Inference

Summary

Target audience: Secondary students (grades 9-12)

Time required: 70min

Objectives: Students will use probabilistic inference to solve problems involving robot localization and to infer membership in a hidden numerical set.

Materials:
- Power point on Markov Localization
- Directions for the “Guess my rule” activity
- Worksheet for Markov Localization
- Graph paper

Introduction (15 min)

Localizing autonomous mobile robots within a known environment requires the use of probabilistic inference. Introduce this idea using the attached power point on Markov Localization. Point out that with inference we can never be fully confident in our conclusions, but are rather basing them on the most likely scenario based on the data we have. In this respect using inference requires a different mindset from deductive reasoning.

Guess my rule (20 min)

Use the attached directions for the “Guess my rule” activity. At the end of the activity debrief and draw connections back to Markov Localization.

Markov Localization and Bayes Rule (30 min)

Use the worksheet “Markov Problem” for this part. Go over the top of the worksheet and review/teach Bayes theorem. Students will then use Bayes theorem to complete the worksheet and find the probability that the robot is under each of the sensors and it most likely position.

Conclusion (5 min)

Talk with the students about the connection between the activities and the importance of probabilistic inference in robotics and beyond.