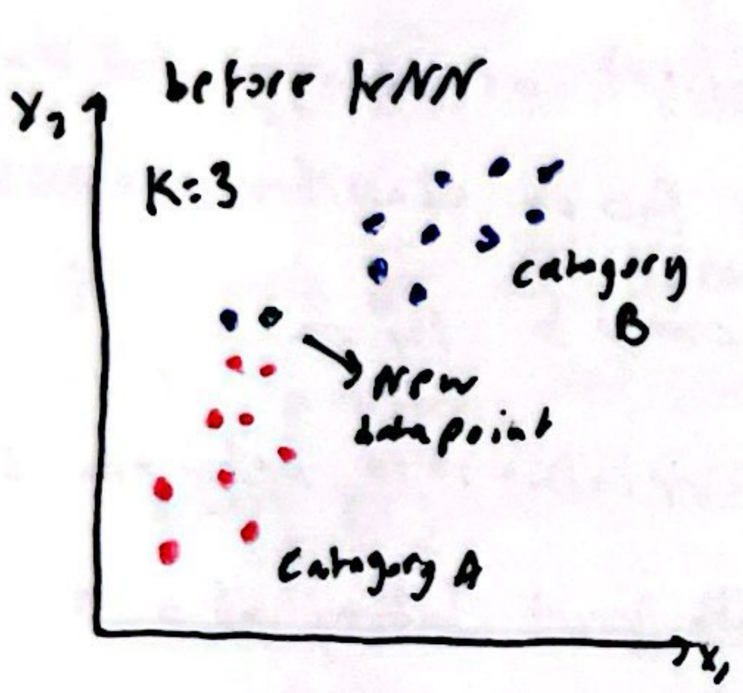
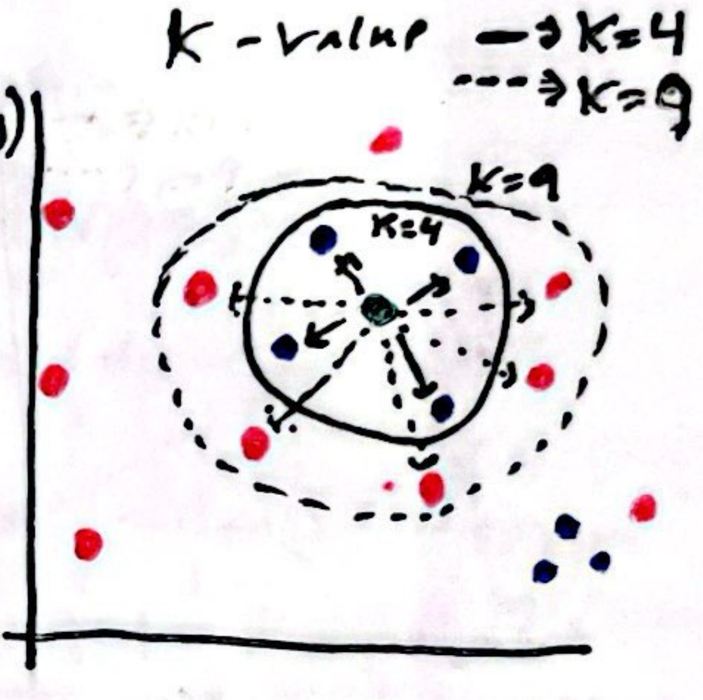
K Nearest Neighbors (KNN) (-supervised -classification -Regretion)

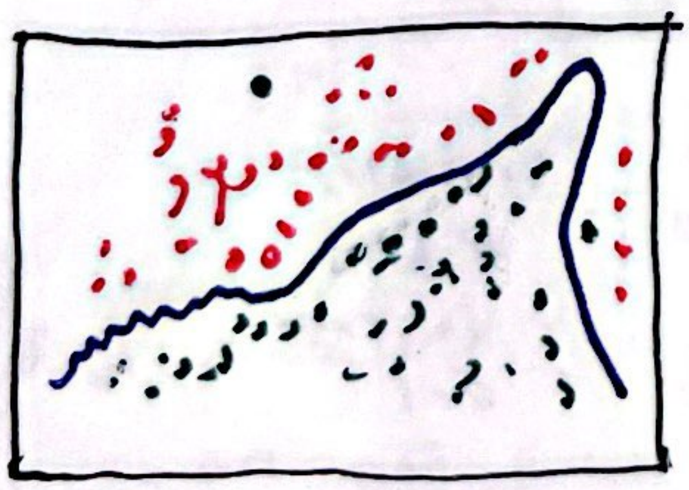
1 - KNN is a simple NON-parametric algorithm used for Classification & Regretion. this means that we dont try to fit any equations and thus find any parameters of a model so no true model fitting is needed.

2 ✱ The idea of kNN is for any given new data point (input) we will predict the target (output) to be the avg or Majority of its K nearest neighbors. K is a hyper paramth like K=3 or K=4... (regretion: avg, classification: majority)

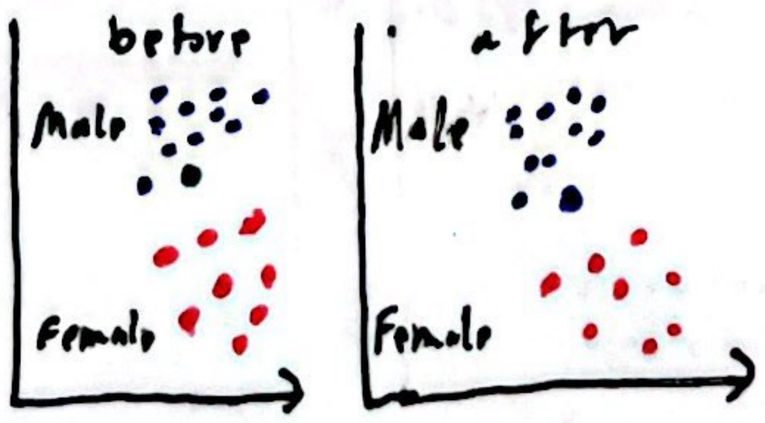




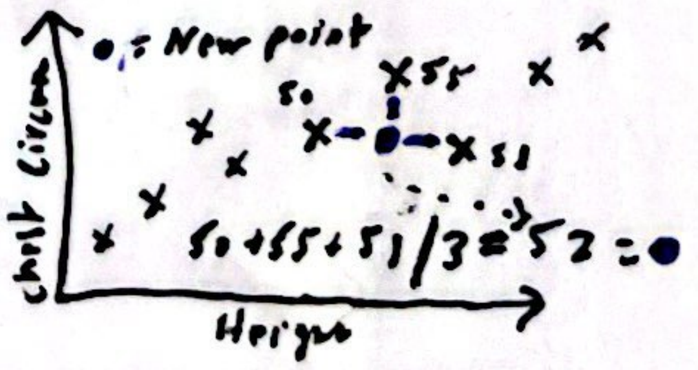
3 ✱ Very powerfull for Complicated non-linear Decision Boundary



4 ✱ in a classification Ex we can say gender of person is the same as the Majority of 5 closest ppl K=5.



5 ✱ in regretion ex the weight of a person is avg weight of the 3 people closest in Height and chest circumfrance



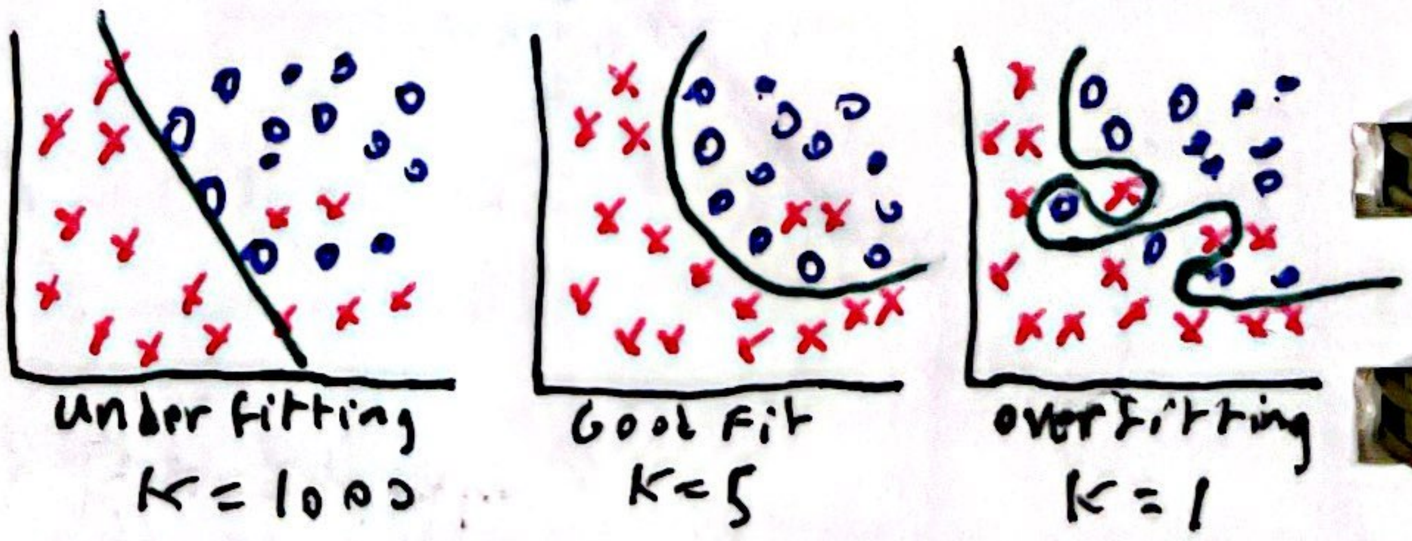
6 ✱ classification vs Regretion kNN

Type of problem	What kNN does
classification	takes Majority vote of K nearest labels
Regretion	takes avg of K nearest target values

7 ✱ what happens in a tie Ex K=4

- the best sol is weighted kNN where in a tie it considers the distance of the labels adds the groups total distance to decide New lable

9 ✱ Choosing the K



✱ Chossing right K is a art and requires cross validation. plus the problem of K=1