Artificial intelligence: A subfield of CS, AI refers to computer programs that can

solve problems humans are good at (e.g. vision, natural language,)

Machine learning: an algorithm to automatically learn from data, or from experience, uncover patterns in data, building autonomous agents

Neural networks: A parametric model used in ML; (very loosely) based on

biological neurons

Deep learning: Neural networks with multiple layers (i.e., processing steps)

Data science: An emerging eld which applies ML techniques to domain-specific

Problems

Supervised learning: have labeled examples of the correct behavior

Semi-supervised learning: utilizes both labeled and unlabeled data

Reinforcement learning: learning system (agent) interacts with the world and learns to maximize a scalar reward signal

Unsupervised learning: no labeled examples – instead, looking for “interesting” patterns in the data

ML Workflow

1. Should I use ML on this problem?

• Is there a pattern to detect?

• Can I solve it analytically?

• Do I have data?

2. Gather and organize data

• Preprocessing, cleaning, visualizing.

3. Establishing a baseline.

4. Choosing a model, loss, regularization, ...

5. Optimization

6. Hyperparameter search.

7. Analyze performance & mistakes, and iterate back to step 4 (or 2).

Nearest Neighbors

• a supervised classification algorithm that predicts the

class of an output feature based on the class of other

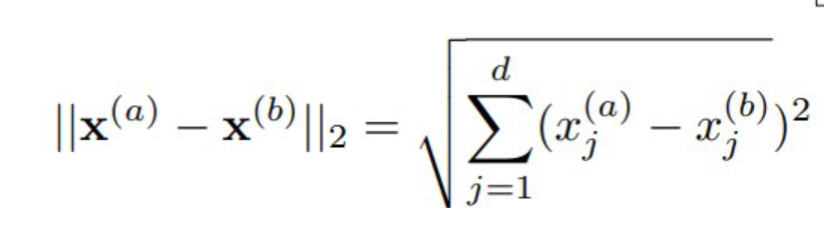
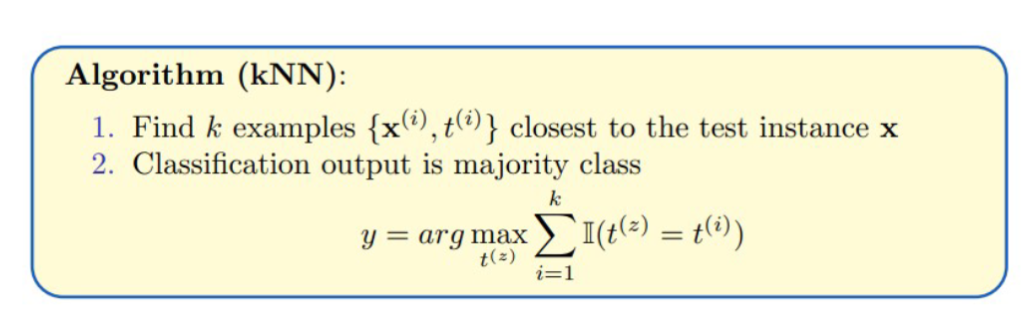
instances with the most similar, or "nearest," input

features

• neighbors, are identified using some distance measure,

and the classes of each neighbor's output feature are

identified

k-Nearest Neighbors

1.Measure the distance: Calculate the distance between the new

data point and all the data points in the dataset.

1.use the Euclidean distance, which is like measuring the straight-line

distance between two points.

2.Find the K nearest neighbors: Identify the K points with the

shortest distances to the new point. These are the K nearest

neighbors.

1.For instance, if K = 3, we select the three points that are closest to our new

point.

3.Majority voting: Among the K nearest neighbors, count how many

points are there for each class type.

1.Whichever type has the majority becomes our prediction for the new point.

1.For example, if two neighbors are class “a” and one is a class “b”, we predict that the

new point is a “a”.