CS 4300: Artificial Intelligence

Assignment: Scavenger Learning

Description

This assignment is the first in a series. In the series, you will create an agent that can learn which objects are most likely of value to be collected and deposited.

The agent is a robot that has recently landed on the surface of a foreign planet. The planet has a long history. Its original, natively evolved, population had a great civilization that died off tens of thousands of years ago. Several thousands of years ago, another population found the planet and built a population that lasted more than a thousand years before failing. Earth has been sending various equipment to study the planet for more than a hundred years.

The original population has come to be known as [NATIVE]. Artifacts left on the planet that were built by that population are very valuable for your research expedition. Of lesser value are the artifacts left by the second population. Most of what they built were copies of the original population, and thus they have been dubbed [MIMIC]. The debris left by a hundred years of probes and other space junk sent from [EARTH] are scattered across the surface. They are a hindrance for your research.

While the base has equipment that is sophisticated enough to determine which objects are of which of the three origins, the robot can only look at an object and tell its color, shape, and size. The robot is tasked with finding the most rewarding collection of 900 objects possible. The robot is to deposit 100 items that it is not rewarded or punished for. Then it is to deposit 900 items in such a way to maximum its expected total score. [NATIVE] items are worth 50 points; [MIMIC] are worth 10 points; [EARTH] items are worth -50 points. Object scores are assigned to the agent when they are deposited in the base, not before.

The robot’s bin has been made infinitely large for this series of assignments, so you can focus on learning, and not the logistics of collecting objects into piles somewhere in the world.

The environment will give your agent a [DEPOSIT_VALUE] percept after each deposit. This will let you know the value of the object, and thus the origin of the object.

In class we studied a Bayesian network that is appropriate for this series of assignments.

Assignment

In this assignment, you will modify your agent so it will keep track of the number of items of each type that are deposited. It needs to track the number of objects of each origin: [NATIVE], [MIMIC], and [EARTH]. It also needs to track the number of items for each origin:color, origin:shape, and origin:size combination. This should make 4 tables that are suitable for use in the Bayesian network discussed.

Requirements

- Build proper infrastructure into your agent to be able to store the counts.
- Examine, pickup, and deposit all objects in the same cell as the base.
- Don’t run out of charge.
- When the simulation is over (right before you quit), display the contents of the tables.
- Quit when all objects have been deposited.

Run your agent

- Run your agent on the 4 tiny learning worlds from 2015. You may have to do a git pull on the ai repository to get these.

Notes

- You should be running from the [RUN Scavenger Learning] script now.
- The tiny worlds have a handful of cells. You can explore all if you want, or only the base if you want.
- There are 2000 objects in the cell with the base.

Passoff

- Submit your agent's output from the 4 tiny worlds that show the counts of all objects types.