Resource Management with Deep Reinforcement Learning

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This paper proposes an approach to solve online resource management problems based on deep reinforcement learning.

1 Introduction

1.1 Comparison between RL approach with general heuristics

- Why real world resource management problems are challenging.

- How RL approach is suitable for resource management task.

1.2 Prescribed model definition:DeepRM

2 Design

2.1 Model

Multi resource cluster scheduling problem formulation

2.2 RL formulation

How RL approaches work in general and task scheduling model as an reinforcement learning approach.

- State representation

- Action space

- Rewards

2.3 Policy training algorithm

- Policy and function approximator used in the prescribed method

- Policy gradient method to maximize cumulative discounted reward of RL algorithm

2.4 System optimization criterions

3 Evaluation

3.1 Methodology

- System setup

- DeepRM parameters

3.2 Comparing scheduling efficiency

Comparison of DeepRM with state of the art schemes on aspects of average job slowdown and average job completion time.

3.3 Convergence behavior of DeepRM

- How DeepRM gains better performance than other schemes

4 Discussion

4.1 Limitation

- Lack of data locality and machine boundary considerations

- Overlooking inter-task dependent job models

4.2 Future research directions

- Finding out a time dependent baseline with an infinite time horizon

5 Conclusion

6 References