Reinforcement Learning and Inverse Optimization for Autonomous Navigation

Special course - Fall 2023

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Week 9 - 27-02-2024:

- Reviewing literature mainly in inverse RL, RL with human feedback and COLREG-compliant collision avoidance.
- Exploring the Data:
    - Question? Land.pickle returning empty list.
    - Question? Depth.pickle vrs depth data in seachart.json.
- Structuring the Python Package:
    - Defining modules and classes for data processing, analysis, and environment implementation.

Week 10 - 04-03-2024:

Imitation library: https://imitation.readthedocs.io/en/latest/#

Algorithms:

- Behavioral Cloning (Policy *)
- Generative Adversarial Imitation Learning (Policy *)
- Adversarial Inverse Reinforcement Learning (Policy, recovers reward func *)
- DAgger (Policy similar to BC but online *)
- Density-Based Reward Modeling (Reward function no interpretable *)
- Maximum Causal Entropy Inverse Reinforcement Learning (Reward *)
- Preference Comparison (Reward)
- Soft Q Imitation Learning (Policy DQN)

Topics & next steps

- Create the env with Gymnasium's API
- Actions:
  - Used sog and cog as action vector and keep lon and lat as observations.
  - create the dynamic model.
- Observations:
  - Model as a multiagent systems.
  - Fix number of dynamic objects.
  - observation horizon.
- Limitations on Horizon Length
- Trajectories to Transitions.
- Metrics