Final Project Topics DL Lab Track 1

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Final Project Requirements

- Implementing recent deep reinforcement learning research
- Final poster session to present work
- Own topics with proposal OR our topic suggestions
- Project proposal due 21.12.19
- Project submission due 01.02.19 (Poster A0 as pdf + Code)
- Poster presentation on 05.02.19
- Groups of 3-4 students

Choosing a Project

- We have several topic ideas
- You can also suggest own ideas via a 1/2-1 page proposal
- All projects should pertain deep RL
- Examples
  - Run a deep RL algorithm on a new application
  - Architecture/hyperparameter search of some algorithm and robustness evaluation
  - Re-implement a recent deep RL paper

RL in AirSim Simulator

- Drone or car environments
- Apply a recent RL or imitation learning algorithm
- Evaluate generalization performance (weather, new scenes, different modalities)

https://github.com/Microsoft/AirSim

Playing hard exploration games by watching YouTube

- Imitation learning from unaligned YouTube videos of people playing Atari games
- Learn reward function via self-supervised temporal distance classification
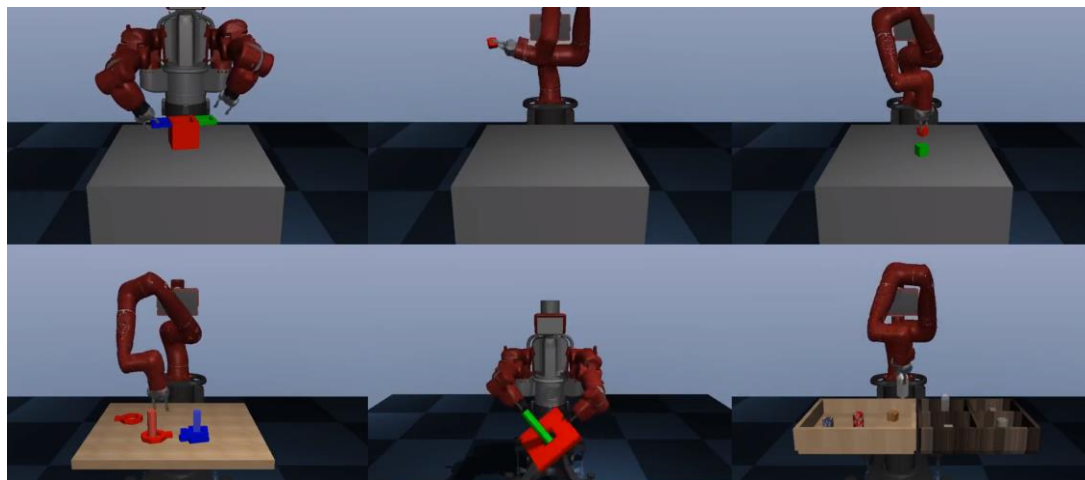- Apply to Montezuma's Revenge or Pitfall

(a) ALE frame   (b) Frames from different YouTube videos

https://arxiv.org/pdf/1805.11592.pdf

Deep RL for Robot Manipulation

- Manipulation benchmark
- Includes distributed PPO and DDPG algorithms
- Combine Imitation Learning with RL
- Evaluate multimodal sensor input


https://surreal.stanford.edu/

Data-efficient Hierarchical Reinforcement Learning

- Hierarchical navigation tasks
- Lower-level and higher-level policies
- Using learned goals to pass instructions from the higher-level policy to the lower-level one

https://sites.google.com/view/efficient-hrl
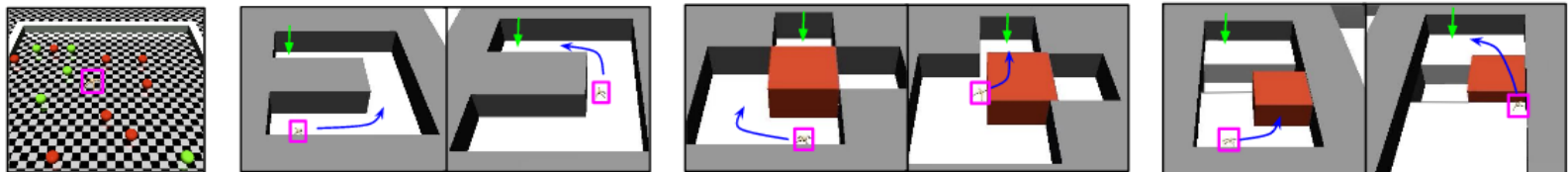
Learning to Reinforcement Learn

- Deep meta-reinforcement learning
- Recurrent neural networks
- Meta-RL A3C algorithm

(a) LSTM A2C   (b) LSTM A3C   (c) Stacked-LSTM A3C

https://arxiv.org/abs/1611.05763
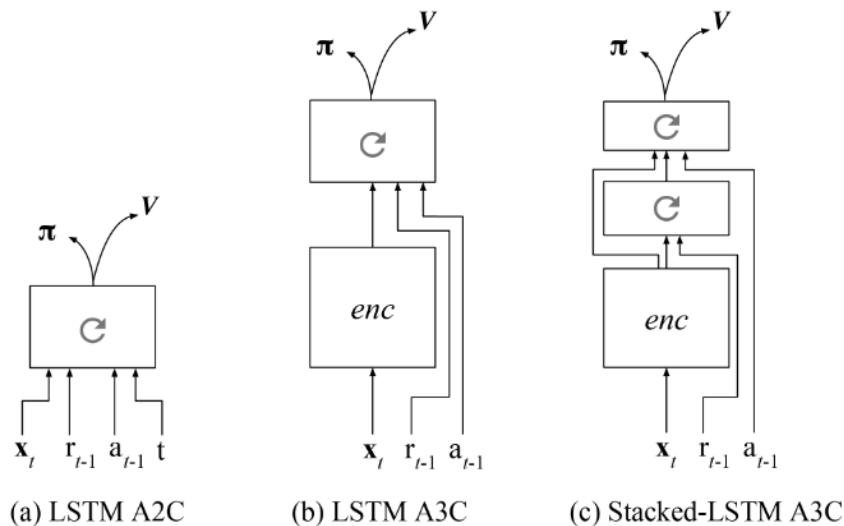
Proposal for your Topics

- Objective ¼ page: explain and why it is important

- Related work ¼ page: most relevant prior work

- Technical outline ¼ page: high-level explanation of approach

- Submit via mail to eitel@cs.uni-freiburg.de and hueglem@cs.uni-freiburg.de til end of this week

Computing

- You can use the computer pool
- You can also use the google cloud engine using our budget for this course

Thank you for your attention!