MENTAL SITUATION CALCULUS

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ABSTRACT

The situation calculus of (McCarthy and Hayes 1969)[1] has mainly been used to reason about states of the physical world, taking into account the locations and physical properties of objects and admitting such events as moving them. Analogously we can consider a mental situation calculus (MSC) in which the situations include beliefs, goals, intentions and other mental qualities, and the events include inferring, observing, establishing goals and discharging them.

MSC has several motivations:

1. MSC involves reifying beliefs, and one of its basic forms will be believes(<proposition>, ss) standing for the assertion that the proposition is believed in mental situation ss. The formalism allows for belief not to be closed under inference. In fact one of the possible mental actions is to make an inference. Therefore, we can describe in detail the circumstances under which we want our system to make inferences.

2. Non-monotonic reasoning requires closer control over inference than deduction, because of its tentative character. Some problems that have recently arisen with blocks world axiomatizations may require that circumscription be controlled in accordance with the pedigree of the system's objective beliefs and not merely being determined by what the beliefs are.

3. It looks like several useful methods of control of reasoning can be accomplished by hill-climbing in mental situation space.

Besides reifying beliefs, MSC involves reifying goals and partial plans for achieving them. Depending on progress the paper to be presented will include both general discussion of MSC and specific formalizations.

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[1]McCarthy, John and P.J. Hayes. 1969: "Some Philosophical Problems from the Standpoint of Artificial Intelligence." In Machine Intelligence 4, edited by D. Michie. American Elsevier, New York, NY.