

Optimizing paths for autonomous flying robots using reinforcement learning

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5 april 2011

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Goal

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Optimizing paths for an vision-based autonomous flying robot using reinforcement learning
Preferably as general as possible

Reinforcement learning

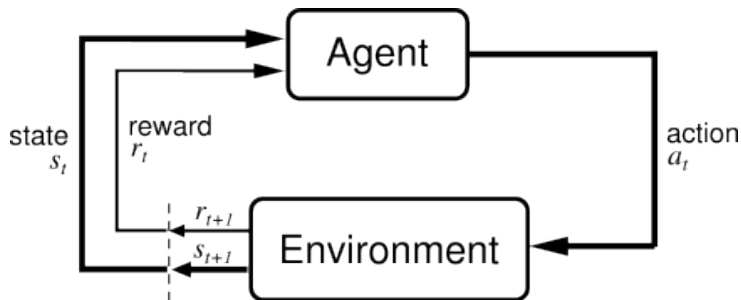


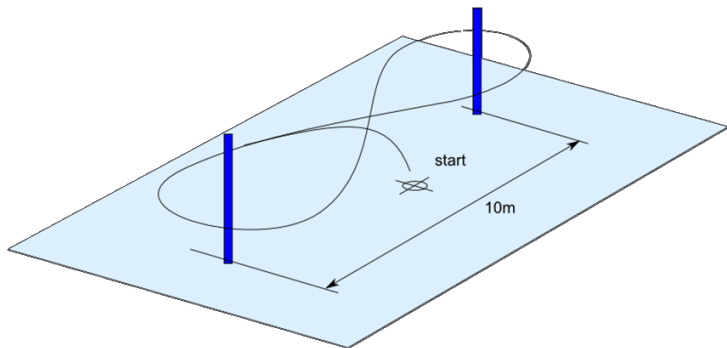
Figure: Reinforcement Learning

Mainly used in simple simulated problems (i.e. games)

Possible approaches

- Path planning in whole environment
 - Extract features from images \rightarrow State
 - A priori path
 - Learn optimal path in state-space
- Estimating parameters for pre-defined path
 - Reinforcement Parameter Control
 - Learn optimal parameters

Practical problem



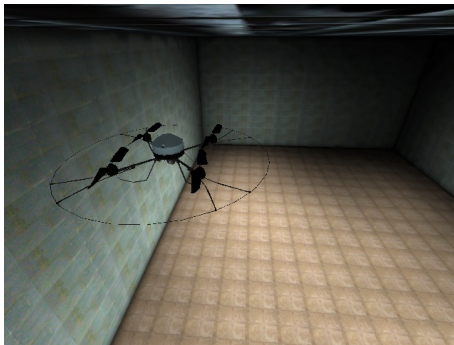
- International Micro Air Vehicle (IMAV) Flight Competition
- Pylon Challenge: fly in figure 8's around poles
- Learn optimal path

Tool: AR.Drone



- Two camera's (Front, Bottom)
- Sensors: accelerometers, gyroscopes, bottom-sonar
- Wifi
- OS: Linux

Tool: simulation



- Unreal tournament
- Airrobot edited
- Create simple levels

Summary

- How to find the optimal flying path (for general problems) using Reinforcement Learning?
- Practical test: what is the optimal path for a figure-8 flight?