Parallel POMDP Solver

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Learning from humans

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POMDP
POMDP:
POMDP: Idea
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Distributed Entropy

\[
\begin{align*}
\text{Entropy} &= - \sum_{x_t} p(x_t | z^{t:1}, a^{t:1}) \log(p(x_t | z^{t:1}, a^{t:1})) \\
&= - \sum_{x_t} \frac{p(x_t | z^{t:1}, a^{t:1})}{p(z^t | z^{t-1:1}, a^{t:1})} \log \left( \frac{p(x_t | z^{t:1}, a^{t:1})}{p(z^t | z^{t-1:1}, a^{t:1})} \right) \\
&= - \sum_{x_t} \frac{p(x_t | z^{t:1}, a^{t:1})}{p(z^t | z^{t-1:1}, a^{t:1})} \log(p(x_t | z^{t:1}, a^{t:1})) + \sum_{x_t} \frac{p(x_t | z^{t:1}, a^{t:1})}{p(z^t | z^{t-1:1}, a^{t:1})} \log(p(z^t | z^{t-1:1}, a^{t:1})) \\
&= - \sum_{x_t} \frac{p(x_t | z^{t:1}, a^{t:1})}{p(z^t | z^{t-1:1}, a^{t:1})} \log(p(x_t | z^{t:1}, a^{t:1})) + \log(p(z^t | z^{t-1:1}, a^{t:1})) \sum_{x_t} p(x_t | z^{t:1}, a^{t:1}) \\
&= \frac{1}{p(z^t | z^{t-1:1}, a^{t:1})} \left( - \sum_{x_t} p(x_t | z^{t:1}, a^{t:1}) \log(p(x_t | z^{t:1}, a^{t:1})) \right) + \log(p(z^t | z^{t-1:1}, a^{t:1}))
\end{align*}
\]
Results

Parallel-POMDP Speedup over Serial-POMDP (99% intervals)

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