Python for Data Science

Introduction to K Nearest Neighbors

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Reading Assignment

Complete Chapter 4

Introduction to Statistical Learning

By Gareth James, et al.

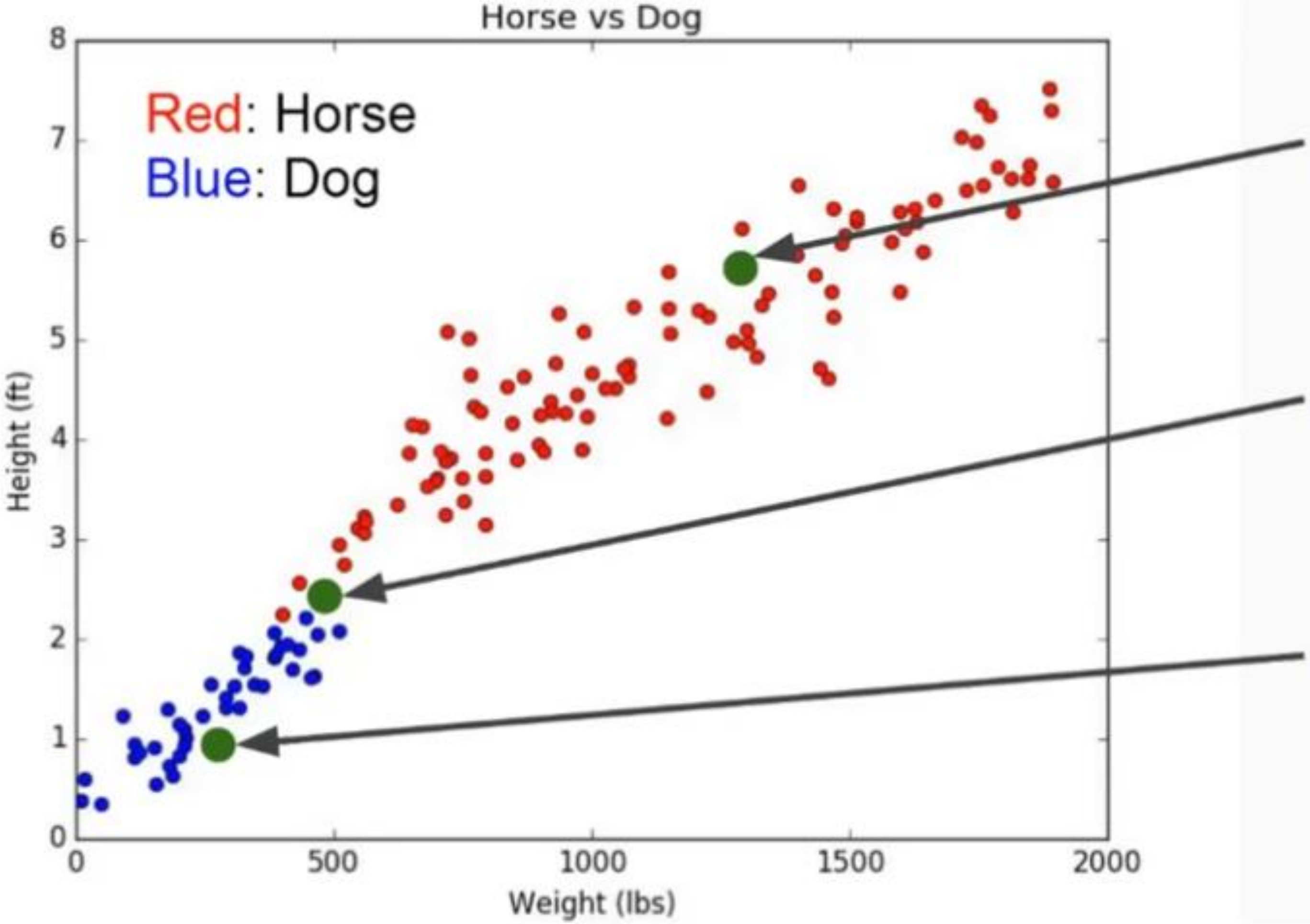
KNN

K Nearest Neighbors is a **classification** algorithm that operates on a very simple principle.

It is best shown through example!

Imagine we had some imaginary data on Dogs and Horses, with heights and weights.

KNN



New datapoint:
Is it a horse or a dog?

New datapoint:
Is it a horse or a dog?

New datapoint:
Is it a horse or a dog?

KNN

Training Algorithm:

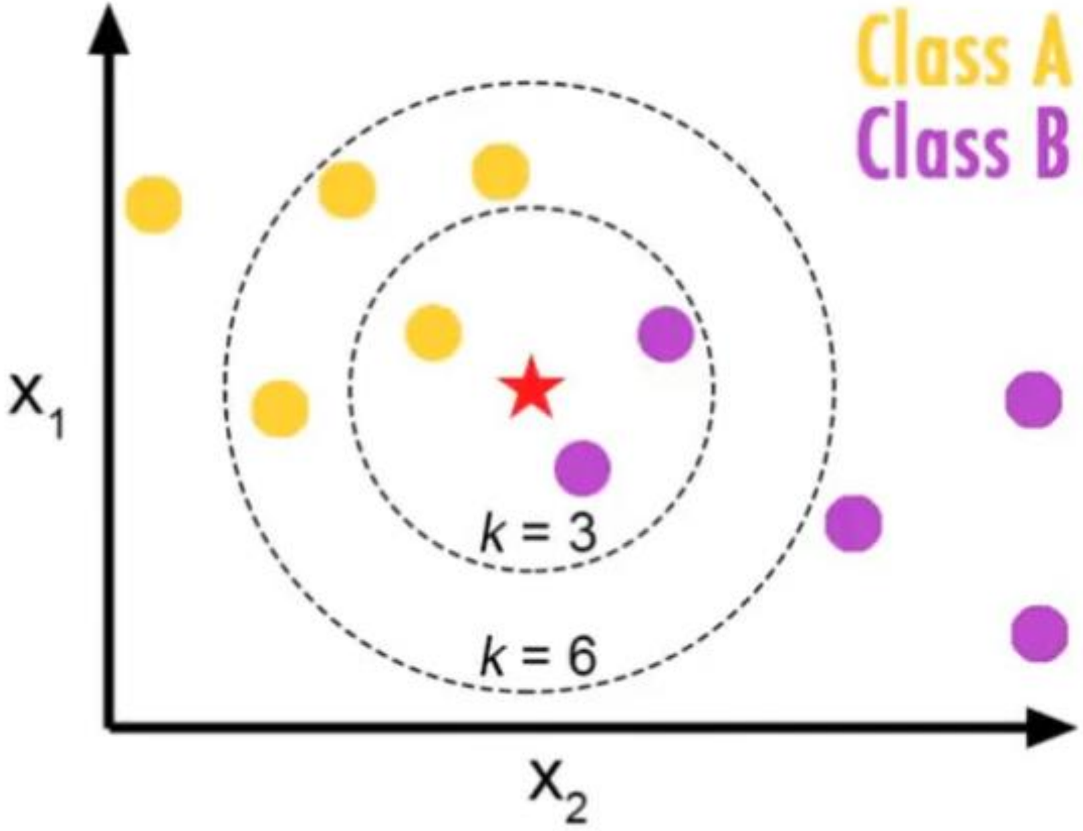
1. Store all the Data

Prediction Algorithm:

1. Calculate the distance from x to all points in your data
2. Sort the points in your data by increasing distance from x
3. Predict the majority label of the “k” closest points

KNN

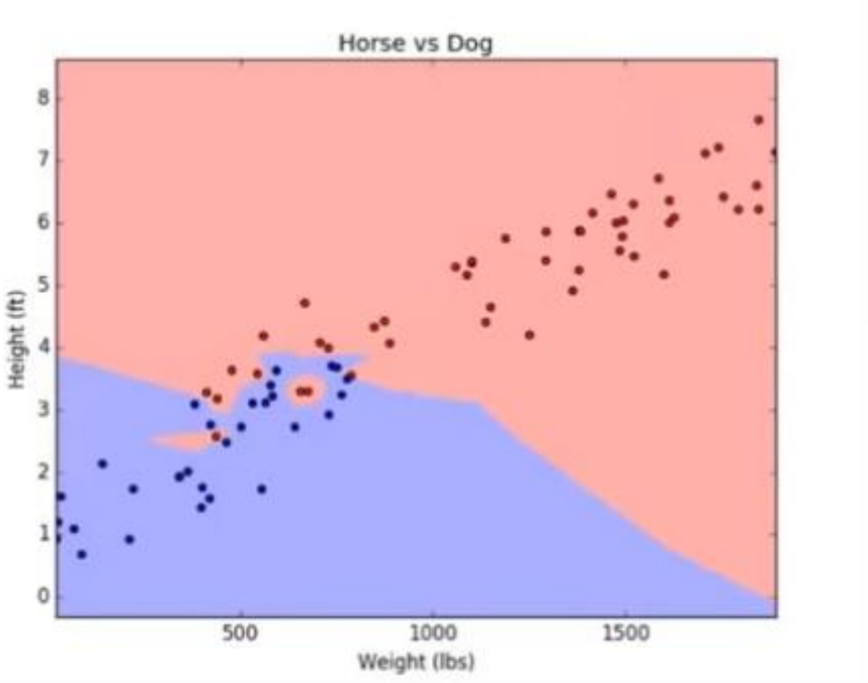
Choosing a K will affect what class a new point is assigned to:



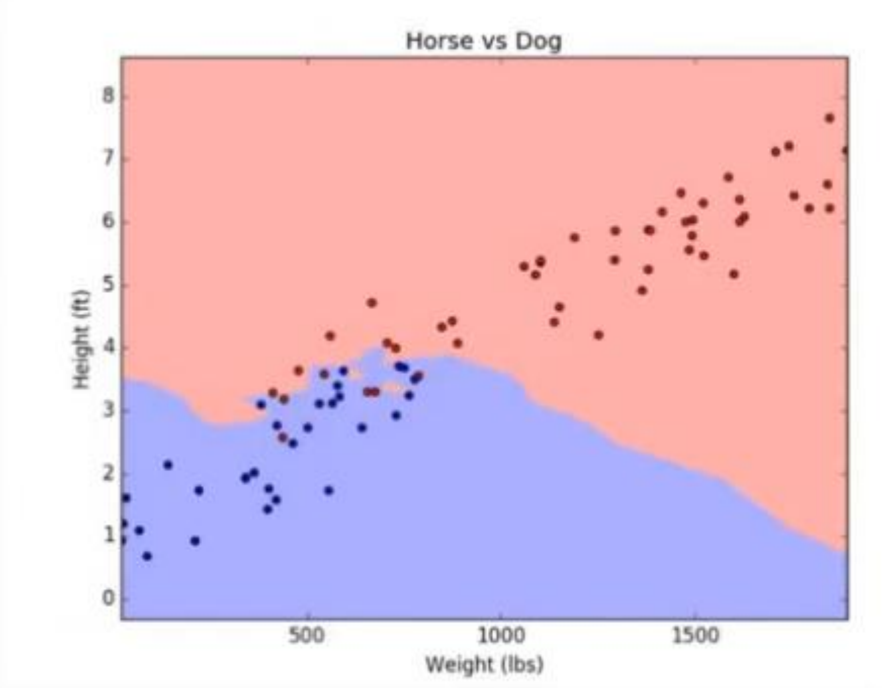
KNN

Choosing a K will affect what class a new point is assigned to:

k=1



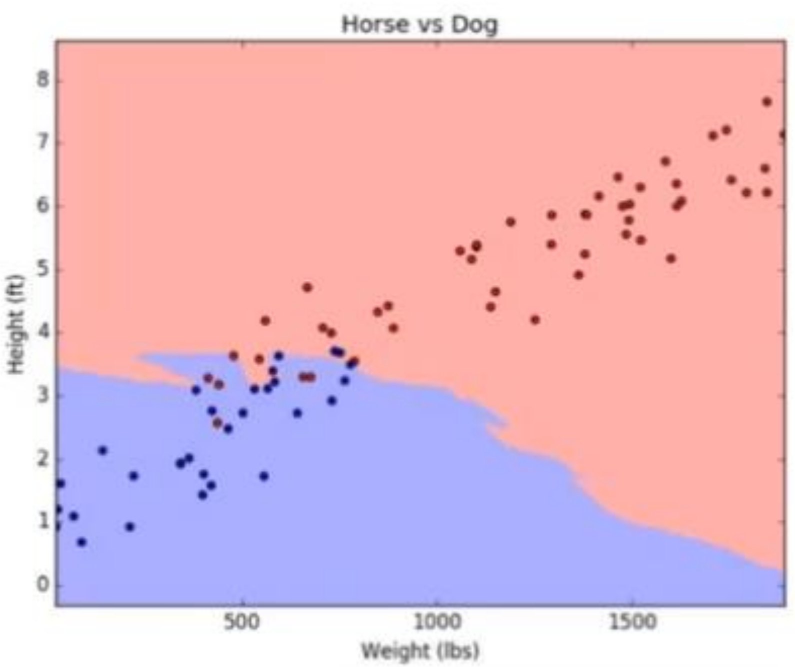
k=5



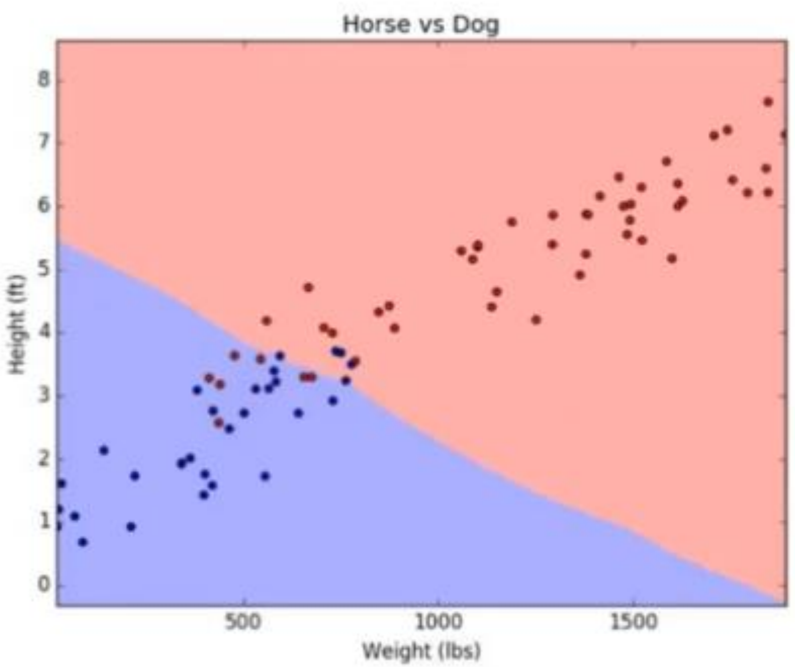
KNN

Choosing a K will affect what class a new point is assigned to:

k=10



k=50



KNN

Pros

- Very simple
- Training is trivial
- Works with any number of classes
- Easy to add more data
- Few parameters
  - K
  - Distance Metric

KNN

Cons

- High Prediction Cost (worse for large data sets)
- Not good with high dimensional data
- Categorical Features don’t work well

Example with Python

A common interview task for a data scientist position is to be given anonymized data and attempt to classify it, without knowing the context of the data.

We're going to simulate a similar scenario by giving you some "classified" data, where what the columns represent is not known, but you have to use KNN to classify it!

K Nearest Neighbors with Python

Thanks!

Any questions ?