Name Group

Intelligent Systems

20 June 2020

3 Dispute Resolution Using Argumentation in Mediation

1. Explain the units of the multi-context BDI agent and their workings.

$$\begin{array}{rcl@{\qquad}rcl} I : I(\alpha) & \Rightarrow & D : D(\lceil\alpha\rceil) & B : \neg B(\alpha) & \Rightarrow & D : \neg D(\lceil\alpha\rceil) \\ D : \neg D(\alpha) & \Rightarrow & I : \neg I(\lceil\alpha\rceil) & C : done(e) & \Rightarrow & B : B(\lceil done(e)\rceil) \\ D : D(\alpha) & \Rightarrow & B : B(\lceil\alpha\rceil) & I : I(\lceil does(e)\rceil) & \Rightarrow & C : does(e) \end{array}$$

2. General theory: consider the usage of these axioms in the algorithm. You should make the difference betwen variables and constants in the logic.

   (a) Explain fully what is the logical meaning and where it is used.
   B : $B_i(Have(X,Z) \wedge Give(X,Y,Z) \rightarrow \neg Have(X,Z))$ (G.4)

   (b) Explain fully what is the logical meaning and where it is used.
   B : $B_i(Have(i,Z) \wedge \neg I_i(Have,i,Z) \wedge Ask(X,i.Give(i,X,Z)) \rightarrow I_i(Give(i,X,Z)))$ (G.5)

   (c) Explain fully what is the logical meaning and where it is used.
   B : $B_i(\neg I_i(Q)) \wedge B_i(P_1 \wedge \ldots \wedge P_j \wedge \ldots \wedge P_n \rightarrow Q) \rightarrow \neg B_i(I_i(P_j))$ (G.6)

   Provide comments related to your findings on the usage of the axioms.

3. Bridge rules: consider the usage of these axioms in the algorithm also.

   (a) Explain fully what is the logical meaning and where it is used.
   $B_\mu(I_X(\varphi)) \wedge B_\mu(\phi \rightarrow I_X(\varphi)) \Rightarrow Tell(\mu, X, B_\mu(\phi \rightarrow I_X(\varphi)))$ (R.2)

   (b) Explain fully what is the logical meaning and where it is used.
   $C : Tell(\mu, i, B_\mu(\varphi)) \Rightarrow B : B_i(\varphi)$. (R.3)

   (c) Explain fully what is the logical meaning and where it is used.
   $I : I_i(Give(X,i,Z)) \Rightarrow C : Ask(i,X,Give(X,i,Z))$. (R.4)

4. Always consider the context as well.

   (a) Explain fully the reasoning expressed by
   {(M.2),(M.5),(G.2)} $\vdash_{pt,mp} B_\mu(I_\beta(Have(\beta, screw)))$ (M.11)

   (b) Explain fully the reasoning expressed by
   {(M.7),(G.1)} $\vdash_{mp} B_\mu(Give(\alpha, Y, screw) \rightarrow Have(Y, screw))$ (M.12)

   (c) Explain fully the reasoning expressed by
   {(M.11),(M.12),(G.2)} $\vdash_{pt,mp} \quad B_\mu(I_\beta(Give(\alpha, \beta, screw)))$ (M.13)

   (d) Explain fully the reasoning expressed by
   {(M.13)} $\vdash_{R.1} Tell(\mu, \beta, I_\beta(Give(\alpha, \beta, screw)))$ (M.14)

   (e) Explain fully the reasoning expressed by
   {(M.14)} $\vdash_{R.3} I_\beta(Give(\alpha, \beta, screw))$ (M.15)

5. Consider a more realistic situation from the real world medation when a possible mediator does not have all the knowledge of the domain and it is up to the participants to find details on how to manage their solutions to their problems. In our case the mediator does not have the axiom below.
   B : $B_\mu(Have(X, hammer) \wedge Have(X, nail) \wedge Have(X, mirror) \rightarrow Can(X, hangMirror))$ (M.3)
   Consider variations and show how an improved algorithm might be able to work for finding solutions in such cases.