Stanford CME 241 (Winter 2021) - Assignment 5

Assignments:

1. Implement another form of FunctionApprox beyond what we've covered in class (we covered linear function approximation, deep neural networks, and tabular). If you have taken a course in statistical learning, you can try implementing Generalized Additive Model (GAM). Otherwise, try implementing Univariate B-Spline. Be sure to test your implementation on an appropriate data set - you can generate a data set from a model (from either the same model you are implementing or a similar/related model).

2. Implement *Approximate Policy Iteration*, generalization of the tabular Policy Iteration we covered in the previous class. In order to implement Approximate Policy Iteration, first review the interface and implementation of *Approximate Policy Evaluation* and *Approximate Value Iteration* (in file rl/approximate_dynamic_programming.py), then design the interface of *Approximate Policy Iteration* to be the same as that of *Approximate Value Iteration*. Note that your implementation of *Approximate Policy Iteration* would need to invoke *Approximate Policy Evaluation* since Policy Evaluation is a component of Policy Iteration. Test that your implementation is correct in two ways:

   - Ensure that *Approximate Policy Iteration* gives the same Optimal Value Function/Optimal Policy as that obtained by *Approximate Value Iteration*.

   - Ensure that *Approximate Policy Iteration* produces the same result as our prior implementation of Policy Iteration (in file rl/dynamic_programming.py). For this you need to pass to your implementation of *Approximate Policy Iteration* a FiniteMarkovDecisionProcess input and a Tabular instance for the FunctionApprox input.