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UTS Kecerdasan Buatan

Date

1. Permasalahan

Diketahui dua Variabe Fuzzy:

Permintaan $(x_1) = 2000$

Persediaan $(x_2) = 460$

Fungsi Keanggotaan :

Permintaan (domain 0-5000)

Turun = trimef $(0, 1000, 3000)$

Naik = trimef $(1000, 3000, 5000)$

Persediaan (domain 0-~~800~~ 1000)

Sedikit = trimef $(0, 200, 420)$

Sedang = trimef $(200, 420, 800)$

Banyak = trimef $(420, 800, 1000)$

Produksi (domain 0-8000)

Berkurang = trimef $(0, 2000, 7000)$

Bertambah = trimef $(1000, 7000, 8000)$

2. Hitung derajat Keanggotaan (μ)

Permintaan turun $(1000, 3000) \rightarrow x_1 = 2000$

Karena 2000 berada disisi Kanan Segitiga :

$$\mu \text{ turun} = \frac{3000 - 2000}{3000 - 1000} = 0,5$$

Permintaan naik $(1000, 3000, 5000) \rightarrow x_1 = 2000$

Karena 2000 sisi kiri Segitiga :

$$\mu \text{ naik} = \frac{2000 - 1000}{3000 - 1000} = 0,5$$

Jadi :

$\mu \text{ (turun)} = 0,5$

$\mu \text{ (naik)} = 0.5$

Persediaan = 450

Sedikit $(0. 200, 420) \rightarrow 450 > 420 \rightarrow \mu = 0$

Sedang $(200, 420, 800) \rightarrow 450$ Sisi Kanan Segitiga = μ Sedang $= \frac{800 - 450}{800 - 420} = 0.946$

Banyak $(420, 800, 1000) \rightarrow 450$ Sisi kiri Segitiga = μ banyak $= \frac{450 - 420}{800 - 420} = 0.054$

hasil :

$\mu \text{ (sedikit)} = 0$

$\mu \text{ (sedang)} = 0.946$

$\mu \text{ (banyak)} = 0.054$

3. Evaluasi

Hitung Strength tiap Rule = min

- $R_1 = min(0.5, 0.54) = 0.054 \rightarrow$ Berkurang
- $R_2 = min(0.5, 0.946) = 0.5 \rightarrow$ Berkurang
- $R_3 = min(0.5, 0) = 0 \rightarrow$ Bertambah
- $R_4 = min(0.5, 0.054) = 0.054 \rightarrow$ Berkurang
- $R_5 = min(0.5, 0.946) = 0.5 \rightarrow$ Bertambah
- $R_6 = min(0.5, 0) = 0 \rightarrow$ Bertambah

4. Agregasi Output

Berkurang $= max(0.054, 0.5, 0.054) = 0.5$

Bertambah $= max(0.05, 0) = 0.5$

5. Hitung Centroid

Rumus Centroid :

$$\bar{X} = \frac{\int_0^{8000} X \cdot \mu\,agg(x)\,dx}{\int_0^{8000} \mu\,agg(x)\,dx}$$

Denominator $D = \int \mu\,agg(x)\,dx$

- $D_1 = \int_0^{1000} \frac{x}{2000}\,dx = 250$
- $D_2 = \int_{1000}^{7500} 0.5\,dx = 0.5 \cdot 6500 = 3250$
- $D_3 = \int_{7500}^{8000} \frac{8000 - x}{1000}\,dx = 125$

Total =

$D = 250 + 3250 + 125 = 3625$

Numerator $N = \int x\,\mu\,agg(x)\,dx$

- $N_1 = \int_0^{1000} x \cdot \frac{x}{2000}\,dx = \frac{1}{2000} \cdot \frac{1000^3}{3} = 166666.6667$
- $N_2 = \int_{1000}^{7500} x \cdot 0.5\,dx = 0.5 \frac{7500^2 - 1000^2}{2} = 13,812,500$
- $N_3 = \int_{7500}^{8000} x \cdot \frac{8000 - x}{1000}\,dx = 958.333.3333$

Total =

$N = 166666.6667 + 13812500 + 958333.3333 = 14937500$

Centroid

$\bar{X} = \frac{N}{D} = \frac{14937500}{3625} = 4121.38$ Jika dibulatkan Produksi $= 4121$