PEMBAHASAN UAS SISTEM CERDAS 2023/2024

JAWABAN HANYA SEBAGAI REFERENSI. BELUM TENTU BENAR!!

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1. **Wumpus**

   a. **Pengetahuan baru apa yang akan didapat oleh agent jika dia melangkah ke [1,2]?**

$R_{11} : B_{1,2}$
$R_{12} : \neg S_{1,2}$

Aturan Permainan
$R_{13} : B_{1,2} \Leftrightarrow P_{2,2} \vee P_{1,3}$

Biconditional elimination pada R_{13}
$R_{14} : (B_{1,2} \Rightarrow P_{2,2} \vee P_{1,3}) \wedge (P_{2,2} \vee P_{1,3} \Rightarrow B_{1,2})$

Elimination pada R14
$R_{15} : B_{1,2} \Rightarrow P_{2,2} \vee P_{1,3}$

Modus Ponens R_{15} dan R_{11}
$B_{1,2} \Rightarrow P_{2,2} \vee P_{1,3}$
$B_{1,2}$
———————
$R_{16} : P_{2,2} \vee P_{1,3}$ (ada PIT di posisi [2,2] atau [1,3])

   b. **Agent kemudian kembali ke [1,1] dan selanjutnya menuju ke [2,1]. Pada langkah terakhir ini buktikan dengan serangkaian inferensi bahwa agent mampu menyimpulkan ada wumpus di [3,1]!**

$R_{17} : S_{2,1} \Leftrightarrow (W_{1,1} \vee W_{2,2} \vee W_{3,1})$

dari R_{11}
$R_{18} : \neg S_{2,1} \Leftrightarrow \neg(W_{2,2} \wedge W_{3,1})$
$R_{19} : (\neg S_{2,1} \Rightarrow (\neg W_{2,2} \vee \neg W_{3,1})) \wedge (\neg(W_{2,2} \vee W_{3,1}) \Rightarrow \neg S_{2,1})$
$R_{20} : \neg S_{2,1} \Rightarrow \neg(W_{2,2} \vee W_{3,1})$
$R_{21} : \neg(W_{2,2} \vee W_{3,1})$
$R_{22} : \neg W_{2,2} \wedge \neg W_{3,1}$
$R_{23} : S_{2,1}$

$R_{24} : S_{2,1} \Leftrightarrow (W_{1,1} \vee W_{2,2} \vee W_{3,1})$
$R_{25} : S_{2,1} \Leftrightarrow (W_{2,2} \vee W_{3,1})$
$R_{26} : (S_{2,1} \Rightarrow (W_{2,2} \vee W_{3,1})) \wedge ((W_{2,2} \vee W_{3,1}) \Rightarrow S_{2,1})$

R_{27} : $S_{2,1} \Rightarrow (W_{2,2} \vee W_{3,1})$
R_{28} : $W_{2,2} \vee W_{3,1}$

Lihat R_{24}: $\neg W_{2,2} \wedge \neg W_{3,1}$
dari R_{24} diperoleh
R_{29} : $\neg W_{2,2}$
dari R_{28} & R_{29}
R_{30} : $W_{3,1}$ (Terdapat wumpus di [3,1])

2. **Himpunan Fuzzy**
   a. **Tentukan fungsi keanggotaan dari masing-masing himpunan fuzzy di atas!**

$$\mu_{KERING}[x] = \begin{cases} 1; & x \leq 10 \\ \frac{20-x}{20-10}; & 10 \leq x \leq 20 \\ 0; & x \geq 20 \end{cases}$$

$$\mu_{LEMBAB}[x] = \begin{cases} 0; & x \leq 10 \text{ atau } x \geq 50 \\ \frac{x-10}{20-10}; & 10 \leq x \leq 20 \\ 1; & 20 \leq x \leq 40 \\ \frac{50-x}{50-40}; & 40 \leq x \leq 50 \end{cases}$$

$$\mu_{BASAH}[x] = \begin{cases} 0; & x \leq 40 \\ \frac{x-40}{50-40}; & 40 \leq x \leq 50 \\ 1; & x \geq 70 \end{cases}$$

   b. **Hitung $\mu_{KERING}(17)$, $\mu_{LEMBAB}(17)$, $\mu_{BASAH}(17)$!**

$\mu_{KERING}[17] = \frac{20-17}{20-10} = \frac{3}{10} = 0,3$

$\mu_{LEMBAB}[17] = \frac{17-10}{20-10} = \frac{7}{10} = 0,7$

$\mu_{BASAH}[17] = 0$

3. - ES: What is the weather today?
   User: dry (CF = 0.9)
   Rule 2: IF today is dry THEN tomorrow is dry (CF = 0.5)
   CF(tomorrow is dry, today is dry) = CF(today is drt) x CF(Rule 2) = 0.9 x 0.5 = 0.45
   - ES: What is the temperature today?
   User: warm (CF = 0.7)
   Rule 5: IF today is dry AND temperature is warm THEN tomorrow is rain (CF = 0.7)

CF(tomorrow is rain, today is dry AND temperature is warm) = min(CF(today is dry), CF(temperature is warm)) x CF(Rule 5) = min(0.9, 0.7) x 0.7 = 0.49

- ES: What about the sky?

  User: overcast (CF = 0.8)

  Rule 6: IF today is dry AND temperature is warm AND sky is overcast THEN tomorrow is rain (CF = 0.65)

  CF(tomorrow is rain, today is dry, temperature is warm, AND sky is overcast) = min(CF(today is dry), CF(temperature is warm), CF(sky is overcast)) x CF(Rule 6) = min(0.9, 0.7, 0.8) x 0.65 = 0.455

Hasil akhirnya adalah:

Tomorrow is dry : 0.45

Tomorrow is rain: 0.49 dan 0.455 (di-combine) CF = 0.49 + 0.455 x (1 - 0.49) = 0.72205

Outputnya adalah Tomorrow is rain karena memiliki CF lebih tinggi, yaitu 0.72205

4. Tidak bisa diselesaikan dengan arsitektur 1 layer karena data dengan output 0 dan 1 tidak dapat dipisahkan dengan sebuah garis lurus (→ nonlinearly separable).

x_1	x_2	y
0	0	0
0	1	1
1	0	1
1	1	0