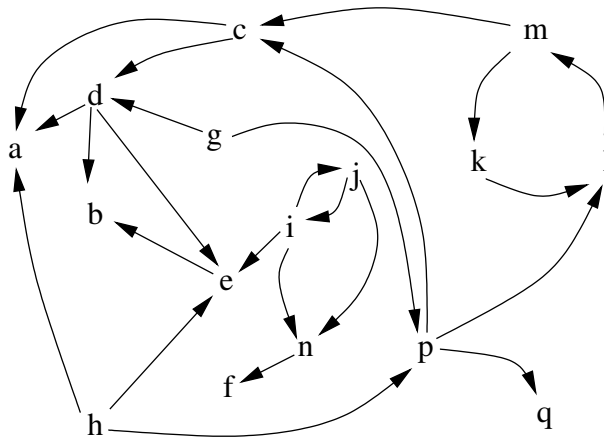


Agent-Based Systems Tutorial 8

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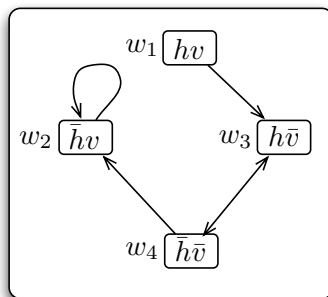
Q1 Consider the abstract argumentation system depicted in the following graph:



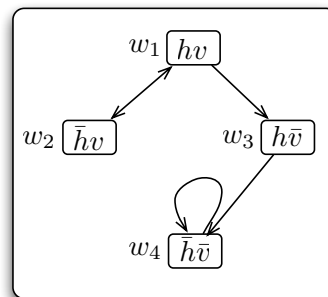
1. Construct the grounded extension.
2. Construct the preferred extension(s).
3. Which arguments can be credulously justified?
4. Which arguments can be sceptically justified?

Q2 You are given the following two accessibility relations for the beliefs of the Buyer and Seller agents in a domain with two arguments h and v , using a modal logic of belief. The diagrams describe models M_B and M_S with valuation functions π_S and π_B , such that $\Box\varphi$ is interpreted as $(\text{Bel } i \varphi)$ for each of the two agents $i \in \{B, S\}$:

Seller



Buyer



- (a) Which of the T , D , 4 and 5 axioms are satisfied by the Bel modality for each of the two agents?

(b) Which of the following statements is true?

1. $\langle M_S, w_1 \rangle \models \neg(h \Rightarrow v)$
2. $\langle M_S, w_1 \rangle \models (\text{Bel } S \neg v)$
3. $\langle M_B, w_2 \rangle \models \neg(\text{Bel } B h)$
4. $\langle M_S, w_4 \rangle \models (\text{Bel } S \neg h \vee \neg v)$
5. $\langle M_B, w_2 \rangle \models (\text{Bel } S (\text{Bel } S \neg h \vee \neg v))$
6. $\langle M_S \rangle \models \neg(\text{Bel } S h \Rightarrow v)$
7. $\models (\text{Bel } S h \vee \neg h) \wedge (\text{Bel } B v \vee \neg v)$
8. $\langle M_B, M_S, w_3 \rangle \models E(\neg h \vee \neg v)$
9. $\langle M_B, M_S, w_1 \rangle \models D(h \wedge \neg v)$

Justify your answers.

(c) Complete the diagrams so that they satisfy the KD45 axiom system by drawing additional edges between possible worlds.

(d) What further edges are needed if you switch from KD45 to S5?