

Optimizing paths in figure-8 task using reinforcement learning

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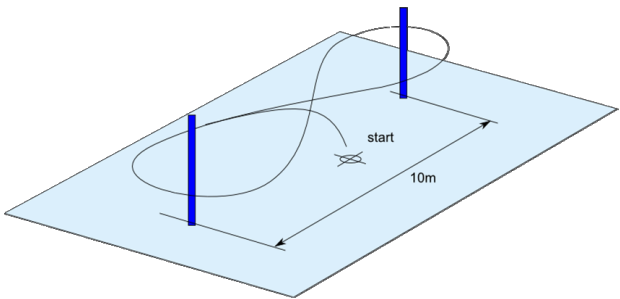
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Goal

Learn path of figure-8 challenge using reinforcement learning for aerial robot.



Why?

- Frequently used for testing (real) robots
- Task suitable for Reinforcement Learning
- Autonomous aerial systems are useful
 - Locations humans / ground robots cannot reach
 - Nice overview
 - Price is dropping

Related Work

- Figure-8 mostly used for ground robots
- Often using SLAM
- Not much 'learning'

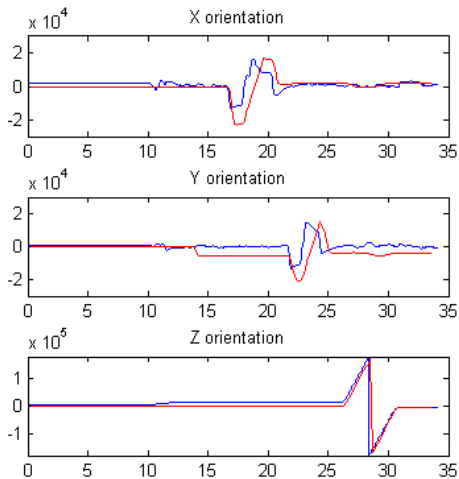
Approach

- Train in simulation, use in real life
 - Unreal Tournament 2004 + USARSim
 - AR.Drone ported to Unreal by Nick Dijkshoorn



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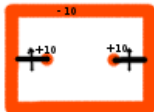
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- Use different stages / force fields (crossed path)
- Use reinforcement learning

- No states but forces



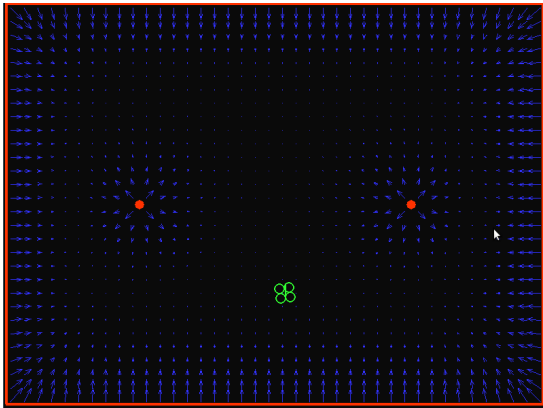
- Rewards: +10 for field transision, -10 for hitting



- Value iteration: each vector has (extra) return value
- Updates:
 - vector addition
 - update last X vectors
 - scale: value difference, last seen, normalize

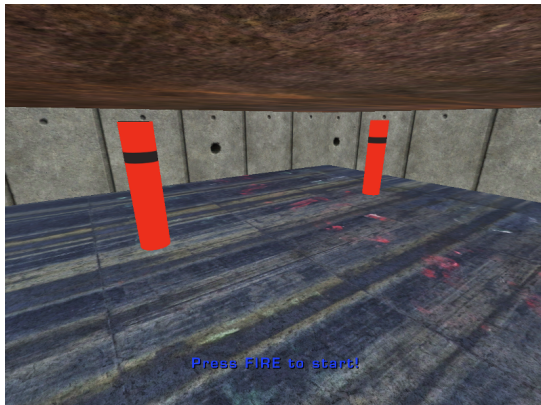


Force fields



Results

- Level in unreal
- Writing code for Unreal



Future Research

- lokalisatie (image matching, optical flow, RatSlam)
- IMAV2011 optimization (better level, etc)

Questions?