

## Department of Applied Mathematics Seminar

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### Topic

Distributional Reinforcement Learning with Regularized Wasserstein Loss

### Date | Time

7 November 2025 (Friday) | 14:00 – 15:00 (HK Time)

### Venue

FJ302

### Abstract:

The empirical success of distributional reinforcement learning (RL) highly relies on the choice of distribution divergence equipped with an appropriate distribution representation. In this paper, we propose Sinkhorn distributional RL (Sinkhorn\$DRL\$), which leverages Sinkhorn divergence-a regularized Wasserstein loss-to minimize the difference between current and target Bellman return distributions. Theoretically, we prove the contraction properties of SinkhornDRL, aligning with the interpolation nature of Sinkhorn divergence between Wasserstein distance and Maximum Mean Discrepancy (MMD). The introduced SinkhornDRL enriches the family of distributional RL algorithms, contributing to interpreting the algorithm behaviors compared with existing approaches by our investigation into their relationships. Empirically, we show that SinkhornDRL consistently outperforms or matches existing algorithms on the Atari games suite and particularly stands out in the multi-dimensional reward setting.

ALL ARE WELCOME