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CISC 3665

**Unit 5 Assignment**

**1: Forward Chaining**

Following rules to reach the goal given.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Time | WM | RuleBase/Action | Rules Checked | Goal Reached? |
| 1 | Kermit sees pond ahead. | Kermit sees pond ahead. Kermit moves towards pond. | Kermit sees obstacle: FALSE Kermit sees monster: FALSE  Kermit sees pond: TRUE | NO |
| 2 | Kermit moves toward pond. | Kermit moves toward pond, Kermit sees fly. | Kermit sees obstacle: FALSE Kermit sees monster: FALSE  Kermit sees pond: FALSE  Kermit moves toward pond: TRUE | NO |
| 3 | Kermit sees fly. | Kermit sees fly, Kermit eats fly | Kermit sees obstacle: FALSE Kermit sees monster: FALSE  Kermit sees pond: FALSE  Kermit moves toward pond: FALSE  Kermit sees fly: TRUE | YES |

**2: Backward Chaining**

Following rules from the goal to find the given WM.

|  |  |  |  |
| --- | --- | --- | --- |
| Time | Goal Proven (Is rule in WM) | Current Rule to check. | Rule with compatible goal |
| 1 | Not in WM | Kermit eats fly. (Goal) | Kermit sees fly, Kermit eats fly. |
| 2 | Not in WM | Kermit sees fly. | Kermit moves towards pond, Kermit sees fly. |
| 3 | “Kermit sees pond” is in WM. | Kermit moves towards pond. | Kermit sees pond ahead. Kermit moves towards pond. |

**3: Predictive Reasoning**

Part 1: Causal Chain:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Pr(boat) | 🡪 | Pr(river) | 🡪 | Pr(orchard) | 🡪 | Pr(food) |

Part 2: What is the probability of Pr(food|boat) given you get in the boat?

Pr(boat) = 100%

Pr(river) = Pr(river|boat)\*Pr(boat) + Pr(river|~boat)\*Pr(~boat)  
Pr(river) = 50%\*100% + 45%\*0% = 0.5\*1 + 0.45\*0 = 50%

Pr(orchard) = Pr(orchard|river)\*Pr(river) + Pr(orchard|~river)\*Pr(~river)  
Pt(orchard) = 75%\*50% + 1%\*50% = 0.75\*0.5 + 0.01\*0.5 = 37.5% + 0.5% = 38%

Pr(food) = Pr(food|orchard)\*Pr(orchard) + Pr(food|~orchard)\*Pr(~orchard)  
Pr(food) = 90%\*38% + 10%\*62% = 0.9\*0.38 + 0.1\*0.62 = 34.2% + 6.2% = 40.4%

Pr(food) = 40.4%

**4: Diagnostic Reasoning**

Part 1: Common Cause Network

|  |  |  |
| --- | --- | --- |
|  | 🡪 | Pr(gold) |
| Pr(asleep) | ------------------------------------- | ------------------------------------- |
|  | 🡪 | Pr(baby) |

Part 2: Probability that gold is left unguarded.

Pr(gold) = Pr(gold|asleep)\*Pr(asleep) + Pr(gold|~asleep)\*Pr(~asleep)  
Pr(gold) = 90%\*20% + 15%\*80% = 0.9\*0.2 + 0.15\*0.8 = 18% + 12% = 30%

Pr(baby) = Pr(baby|asleep)\*Pr(asleep) + Pr(baby|~asleep)\*Pr(~asleep)  
Pr(baby) = 25%\*20% + 2%\*80% = 0.25\*0.2 + 0.02\*0.8 = 5% + 1.6% = 6.6%

**5: Explaining Away**

Part 1: Common Effect Network

|  |  |  |
| --- | --- | --- |
| Pr(lightsaber) | 🡪 |  |
|  |  | Pr(alien) |
| Pr(poison) | 🡪 |  |

Part 2: Probability that the alien is killed. Pr(alien)

Pr(alien) = Pr(lighsaber^posion)\*Pr(lightsaber)\*Pr(poison) +  
 Pr(~lightsaber^poison)\*Pr(~lightsaber)\*Pr(poison) +  
 Pr(lightsaber^~poison) )\*Pr(lightsaber)\*Pr(~poison) +  
 Pr(~lightsaber^~poison) )\*Pr(~lightsaber)\*Pr(~poison)

Pr(alien) = 87%\*77%\*10% + 12%\*23%\*10% + 68%\*77%\*90% + 5%\*23%\*90% =  
 6.699% + 0.276% + 47.124% + 1.035% = 55.134%  
 Well…good luck human and alien. You’re both going to need it…