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Nearest Neighbour Method

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Contents

***Abstract*—This manual introduces the nearest neighbour method.**

1 Problem Statement

1.1 Let $\{x_i\}_{i=0}^{N}$ be the marks obtained by students in a class. The objective is to award grades ranging from A (highest) to D (lowest) to the students. This is done by mapping a set of marks (which are closer to each other in some sense) to a cluster.

1.2 Table 1.2 shows the equivalence of each grade to a cluster. Thus, the objective is to map x_i to

Cluster	C_6	C_5	C_4	C_3	C_2	C_1	C_0
Grade	A	A-	B	B-	C	C-	D

TABLE 1.2

C_j.

2 Algorithm

2.1 Let m be the iteration number.

2.2 *Initialization:*$m = 0$. Compute the mean value of the cluster C_j as

$$\mu_j^0 = \frac{j}{K-1} \max_{0 \le i \le N-1} x_i \tag{2.1}$$

2.3 *Fitting:* For x_i, let

$$\left|\mu_k^m - x_i\right| < \left|\mu_j^m - x_i\right| \forall\, j \tag{2.2}$$

Assign x_i to the cluster C_k.

2.4 Let $x_{i,k}$ be the set of all x_i assigned to cluster C_k in the mth iteration. Let N_k be the number of such elements. Revise the mean value of C_k as

$$\mu_k^m = \frac{1}{N_k} \sum x_{i,k} \tag{2.3}$$

2.5 Repeat the above process till $\mu_k^m = \mu_k^{m+1}$, i.e. the algorithm converges.

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