UNIVERSIDAD POLITÉCNICA DE YUCATÁN

COMPUTATIONAL ROBOTICS ENGINEERING

GROUP: 9° “B”

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SUBJECT: MACHINE LEARNING

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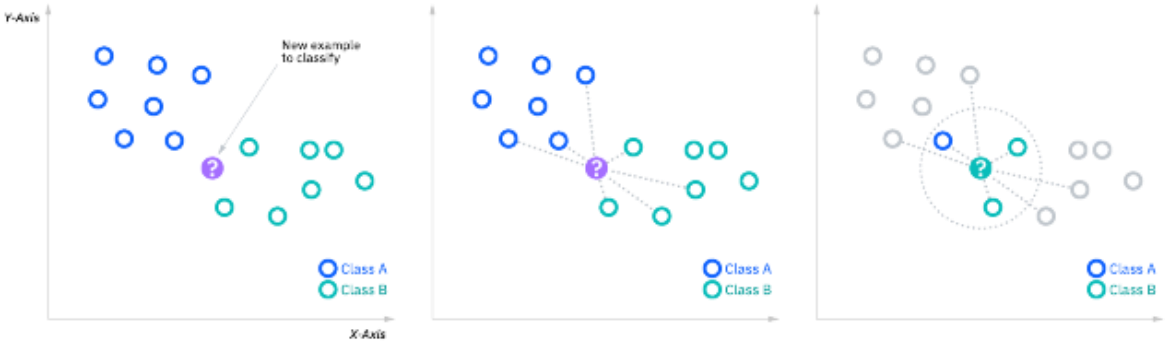
Explanation of the intuition behind the KNN algorithm.

The k-nearest neighbors algorithm, also known as KNN or k-NN, is a non-parametric supervised learning classifier, which uses proximity to make classifications or predictions about the clustering of an individual data point.

While it can be used for regression or classification problems, it is generally used as a classification algorithm, assuming that similar points can be found close to each other.

For classification problems, a class label is assigned based on a majority vote, that is, the label that is most frequently represented around a given data point is used. While this is technically considered "majority voting," the term "majority voting" is more commonly used in the literature. The distinction between these terminologies is that "majority vote" technically requires a majority greater than 50%, which primarily works when there are only two categories. When you have multiple classes, for example four categories, you don't necessarily need 50% of the votes to reach a conclusion about a class; can assign a class tag with a vote greater than 25%. (IBM, 2021)



Algorithm pseudocode

COMIENZO
  Entrada: $D = \{(\mathbf{x}_1, c_1), \ldots, (\mathbf{x}_N, c_N)\}$
    $\mathbf{x} = (x_1, \ldots, x_n)$ nuevo caso a clasificar
  PARA todo objeto ya clasificado (x_i, c_i)
    calcular $d_i = d(\mathbf{x}_i, \mathbf{x})$
  Ordenar $d_i (i = 1, \ldots, N)$ en orden ascendente
  Quedarnos con los K casos $D_{\mathbf{x}}^K$ ya clasificados más cercanos a $\mathbf{x}$
  Asignar a $\mathbf{x}$ la clase más frecuente en $D_{\mathbf{x}}^K$
FIN

(Sulla-Torres, 2017)

Loss function + Optimization function identification.

In the knn method you cannot use the reduction or/and optimization functions

References

IBM. (2021, June 1). *IBM*. Retrieved from IBM: https://www.ibm.com/mx-es/topics/knn

Sulla-Torres, J. (2017, JAN 2). *Researchgate*. Retrieved from Researchgate: https://www.researchgate.net/figure/Pseudocodigo-de-KNN-Para-la-seleccion-del-valor-k-se-puede-utilizar-alguna-de-las_fig1_319342738