

CS 182 Spring 2004. Assignment 5 Solution.

Regier model exercises

The solutions here are model answers only. There are a number of equally good answers to these questions.

Problem 1. Attempt to train the program on the following seven concepts:

below bigger enclose right near out in

For successfully learned concepts: Describe what features enabled the system to learn. For concepts the system was unable to learn, explain why it could not be learned. What additional features would be necessary to allow the system to learn these?

The system should successfully learn *below*, *right*, *out*, *in*.

- *below*: non-overlap (LM interior map), directional features
- *right*: directional features
- *out*: non-overlap (LM interior map)
- *in*: inclusion (LM interior map)

The system might have difficulty with *enclose*.

- It has all the necessary features to learn the concept
- The particular training examples that are used (positive as well as negative examples) might make it difficult for the system to figure out which features are important

The system should be unable to learn *bigger*, *near*

- It has no distance or size features

Problem 2. Now consider the following concepts:

into blue between inside past around

Would you expect these concepts to be learnable given appropriate training examples? Would they be learnable by the dynamic version of the program? What additional features would be necessary to allow the system to learn?

The static version of the system (as it is) should be able to learn *inside*. One might have to be careful with the training examples.

The dynamic version of the system (i.e. with motion buffer) should successfully learn *into*.

There are a number of senses of around:

- A static sense which carries the meaning of being nearby, as in *he's around*. One would expect the system to have trouble learning this sense, because it has no distance features.
- A dynamic sense which carries the meaning of going exactly one cycle around a landmark, ending where you started, as in *walk around the building*. The dynamic system would have trouble with it, since min, max, min/max count, and average is insufficient to capture the path.
- A dynamic sense which carries the meaning of going around the landmark, but not necessarily completing one cycle, as in *walk around the ditch*. Again the dynamic system would have trouble with it because of the path information.
- Another dynamic sense which carries the meaning of some random path, as in *walking around in the park*. It is again difficult (but feasible) to make the system capture this kind of path.

The dynamic version of the system would have trouble with *past*

- *past* requires that a trajectory first approach the landmark, and then move away from it
- There is no distance feature in the system

Either version system would be unable to learn *blue*, *between*

- *blue* requires color as a feature
- *between* requires two landmarks for comparison