

Machine Learning (HW #3)

ME I Sem, CSE, 2024

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1. What is classification and what are its applications?
2. Give the mathematical definition classifier?
3. What is Euclidean distance? How this distance is related to similarity of two objects?
4. Explain the working of classifier with the help of block diagram.
5. Explain the working of K-nearest neighbor (KNN) algorithm. Find out its complexity.
6. What are the advantages of KNN algorithm?
7. How you will compute similarity between two objects having attributes (dimensions) $\mathbf{x}_i = \{x_{i,1}, \dots, x_{i,n}\}$ and $\mathbf{x}_j = \{x_{j,1}, \dots, x_{j,n}\}$, respectively.
8. Let there are three objects A, B, C , each having four attributes as:
A=(5, -2.2.5, 4);
B=(2.5, -4, 2, 3);
C=(6, 3, 4, 1.5).
Find out the vectorial distances between A, B and B, C , and determine, whether B is near to A or C .
9. Explain the working of linear classifier?
10. How a perceptron learns, in other words, how you induce a classifier? Explain the complete process for this.
11. Consider the linear classifier and table 1 for a binary classifier:

Table 1: Perceptron Learning

Example	x_1	x_2	$c(\mathbf{x})$
Ex1	0	1	1
Ex2	1	0	1
Ex3	1	1	0

Assume that $x_0 = 1$. Find out the linear classifier, if learning rate $\eta = 0.2$, and random weights $[w_0, w_1, w_2] = [0.2, 0.5, 0.1]$.

12. Explain regression. How you obtain it: 1. manually, 2. computing mathematically?
13. How you will compute the “regression line” of Fig. 1 for a given data set? Describe the procedure or algorithm.
14. What is use of *gradient descent* method? Explain, working and computation performed by equation:

$$Cost = \frac{\sum_1^n ((\beta_1 x_i + \beta_0) - y_i)^2}{2 * n} \quad (1)$$

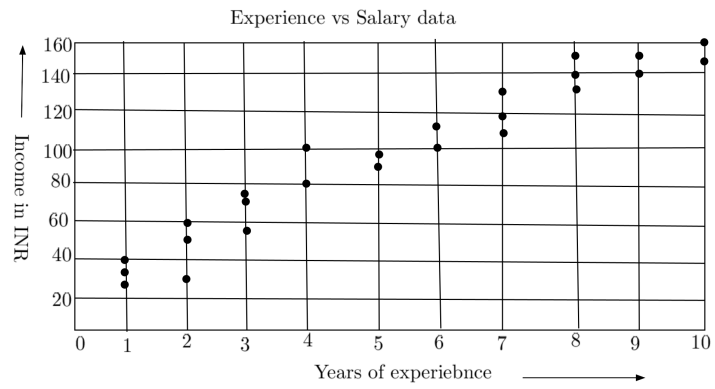


Figure 1: Experience vs Salary Plot