CS577 Final Project Proposal

Recurrent World Models Facilitate Policy Evolution

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Main Paper

David Ha, Jurgen Schmidhuber. Recurrent World Models Facilitate Policy Evolution, Advances in Neural Information Processing Systems 31 (NIPS 2018) URL: https://papers.nips.cc/paper/7512-recurrent-world-models-facilitate-policy-evolution

Problem Statement

Can agents learn inside of their own dreams? Building generative neural network models of popular reinforcement learning environments. Our model can be trained quickly in an unsupervised manner to learn a compressed spatial and temporal representation of the environment. By using features extracted from the world model as inputs to an agent, we can train a very compact and simple policy that can solve the required task.

Approach

We present a simple model inspired by our own cognitive system. In this model, our agent has a visual sensory component that compresses what it sees into a small representative code. It also has a memory component that makes predictions about future codes based on historical information. Finally, our agent has a decision-making component that decides what actions to take based only on the representations created by its vision and memory components.

Data

Since our project uses Reinforcement Learning, data is generated on the fly as the agent in question continues to play the game and learn a policy. We use two of OpenAI Gym's environments namely DoomTakeCover and CarRacing for performing our experiments. These environments generate frames of their respective games which is then used as input to our world model. Thus, in a way it can be seen that we don't need any external source of data.

References

1. World Models blogpost by the authors, https://worldmodels.github.io/
2. OpenAI Gym, https://gym.openai.com/
3. Blog Post for replicating the experiment, http://blog.otoro.net/2018/06/09/world-models-experiments/
4. Code for the experiment which will be referenced and modified, https://github.com/hardmaru/WorldModelsExperiments