Machine Learning

AP 157 Lecture
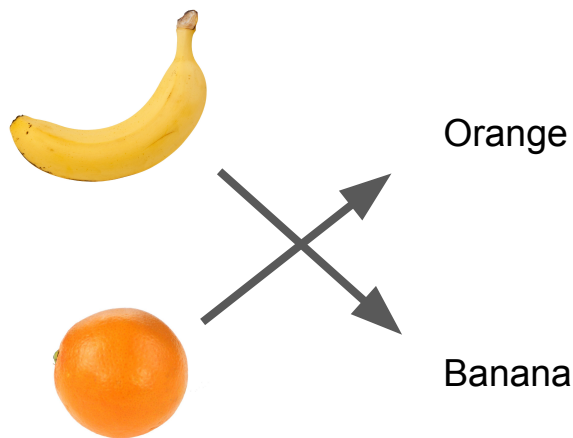
Machine Learning

DATA

TASKS
- Supervised Learning
- Unsupervised Learning
- Reinforcement Learning
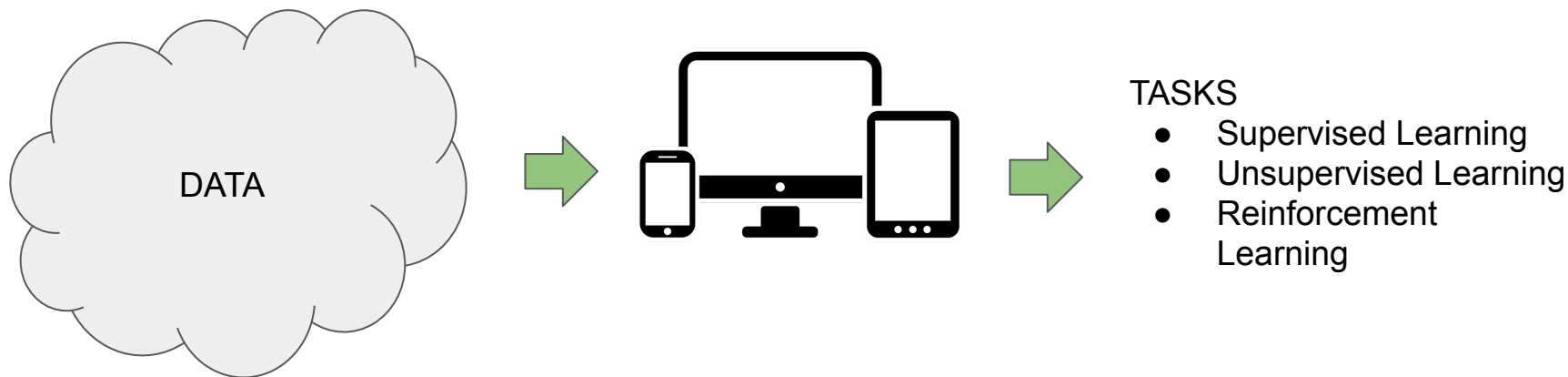
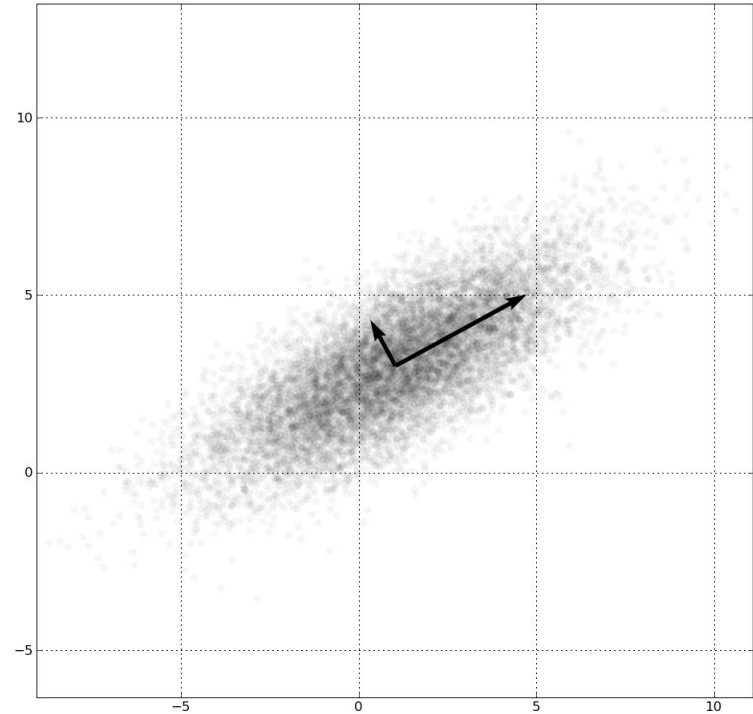# **Supervised Learning** - mapping into input-output pairs
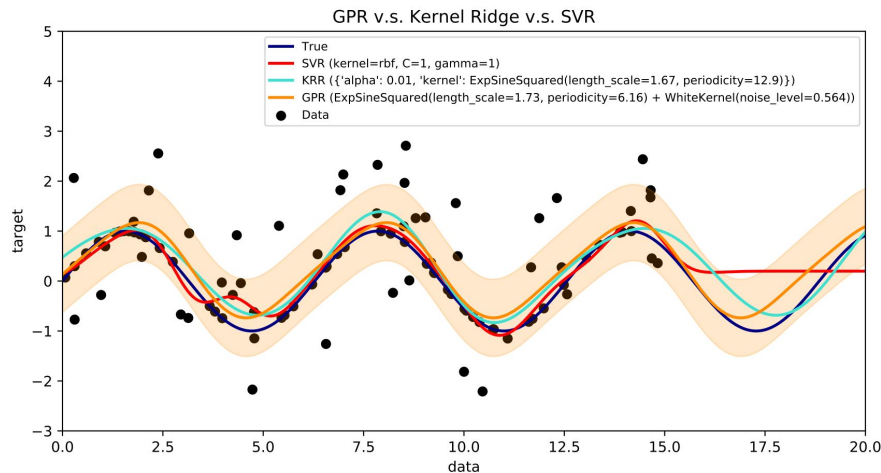
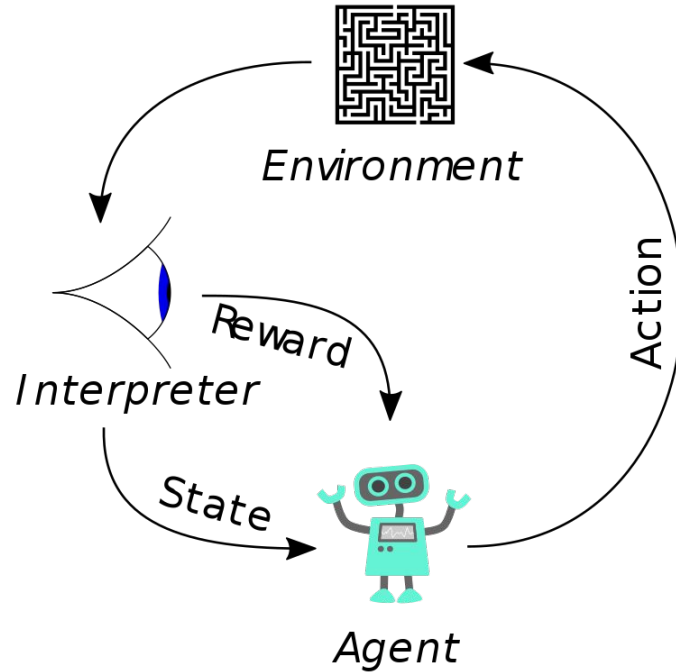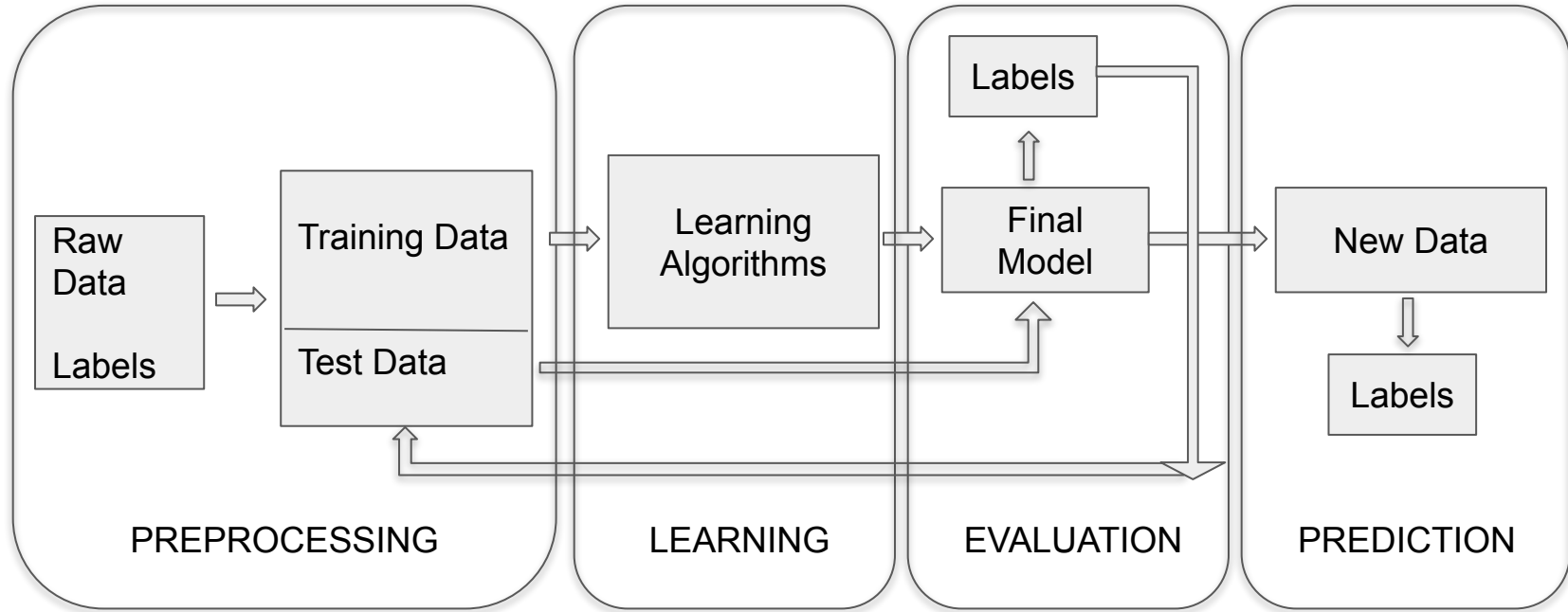# **Unsupervised Learning** - finding patterns in unlabelled data

Clustering
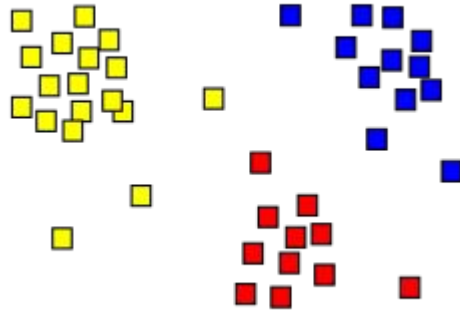
Compression

Reinforcement Learning - positive feedback loop; explore vs exploit; data obtained from interacting with environment.

Image from

Machine Learning Workflow for Predictive Modeling

Reference: S. Raschka

Classifiers

Geol 197 Special Topics (Machine Learning and Its Application to Geosciences)
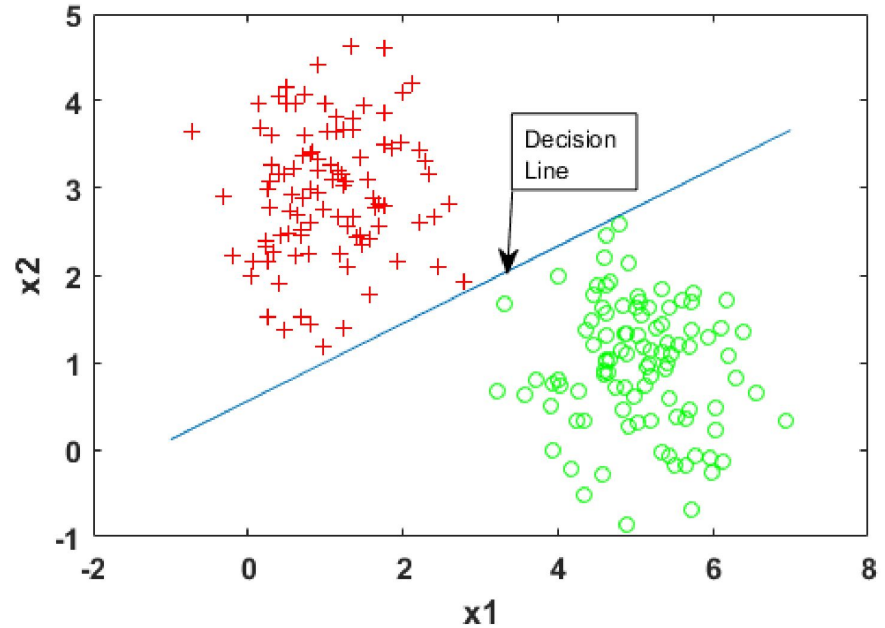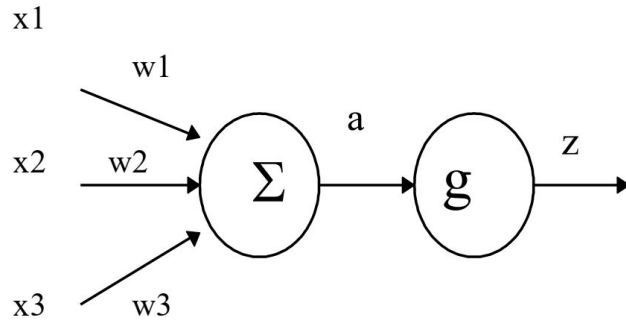Maricor Soriano

Topics

- Perceptron
- Support Vector Machine
- k-Nearest Neighbors
- Tree

Perceptron

Simple model of a neuronal cell.
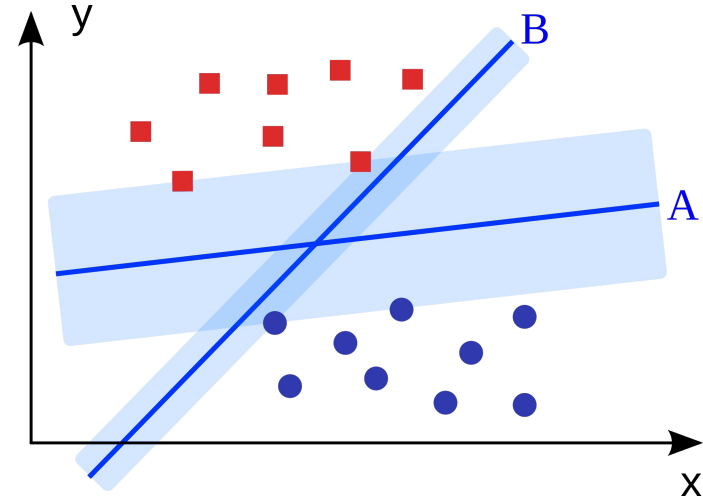
Can be connected into networks.

Learns a mapping by changing weights of its connections

Support Vector Machines

Finds the decision line that maximizes separation between classes.

"Support vectors" are feature points that are closest to the opposite class.
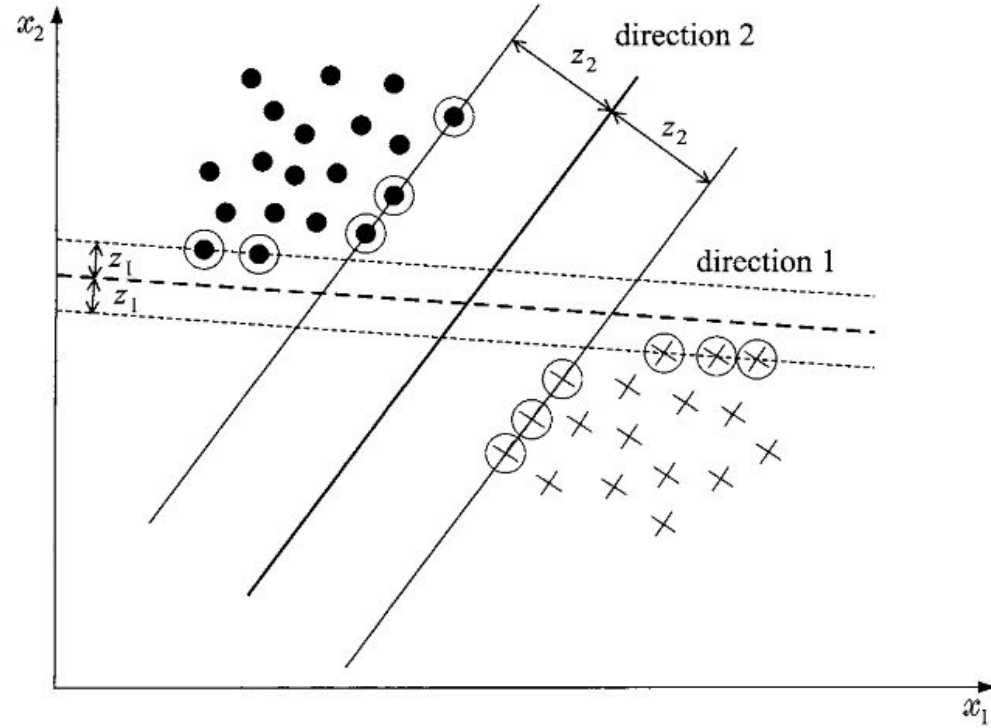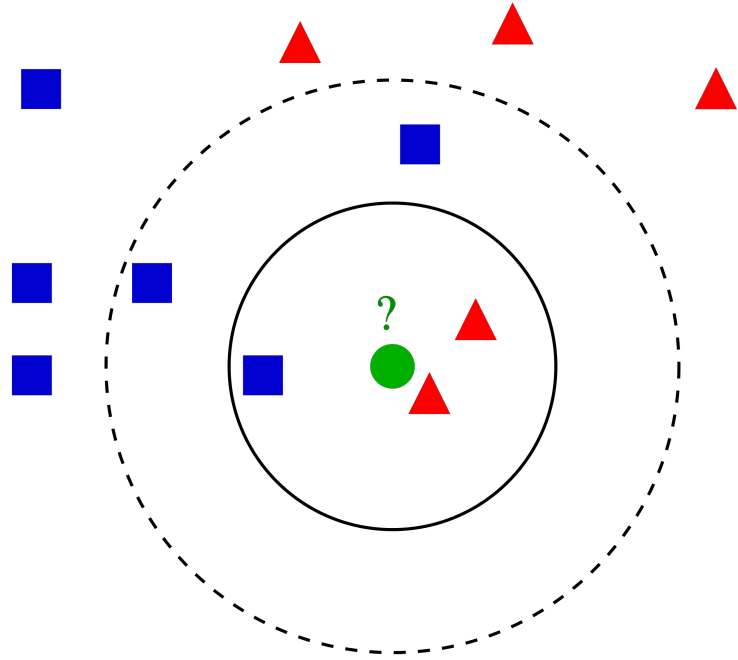

Figure from Wikimedia Commons

Figure from Chapter 3, Theoderidis "Pattern Recognition"

k-Nearest Neighbors

Classify the unknown feature by votation

Feature belongs to the class with the most number of shortest distance between unknown and class features.
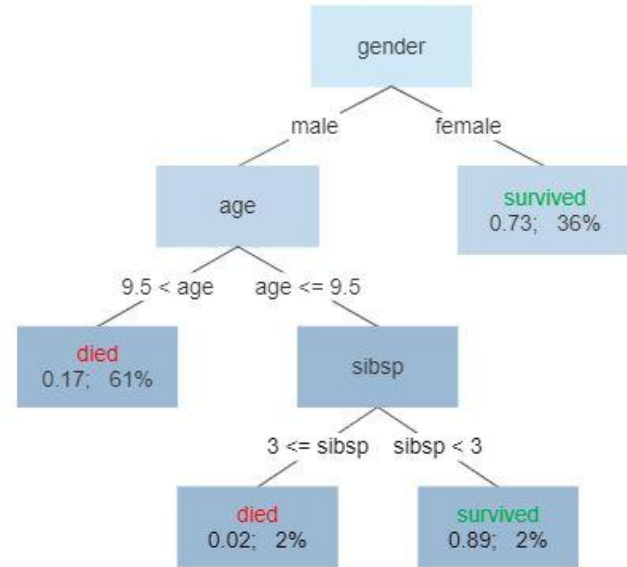

Figure from Wikimedia Commons

Decision Tree

Classification is based on a flowchart
of feature conditions.

Random Forest

Many decision trees are set up and
final classification is made on the most
number of votes by the decision trees

Survival of passengers on the Titanic

Figure from Wikimedia Commons

Practice using available datasets and tools

[The Fisher/Anderson Iris Dataset](#)

[Matlab Classifier App - demo](#)