CS221 Fall 2018 Homework 5

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Collaborators:

By turning in this assignment, I agree by the Stanford honor code and declare that all of this is my own work.

Problem 1

(a) We can write the recurrence as a straight-forward generalization of what was presented in lecture. We'll have:

$$
V_{\text{minmax}}(s, d) = \begin{cases}
\text{Utility}(s) & \text{IsEnd}(s) \\
\text{Eval}(s) & d = 0 \\
\max_{a \in \text{Actions}(s)} \{V_{\text{minmax}}(\text{Succ}(s, a), d)\} & \text{Player}(s) = a_0 \\
\min_{a \in \text{Actions}(s)} \{V_{\text{minmax}}(\text{Succ}(s, a), d)\} & \text{Player}(s) \in \{a_1, \cdots a_{n-1}\} \\
\min_{a \in \text{Actions}(s)} \{V_{\text{minmax}}(\text{Succ}(s, a), d-1)\} & \text{Player}(s) = a_n
\end{cases}
$$

(b) In "submission.py"

Problem 2

(a) In "submission.py"

Problem 3

(a) We can write the recurrence as a straight-forward generalization of what was presented in 1a. We'll have:

$$
V_{\text{minmax}}(s, d) = \begin{cases}
\text{Utility}(s) & \text{IsEnd}(s) \\
\text{Eval}(s) & d = 0 \\
\max_{a \in \text{Actions}(s)} \{V_{\text{minmax}}(\text{Succ}(s, a), d)\} & \text{Player}(s) = a_0 \\
\frac{1}{|\text{Actions}(s)|} \sum_{a \in \text{Actions}(s)} V_{\text{minmax}}(\text{Succ}(s, a), d) & \text{Player}(s) \in \{a_1, \cdots a_{n-1}\} \\
\frac{1}{|\text{Actions}(s)|} \sum_{a \in \text{Actions}(s)} V_{\text{minmax}}(\text{Succ}(s, a), d-1) & \text{Player}(s) = a_n
\end{cases}
$$

(b) In "submission.py"