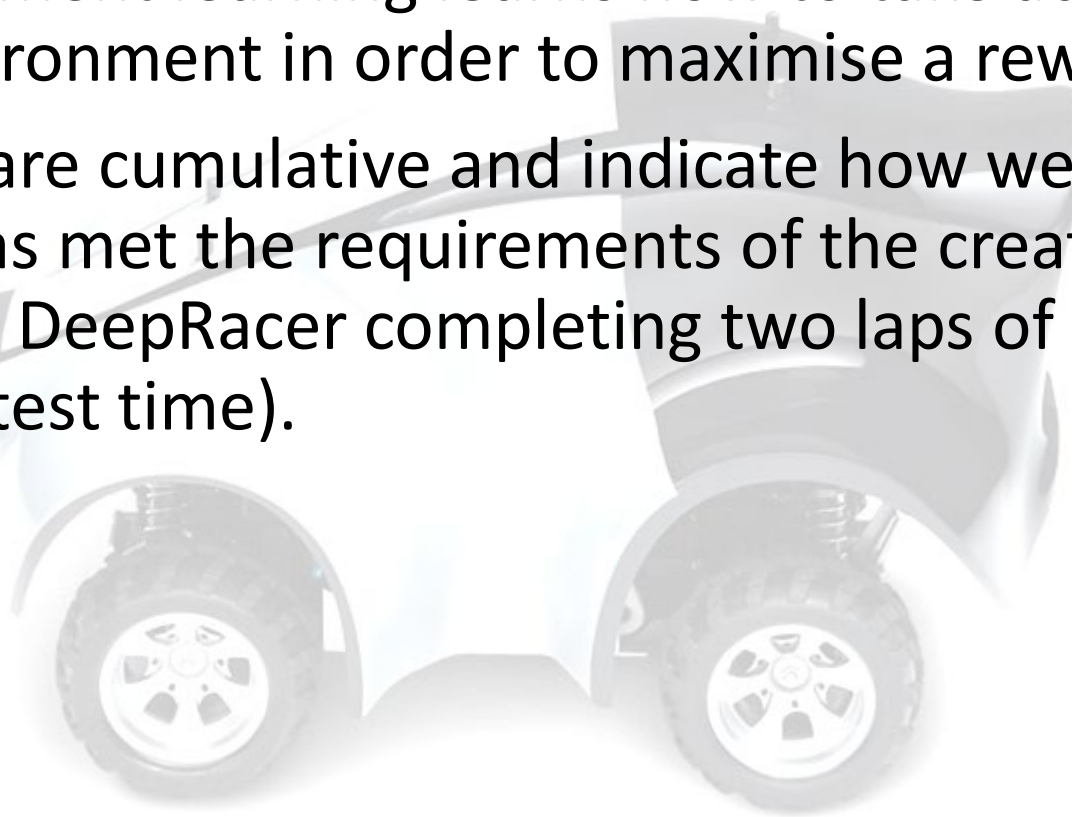
Reinforcement-Learning

Using AWS SageMaker and RoboMaker

by Shaun Price
https://www.linkedin.com/in/shaunprice/

What Is Reinforcement Learning

- Reinforcement learning learns how to take actions in an environment in order to maximise a reward.
- Rewards are cumulative and indicate how well the system has met the requirements of the creator (e.g. AWS DeepRacer completing two laps of a track in the fastest time).



Types Of Reinforcement Learning

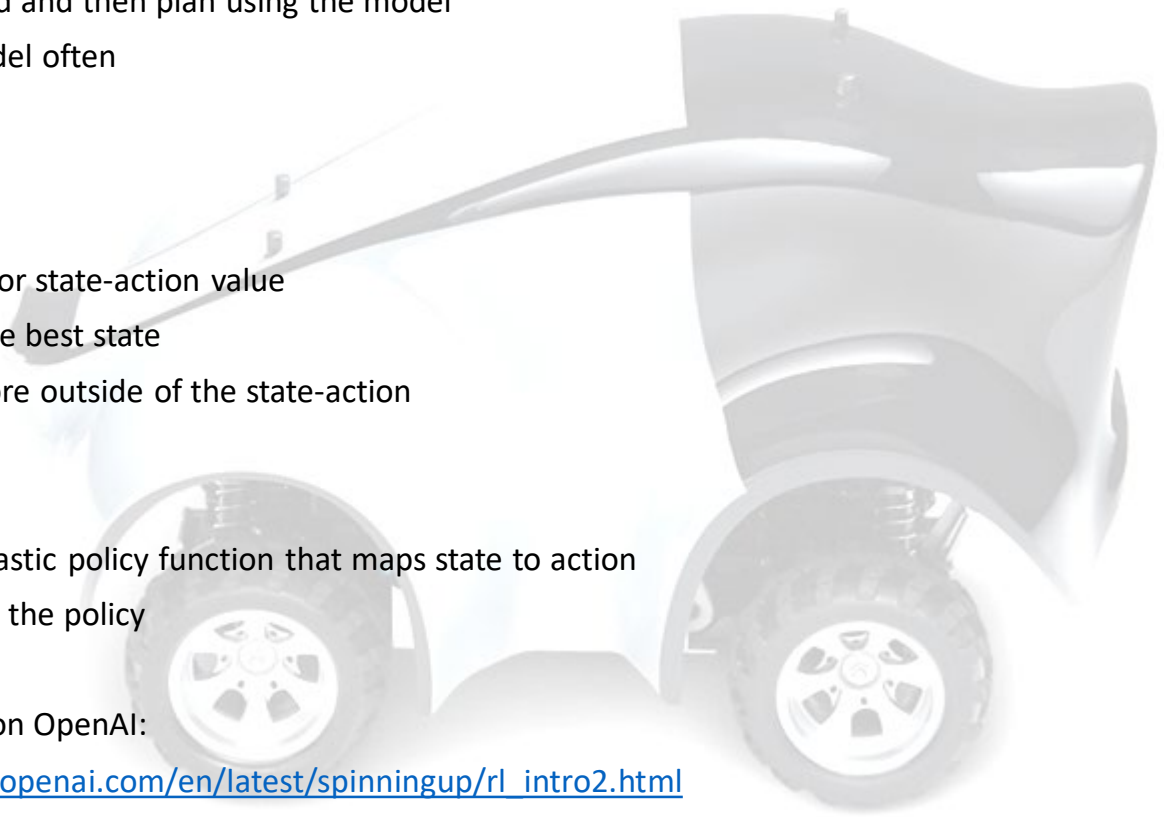
- **Model based**
- Model the world and then plan using the model
- Update the model often
- Replan often

- **Value based**
- Learn the state or state-action value
- Acts by using the best state
- Randomly explore outside of the state-action

- **Policy based**
- Learn the stochastic policy function that maps state to action
- Act by sampling the policy

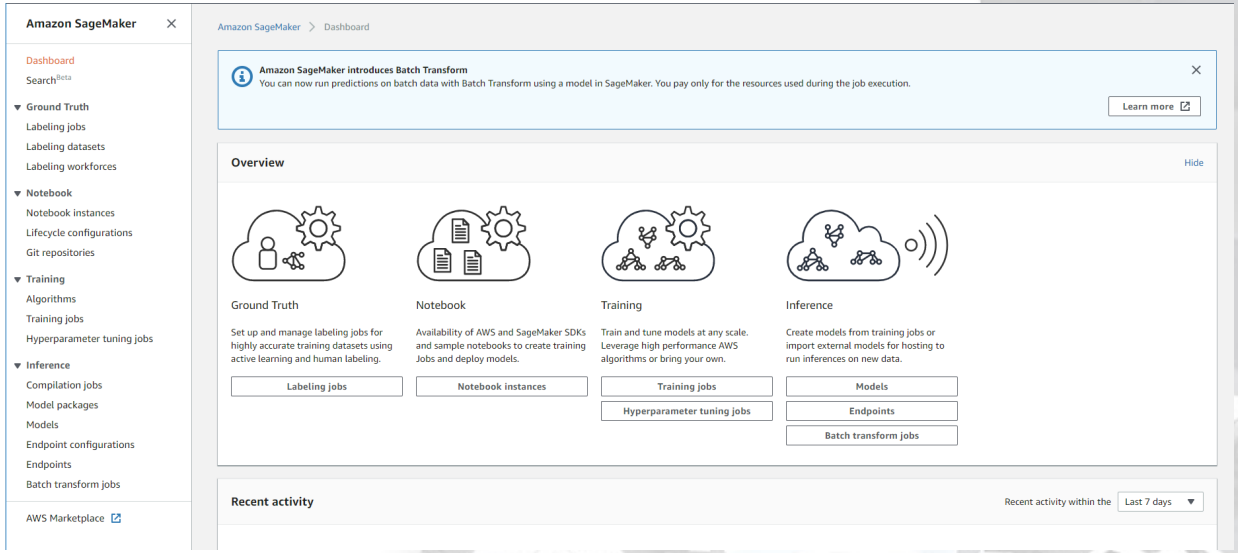
More information on OpenAI:

https://spinningup.openai.com/en/latest/spinningup/rl_intro2.html



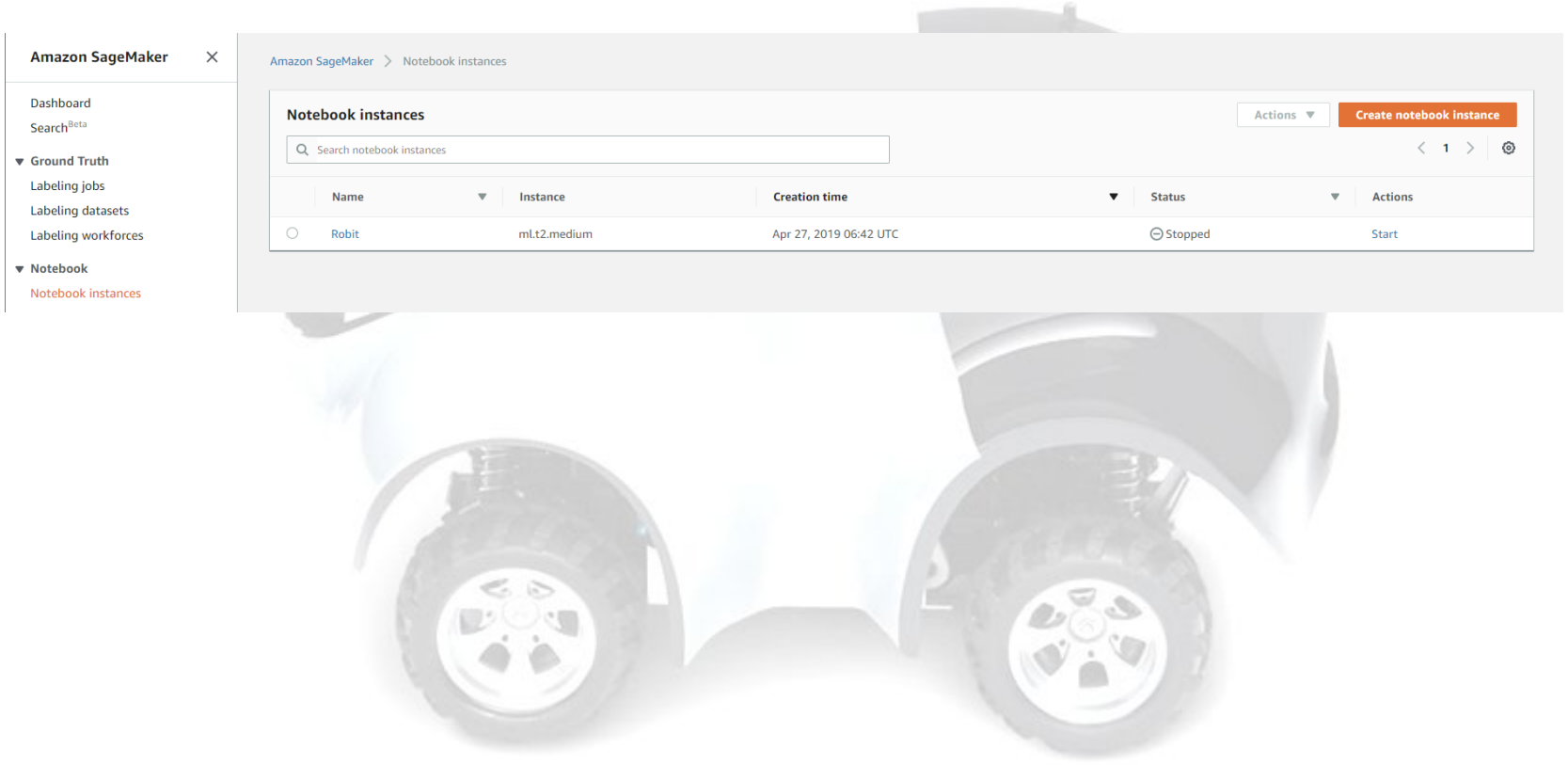
Setting-up an RL Environment

Open AWS SageMaker



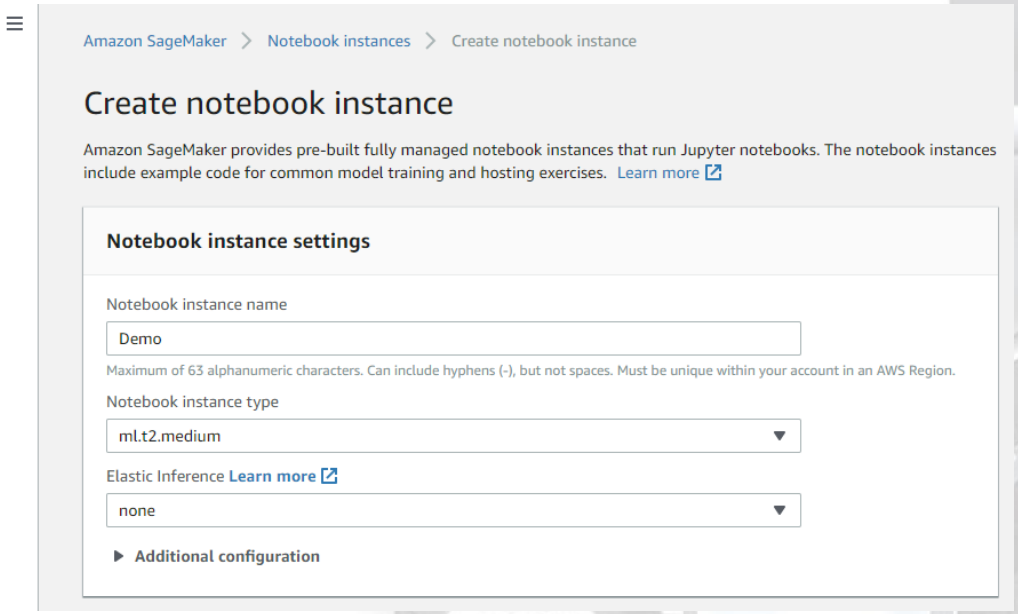
Open Notebook Instances

Click on Notebook Instances



Create a Notebook

Create a new Notebook

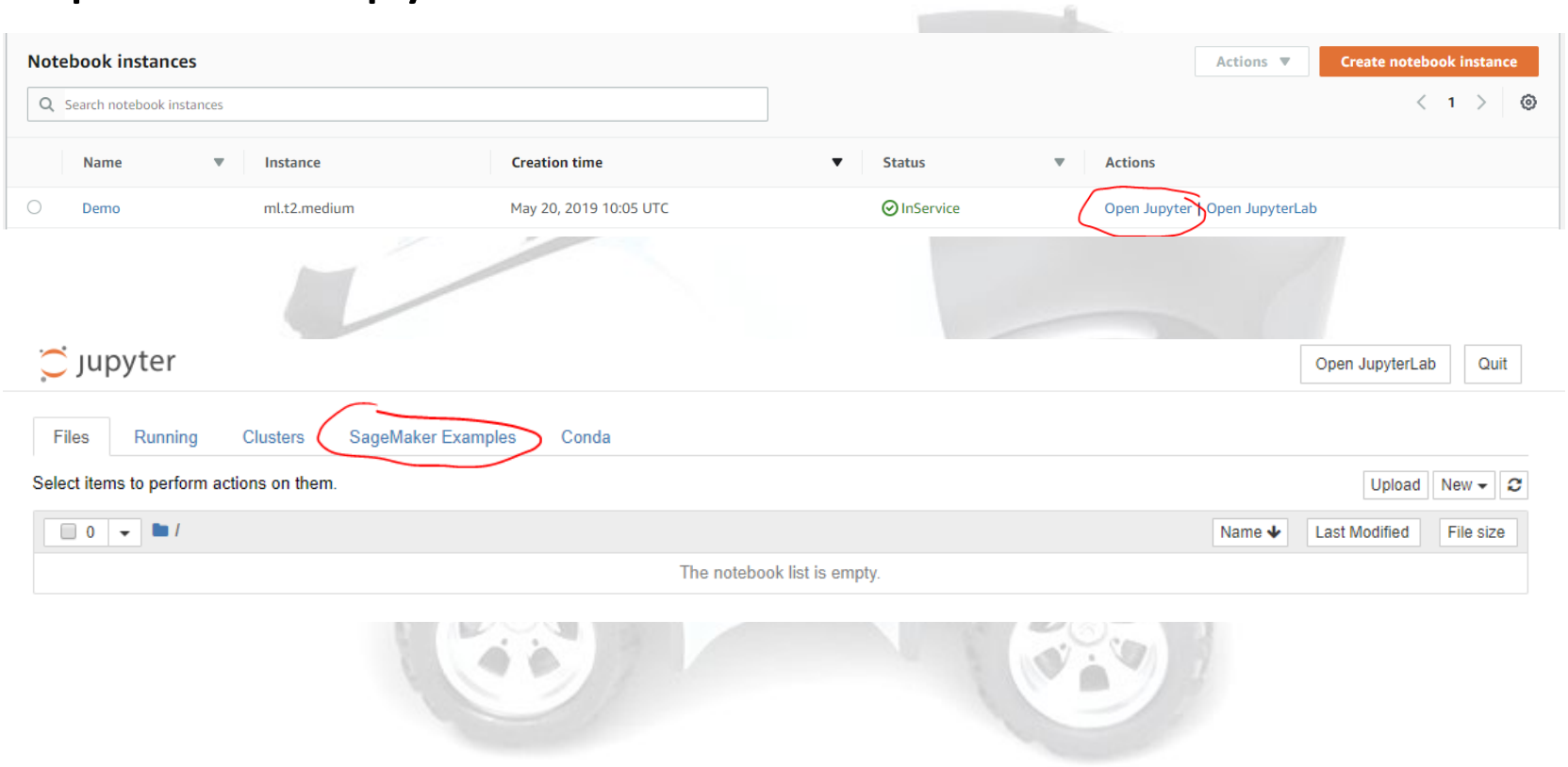


Click 

at the bottom of the page

Open a Jupyter Notebook

Open the Jupyter Notebook



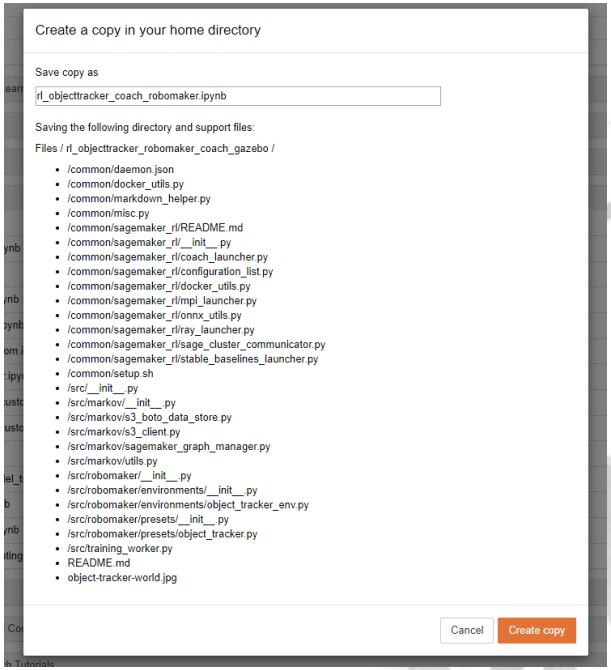
Opening the Example

Use the example

rl_objecttracker_coach_robomaker.ipynb

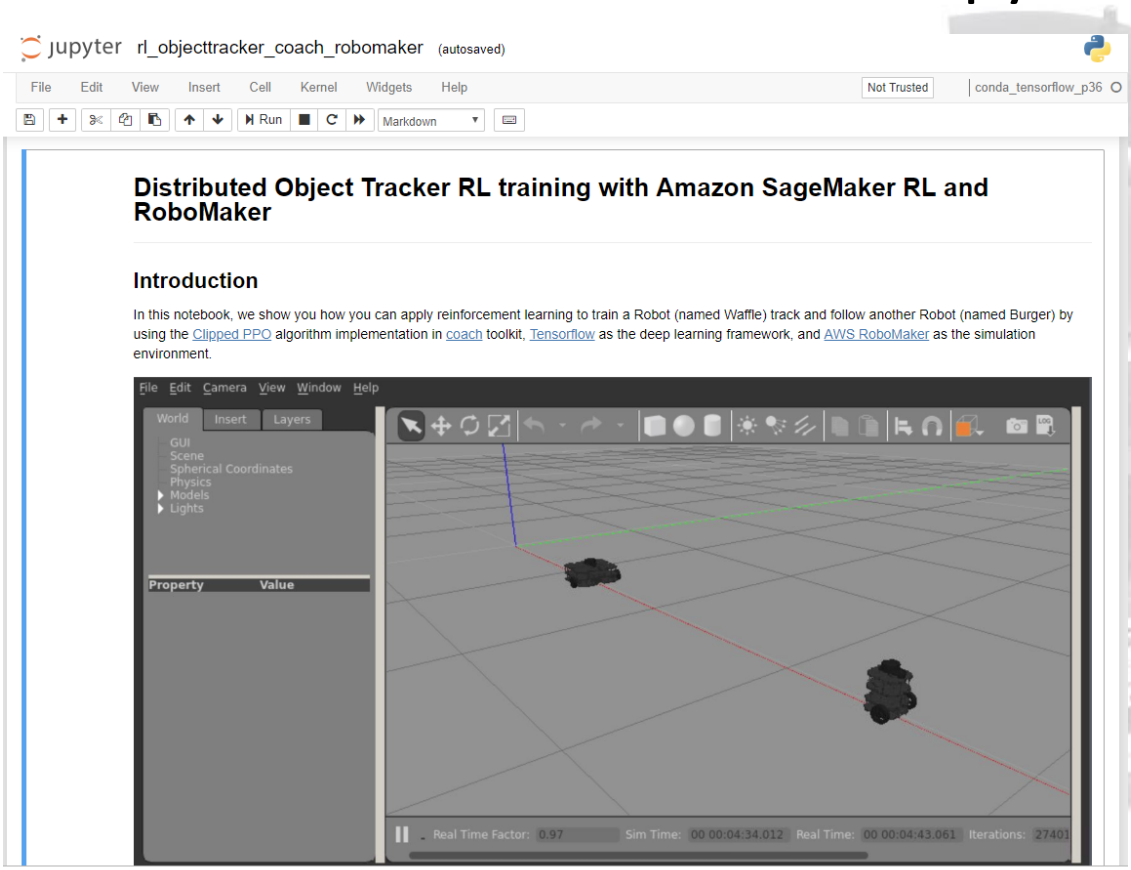
Create a copy of the example

Click [Create Copy]



Run the Jupyter Notebook

Follow the Instructions in the Jupyter Notebook:



References

Articals

Amazon SageMaker Examples

https://github.com/awslabs/amazon-sagemaker-examples

Reinforcement learning Examples

https://github.com/awslabs/amazon-sagemaker-examples/tree/master/reinforcement_learning

amazon-sagemaker-examples/reinforcement_learning/rl_objecttracker_robomaker_coach_gazebo/

https://github.com/awslabs/amazon-sagemaker-examples/tree/master/reinforcement_learning/rl_objecttracker_robomaker_coach_gazebo

Using SageMaker Notebook examples

https://docs.aws.amazon.com/sagemaker/latest/dg/howitworks-nbexamples.html

What is reinforcement learning

https://en.wikipedia.org/wiki/Reinforcement_learning

Deep Reinforcement Learning: Pong from Pixels by Andrej Karpathy

http://karpathy.github.io/2016/05/31/rl/

Videos

An introduction to Reinforcement Learning by Arxiv Insights

https://www.youtube.com/watch?v=JgvyzIkgxF0

Stanford University School of Engineering - Lecture 14 | Deep Reinforcement Learning

https://www.youtube.com/watch?v=lvoHnicueoE

MIT 6.S091: Introduction to Deep Reinforcement Learning (Deep RL)

https://www.youtube.com/watch?v=zR11FLZ-O9M

Reinforcement Learning for Stock Prediction by Saraj Raval

https://www.youtube.com/watch?v=05NqKJ0v7EE