Ying Fan

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EDUCATION

Computer Sciences Department, UW-Madison Madison, WI, USA
PhD Student, Overall GPA: 3.9/4.0 Sep 2019 – Present
Yuanpei College, Data Science Major, Peking University Beijing, China
Bachelor of Science, Overall GPA: 3.6/4.0; Major GPA: 3.8/4.0 Sep 2015 – Jul 2019

PAPERS

1. **Ying Fan**, Yifei Ming. Model-based Reinforcement Learning for Continuous Control with Posterior Sampling (**ICML 2021 with long talk**, rate: 3%, paper: *proceedings.mlr.press/v139/fan21b.html*, code: *github.com/yingfan-bot/mbpsrl*)
2. **Ying Fan**, Sharon Li. Towards Unknown-aware Deep Q Learning (Under Review)
3. Yifei Ming*, **Ying Fan*** and Sharon Li. Bandit-based Learning for Out-of-distribution Detection (Under Review, * indicates equal contribution)
4. **Ying Fan,** Letian Chen and Yizhou Wang. Efficient Model-Free Reinforcement Learning Using Gaussian Process. (*arxiv.org/abs/1812.04359*)

RESEARCH EXPERIENCES

Unknown-Aware Deep Q Learning 2021
Advisor: Sharon Li, UW-Madison
➢ Aimed at making Deep Q learning framework aware of out-of-distribution (OOD) input and mitigate the issue of incorrect high estimation of Q values without hurting the cumulative reward
➢ Designed to regularize the training from a probabilistic view to facilitate higher OOD uncertainty for OOD states and vice versa
➢ Provided the proof that the regularization does not hurt the convergence solution of Q learning, and conducted experiments on Atari game to show state-of-the-art OOD detection performance

Informative Outlier Mining via Bandits 2021
Advisor: Sharon Li, UW-Madison
➢ Aimed at informative outlier mining for classifiers to reject out-of-distribution inputs and avoid overconfidence
➢ Defined boundary score as an OOD indicator, and reformulate the problem of informative mining as a bandit problem
➢ Derived the sample efficiency on the final FNR and FPR by combining the theoretical results of bandit regrets and PAC-bound in classification

Model-based Reinforcement Learning for Continuous Control with Posterior Sampling 2020
Independent Research, Paper Accepted to ICML 2021 (long talk)
➢ Aimed at efficient exploration in continuous state-action spaces using model-based posterior sampling algorithm
➢ Derived the Bayesian regret, which is the first regret of continuous PSRL that is polynomial in episode length with function approximation in continuous state-action spaces
➢ Achieved more efficient exploration compared with state-of-the-art model-based algorithms in control benchmark tasks

Meta Reinforcement Learning 2018
Advisor: Michael Littman, Brown University
➢ Aimed at fast adaptation to a series of tasks, where some basic laws are shared, as a potential solution to achieve learning to learn and improve sample efficiency

- ➢ Proposed meta reward designer, with evolutional strategy to obtain task-level information and adjust the policy dynamically when the recognition of the task changed
- ➢ Made further improvements by treating the loss from a single task and that from whole range of tasks as different objective functions, and achieved the goal by truncated bi-level optimization

Using Failed Demonstration in Model-free Reinforcement Learning   2017
Advisor: Yizhou Wang, Peking University
- ➢ Aimed to make use of unsuccessful demonstrations to improve the efficiency and robustness of reinforcement learning
- ➢ Developed a theoretical analysis on how state distribution in the demonstrations decides the expectation of posterior variance of predicted value function in gaussian process
- ➢ Conducted the experiments in control tasks and verified the theorem via learning curves

HONORS & AWARDS
- ➢ Founder Scholarship, Peking University (top 5%)
- ➢ Award for Academic Excellence, Peking University (top 5%)
- ➢ Third Prize of the 25th "Challenge Cup", Youth Science Competition of Peking University

EXTRACURRICULAR ACTIVITIES
Teaching Assistant Experiences:
CS 300 Programming II, UW-Madison   Aug 2020-Dec 2020
CS 760 Machine Learning, UW-Madison   Jan 2020-May 2020
Freshman Seminar of Yuanpei College, Peking University   Sep 2016-Jun 2017

SKILLS & QULIFICATIONS
- ➢ Language: Mandarin(Native), English (TOEFL 108/120)
- ➢ Python (Pytorch, TensorFlow, etc), C/C++, R, MATLAB, Latex, SQL
- ➢ Chinese Lute (Level 9, Central Conservatory of Music)