CS 4300: Artificial Intelligence

Assignment: Scavenger Learning Expected Values

Description

This assignment is the next 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 civilization 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, your agent needs to display the expected value of every object, after all objects have been deposited.

Requirements

- Build functionality to calculate the expected value of an object, given the stats tables collected.
- Before quitting, display the expected values of all objects.

Run your agent

- Run your agent on the 4 tiny learning worlds from 2015.

Notes

- This is after you already know their value, but calculate as if you didn’t know.

Passoff

- Submit your agent’s output from the 4 tiny worlds that show the expected values of all objects.