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UTS Keerdasan Buatan

Date

1. Permasalahan

Diketahui dua Variabel Fuzzy:

Permintaan (x_1) = 2000

Persediaan (x_2) = 450

Fungsi Keanggotaan:

Permintaan (domain 0-5000)

Turun = $\text{trimf}(0, 1000, 3000)$

Naik = $\text{trimf}(1000, 3000, 5000)$

Persediaan (domain 0-1000)

Sedikit = $\text{trimf}(0, 200, 420)$

Sedang = $\text{trimf}(200, 420, 800)$

Banyak = $\text{trimf}(420, 800, 1000)$

Produksi (domain 0-8000)

Berkurang = $\text{trimf}(0, 2000, 7000)$

Bertambah = $\text{trimf}(1000, 7000, 8000)$

2. Hitung derajat Keanggotaan (μ)

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

Karena 2000 berada di sisi 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) $\rightarrow 450$ S.Si Kanan Segitiga = $\mu_{\text{Sedang}} = \frac{800 - 450}{800 - 420} = 0.946$

Banyak (420, 800, 1000) $\rightarrow 450$ S.Si Kiri Segitiga = $\mu_{\text{Banyak}} = \frac{450 - 420}{800 - 420} = 0.054$

hasil:

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

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

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

3. Evaluasi

Hitung Strength tiap Rule = min

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

4. Agregasi Output

$$\text{Berkurang} = \max(0.054, 0.5, 0.054) = 0.5$$

$$\text{Bertambah} = \max(0.054, 0) = 0.5$$

5. Hitung Centroid

Rumus Centroid -

$$\bar{x} = \frac{\int_a^b x \mu_{agg}(x) dx}{\int_a^b \mu_{agg}(x) dx}$$

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 $N = \int x \mu_{agg}(x) dx$

$$- N_1 = \int_0^{1000} x \cdot \frac{x}{2000} dx = \frac{1}{2000} \cdot \frac{1000^3}{3} = 166666.6667$$

$$- N_2 = \int_{1000}^{7500} x \cdot 0.5 dx = 0.5 \cdot \frac{7500^2 - 1000^2}{2} = 13,812,500$$

$$- N_3 = \int_{7500}^{8000} x \cdot \frac{8000-x}{1000} dx = 958,333.3333$$

Total =

$$N = 166666.6667 + 13,812,500 + 958,333.3333 = 14,937,500$$

Centroid:

$$\bar{x} = \frac{N}{D} = \frac{14,937,500}{3625} = 4121.38 \text{ jika Liburatkan Produksi} = 4121$$