Learning Scheduling Algorithms for Data Processing Clusters

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This paper gives an overview of how modern machine learning techniques can be used to solve the scheduling problem in data processing clusters.

1 Introduction

This paper proposes Decima, a general-purpose reinforcement learning(RL) and Neural Network based scheduling service for data processing jobs with a high-level goal of minimizing the average job completion time(JCT).

2 Motivation

Illustrate the challenges of using job-specific information to make scheduling decisions.

3 Design Challenges

Key challenges in the design of Decima:

1. **Scalable state information processing.**

   This subsection describes the challenges of incorporating dynamic information to make scheduling decisions.

2. **Huge space of scheduling decisions.**

   This subsection describes the challenges of having a large action space of scheduling decisions.

3. **Training for continuous stochastic job arrivals.**

   This subsection describes the challenges in training with continuous job arrivals.

4 Design

This section describes the design of Decima and how it addresses the challenges mentioned in section 3.

5 Implementation

1. **Spark Integration**

   This subsection describes how Decima is integrated with Spark.

2. **Spark Simulator**

   This subsection describes the results of simulation in Spark.

6 Evaluation

This section compares the performance evaluation of Decima with existing baseline algorithms like Spark's default FIFO scheduling, shortest-job-first critical path heuristic(SJF-CP), simple fair scheduling, etc.

7 Discussion

This section proposes future research scope and potential applications where Decima can be implemented.

8 Conclusion

Decima demonstrates the use of reinforcement learning and neural networks to automatically learn com-

plex cluster scheduling policies.

References

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