Half-year Summary

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Time: March 2021 – June 2021
Topic: Multimodal and Multiagent

What I do:
1. Survey papers.
2. Implement paper (CVPR 2015):
   Show and Tell: A Neural Image Caption Generator
3. Implement paper (ICML 2018):
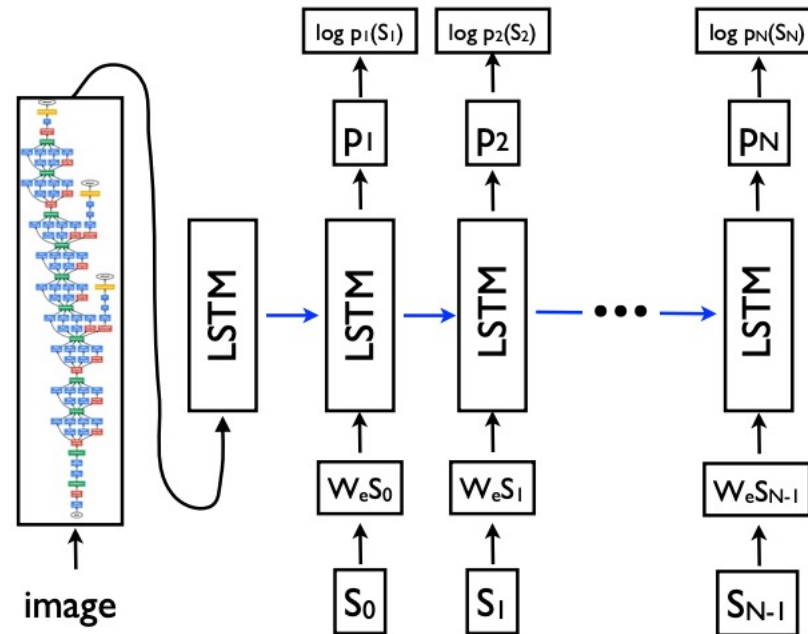   QMIX: Monotonic Value Function Factorization for Deep Multi-Agent Reinforcement Learning

Figure 3. LSTM model combined with a CNN image embedder (as defined in [12]) and word embeddings. The unrolled connections between the LSTM memories are in blue and they correspond to the recurrent connections in Figure 2. All LSTMs share the same parameters.

QMIX: Overall Structure
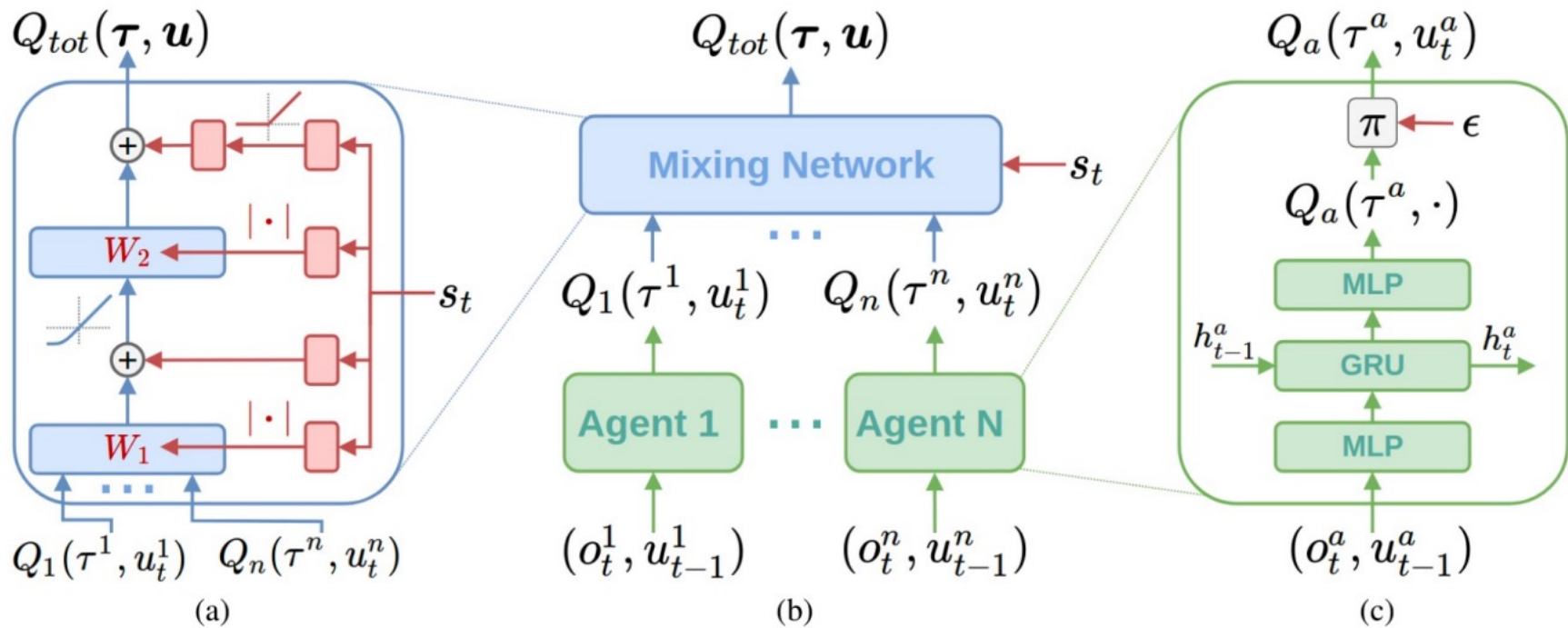
Time: July 2021 – September 2021
Topic: <u>Differentially Privacy and Temporal Difference (submit to AAAI 2022)</u>

What I do:
1. Prove main theorems.
2. Finish experiments.
3. Polish writing.

Theorem 5.2 (Utility under state-action-state). *Under Assumptions 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, if we set the parameters $\alpha = \beta = 3$, $0 < \eta \leq \mu/(4L_F^2)$, $0 < \kappa \leq \eta\mu^2/(9L_F^2)$, $\nu_t = 1/4(t+b)^{\frac{1}{2}}$ with $b \geq \max\{(2\kappa L_F^2/\mu)^2, 3\}$ and choose the number of iterations $T = \frac{Cn\epsilon}{\sqrt{d\log(1/\delta)}}$ where C is a constant, then with the Gaussian noise in Theorem 5.1, the output of Algorithm 1 satisfies*

$$\frac{1}{T}\sum_{t=0}^{T-1}\mathbb{E}\|\mathfrak{M}_t\| \leq \tilde{\mathcal{O}}\left(\frac{(d\log(1/\delta))^{\frac{1}{8}}}{(n\epsilon)^{\frac{1}{4}}}\right).$$
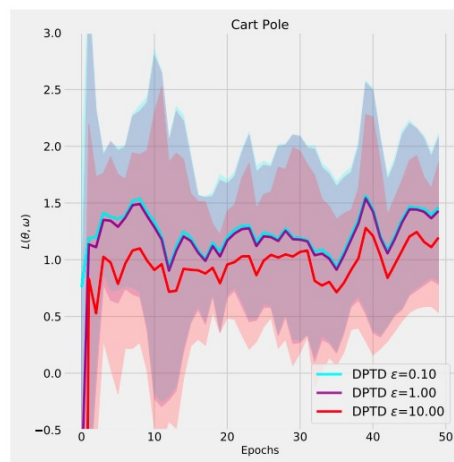
Moreover, the total gradient complexity of Algorithm 1 is

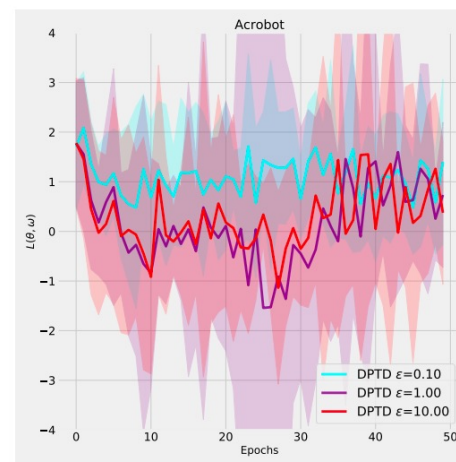$$2(T+1) = \mathcal{O}\left(\frac{n\epsilon}{\sqrt{d\log(1/\delta)}}\right).$$

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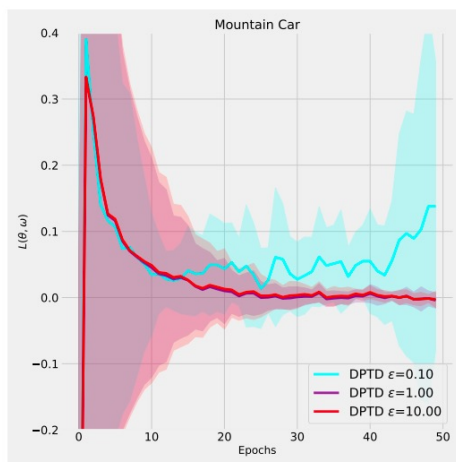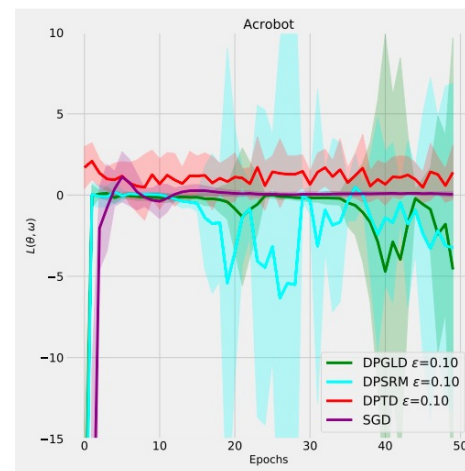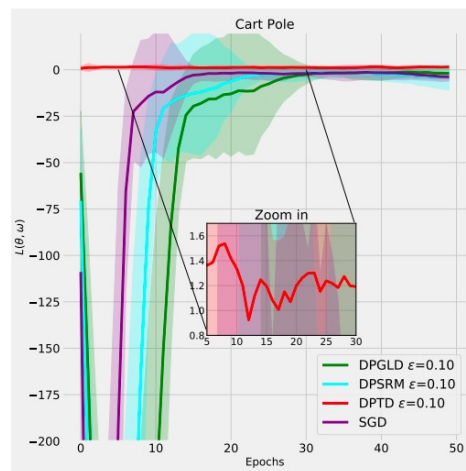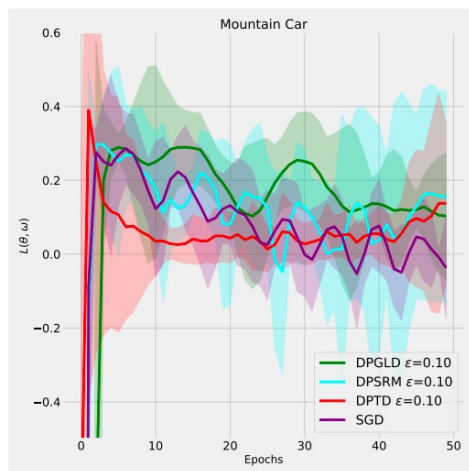
(a)   (b)   (c)

1. Be active. Do things quickly and actively.

2. Be scrupulous, especially in writing.

3. Do not think too much. Why not do it?

4. Focus. (research direction)

5. Do not wait for others' push.

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1. Main goal: [apply for a PhD position]

2. Pass English exams in Junior year (TOEFL, GRE).

3. Continue doing research (RL theory).

4. Improve GPA in the next two semesters.

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Thanks