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COURSE - B.Sc. Computer Science.

Q8-1 Predict Diabetic patient ( $K=3$ , Euclidean Distance).<sup>①</sup>

Test Example 1 -

BMI = 43.6, Age = 40

BMI	AGE	SUGAR	Distance.
33.6	50	1	$\sqrt{((43.6-33.6)^2 + (40-50)^2)} = 14.14$
26.6	30	0	$\sqrt{((43.6-26.6)^2 + (40-30)^2)} = 19.23$
23.4	40	0	$\sqrt{((43.6-23.4)^2 + (40-40)^2)} = 20.2$
43.1	67	0	$\sqrt{((43.6-43.1)^2 + (40-67)^2)} = 27.0$
35.3	23	1	$\sqrt{((43.6-35.3)^2 + (40-23)^2)} = 18.7$
35.9	67	1	$\sqrt{((43.6-35.9)^2 + (40-67)^2)} = 28.0$
36.7	45	1	$\sqrt{((43.6-36.7)^2 + (40-45)^2)} = 8.47$
25.7	46	0	$\sqrt{((43.6-25.7)^2 + (40-46)^2)} = 19.27$
23.3	29	0	$\sqrt{((43.6-23.3)^2 + (40-29)^2)} = 22.77$
31	56	1	$\sqrt{((43.6-31)^2 + (40-56)^2)} = 20.42$

$\Rightarrow$  3 nearest neighbours.

1. (36.7, 45, 1)  $\rightarrow$  distance = 8.47

2. (33.6, 50, 1)  $\rightarrow$  distance = 14.14

3. (35.3, 23, 1)  $\rightarrow$  distance = 18.7

$\rightarrow$  All 3 neighbours = 1  $\rightarrow$  Predicted Sugar = 1 (Diabetic).

Q8-2 Predict Missing weight using  $1\text{-NN}$ .

$\rightarrow$  Height = 5.5, Age = 38, Weight = ?



ID	Height	Age	Weight	Distance.
1	5.0	45	77	$\sqrt{((5.5-5.0)^2 + (38-45)^2)} = 7.00$
2	5.11	26	47	$\sqrt{((5.5-5.11)^2 + (38-26)^2)} = 12.00$
3	5.6	30	55	$\sqrt{((5.5-5.6)^2 + (38-30)^2)} = 8.00$
4	5.9	34	59	$\sqrt{((5.5-5.9)^2 + (38-34)^2)} = 4.03$
5	4.8	40	72	$\sqrt{((5.5-4.8)^2 + (38-40)^2)} = 2.06$
6	5.8	36	60	$\sqrt{((5.5-5.8)^2 + (38-36)^2)} = 2.00$
7	5.3	19	40	$\sqrt{((5.5-5.3)^2 + (38-19)^2)} = 19.00$
8	5.8	28	60	$\sqrt{((5.5-5.8)^2 + (38-28)^2)} = 10.00$
9	5.5	23	45	$\sqrt{((5.5-5.5)^2 + (38-23)^2)} = 15.00$
10	5.6	32	58	$\sqrt{((5.5-5.6)^2 + (38-32)^2)} = 6.00$

⇒ For  $k=3$

→ 3 nearest

- ID 6 → weight = 60
- ID 5 → weight = 72
- ID 4 → weight = 59

$$\text{predicted weight} = \frac{60 + 72 + 59}{3} = 63.67 \text{ kg} \dots$$

⇒ for  $k=5$

→ 5 nearest

- ID 6 (60), ID 5 (72), ID 4 (59), ID 10 (58), ID 1 (77).

$$\text{predicted weight} = \frac{60 + 72 + 59 + 58 + 77}{5} = 65.2 \text{ kg}.$$