

Lecture 2: Problem Set 2 (Due Friday, Feb. 23)

Reading: Minsky and Papert, "Progress Report on Artificial Intelligence" 1971

Problem 1

An analogy completion problem is succinctly described as "A is to B as C is to which one of these (D)?"

- a) Make up an analogy completion problem that is different from the simple visual analogy completion problem at the beginning of the progress report. This does not necessarily have to be visual!
- b) Make a description for "A" and a description for "C".
- c) Find a way to change your description of "A" so that it describes "B". Make up a description for this way to change.
- d) Use your answer to part (c) to change your description of "B" into a new description. If this new description is not helpful in solving the analogy problem, then repeat this process potentially using different descriptions of "A", "B", "C", and the way to change "A" to "C".

Problem 2

Minsky and Papert briefly discuss how young children draw very simple representations of complex objects, such as other humans.

- a) Why would asking a child to draw help us to understand how humans think about drawing?
- b) What would be some differences between what might be learned from asking a child to draw and asking a professional artist to draw?
- c) How would you program a computer to learn to draw a better nose, such as the child described in the report? Describe the change that would occur in the computer's internal descriptions of how to draw a face.

Problem 3

Minsky and Papert state,

"The community of ideas in the area of computer science makes a real change in the range of available concepts. Before this, we had too feeble a family of concepts to support effective theories of intelligence, learning, and development. ... Computer science has brought a flood of such ideas, well defined and experimentally implemented, for thinking about thinking; only a fraction of them have distinguishable representations in traditional psychology: <list> ... All these serve today as tools of a curious and intricate craft, programming. But just as astronomy succeeded astrology, following Kepler's discovery of planetary regularities, the discoveries of these many principles in empirical explorations of intellectual processes in machines should lead to a science, eventually."

- a) Think of five computer science ideas and explain how they can help to think about human psychology.
- b) Think of five psychology or neuroscience ideas and explain how they have helped to think about computer science.