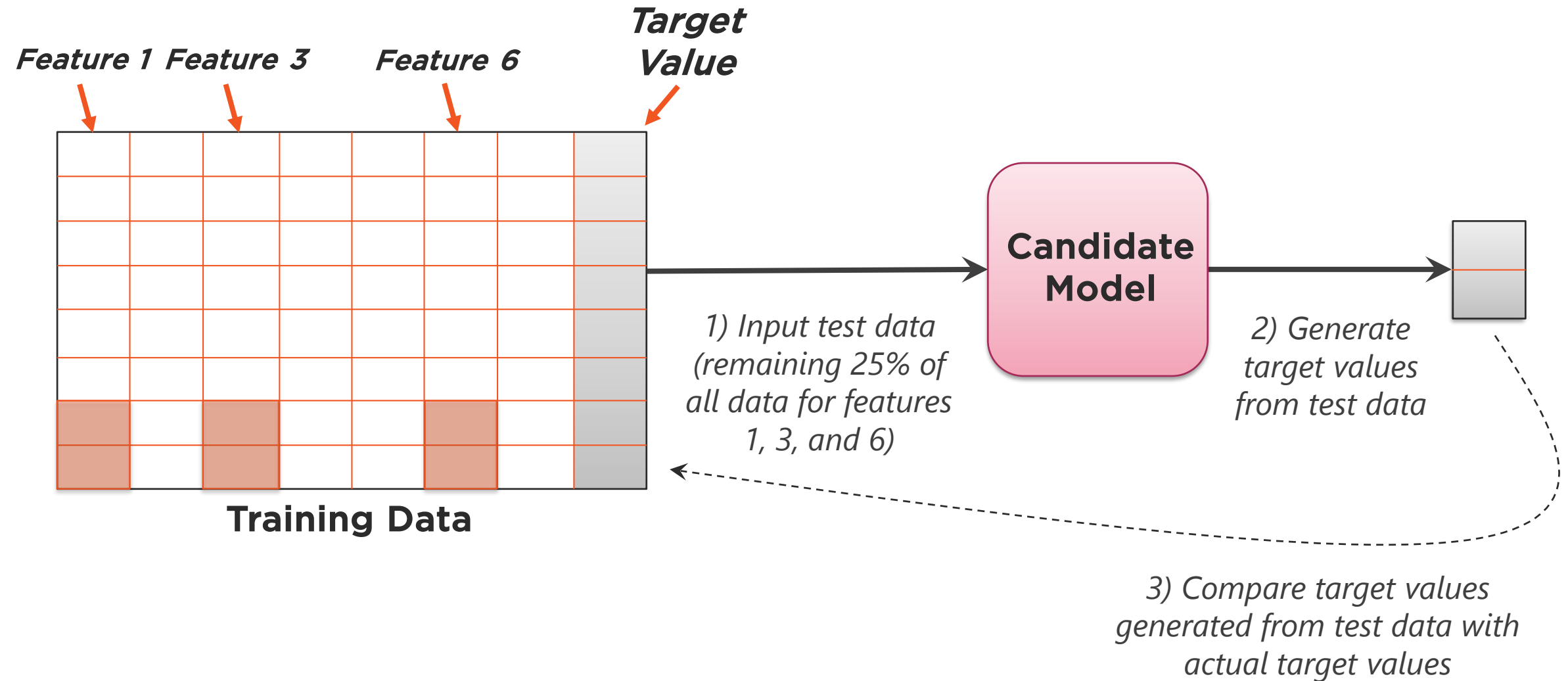
**Chosen
Learning
Algorithm**

3) Generate
candidate
model

**Candidate
Model**



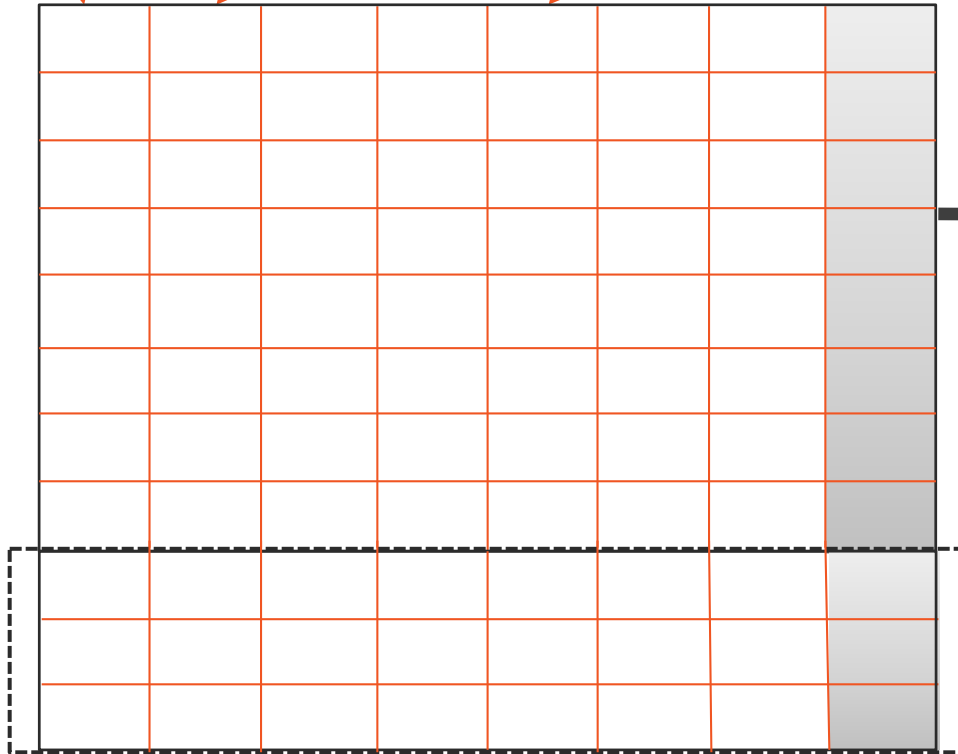
Testing a Model with Supervised Learning



Improving a Model: Some Options

1) Choose different features

Feature 1 **Feature 2** **Feature 5**

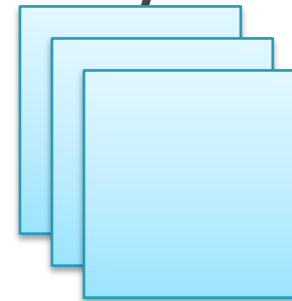


2) Add more (or newer) example data

3) Modify learning algorithm parameters or choose a different algorithm

Chosen Learning Algorithm

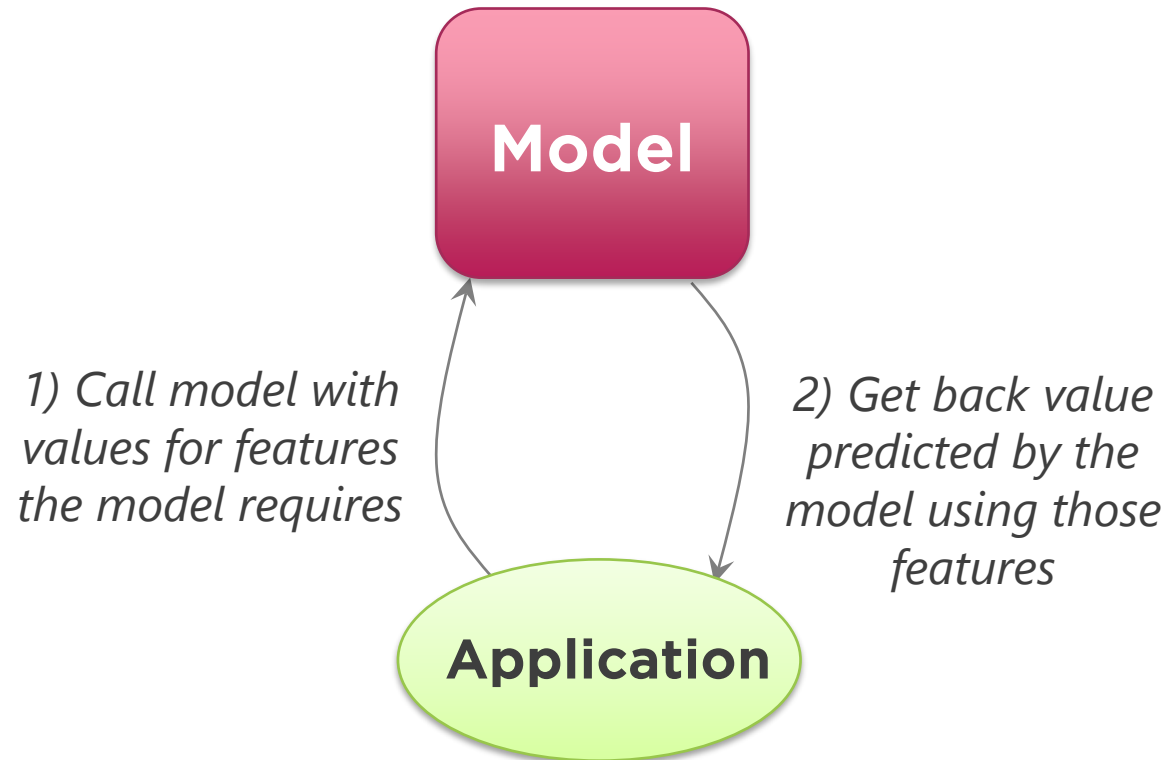
Candidate Model



Available Learning Algorithms



Using a Model



Summary



Machine learning has come of age

Machine learning isn't hard to understand

- Although it can be hard to do well

Machine learning can probably help your organization

