Deep - Multiple Intentions Inverse Reinforcement Learning

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The entire field of Reinforcement Learning(RL) stands on the concept of reward, which is the way to order an agent to perform a task. A slight inaccuracy in specifying rewards might lead to an RL agent performing entirely different task than we prefer. Applicability of RL in real-world domain, hence, is limited considering resources spent in the process of adjusting rewards and re-training agent. Inverse Reinforcement Learning(IRL) comes to rescue in such circumstances with its distinctive approach of estimating rewards, using given environmental information called features and by observing experts performing the same tasks, This dissertation attempts to resolve two special cases of IRL in a single method 1. when expert observations are intermix of multiple rewards i.e multiple intentions are involved and 2. rewards are complex combination of features. We study the applicability of the combination of two techniques viz. Expectation-Maximization and Deep Neural Networks, in such situations. The proposed approach is evaluated against previously proposed Maximum Entropy based Linear-IRL, in a simulated environment viz. Objectworld, with two features. The proposed method matches the performance of the existing method in the experiment with one feature, while outperforms it with the other one; which gives the hint of the design's potential to handle both the above mentioned issues. Altogether, this dissertation puts research efforts in the idea of designing a single IRL approach to handle various issues involved.