COM316: Artificial Intelligence

Problem 8: Semantic Networks

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The Problem

Intro

Problem 6 used predicate calculus with predicate representations to deal with the objects of the world. Now we want to expand that to help our ability to reason. What if we had categories of objects that we could reason with? Say we had different types of obstacles some that we could walk over, others that we couldn't. For example, we could have boxes, crates, poles, chairs, tables, rocks, buildings, etc. These could be categorized such as chairs and tables are both furniture-items. And we could go on to say that if it is a furniture-item then one could step on it to get past. Now we can write a general rule using furniture-item instead of two rules, one for chairs and one for tables.

Given

1. Same as Problem 6.
2. A more complicated world with differing obstacles.
3. isa links that link objects to their category: (isa chair furniture-item).

Problem

Using a graphical representation with nodes as objects and edges as links create a hierarchical structure with block at the top. clear and obstacle will have one way isa links to block. Make up reasonable objects to be obstacles that can fit into the hierarchy. Add additional links to describe the objects. Now graphically represent some portion of our 2d grid (2x2 blocks should suffice) that makes use of the new hierarchy.

We met to discuss this problem on October 23rd

Our Solution

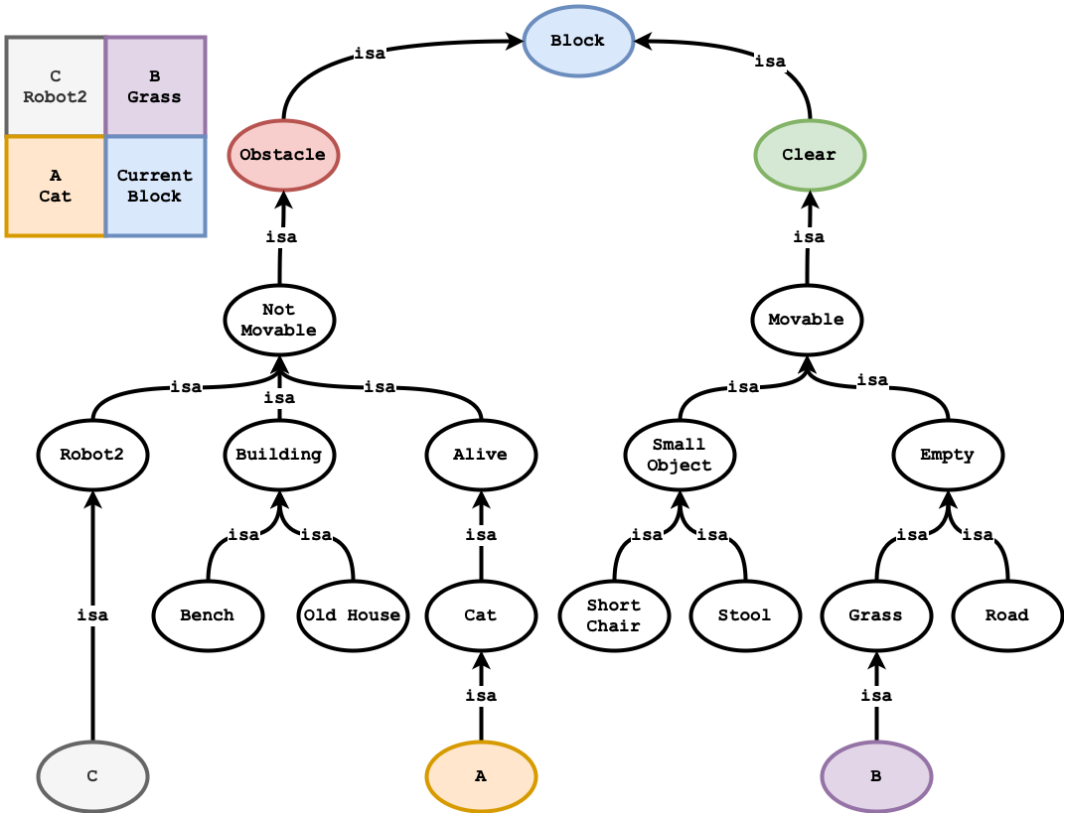

Figure 1: Our semantic network

In our Semantic Network, we start from the bottom as A, B, or C. The facts move upward in the network by adding more facts to our knowledge base. When we reach the top, we have important information about our starting point and can conclude whether we can move to the next square.

For example;

$$A \text{ (Starting fact) } isa \text{ } Cat \rightarrow Cat \text{ } isa \text{ } Alive \rightarrow Alive \text{ } isa \text{ } Not \text{ } Movable \rightarrow$$
$$Not \text{ } Movable \text{ } isa \text{ } Obstacle \rightarrow Obstacle \text{ } isa \text{ } Block$$

From these new facts, we can reason that we can not move to A.

$$B \text{ (Starting fact) } isa \text{ } Grass \rightarrow Grass \text{ } isa \text{ } Empty \rightarrow Empty \text{ } isa \text{ } Movable \rightarrow$$
$$Movable \text{ } isa \text{ } Clear \rightarrow Clear \text{ } isa \text{ } Block$$

From these new facts, we can reason that we can move to B.