

Computational Science Alliance

Overseas Conference Report

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Through the support of the Computational Science Alliance overseas dispatch program, I attended and presented my research at the International Conference on Artificial Intelligence and Applications (ICAAI 2024) in London, UK, from October 17-19, 2024. ICAAI is a significant international conference focusing on artificial intelligence and its applications.

Research Presentation

I presented our research on “Sub-Batch Update Mechanism for Component-Wise Natural Gradient Descent,” which addresses a critical challenge in distributed neural network training. Our work introduces a novel approach to maintaining data stochasticity when using large batch sizes in parallel computing environments. The key innovation is the Sub-Batch update mechanism, which divides large batches into sub-batches and updates network parameters using each sub-batch independently before aggregation.

The research demonstrated significant improvements in training efficiency and model accuracy. Our experimental results showed that the proposed Sub-Batch update mechanism applies particularly to CW-NGD and cannot be applied to Adam, SGD training algorithms. The cross-algorithm comparative experiments' results showed that CW-NGD with Sub-Batch update mechanism (CW-NGD+) consistently produced trained networks with higher accuracy than Adam and SGD across all six tested datasets, including the large-scale ImageNet dataset.

Conference Experience

During the presentation, there was significant interest in our approach to maintaining data stochasticity while leveraging large batch sizes for parallel computing. The audience was particularly engaged with our method's ability to improve generalization capability without compromising computational efficiency. The discussions following the presentation provided valuable insights and potential new exploration of our methodology.

Impact and Future Directions

This conference experience has been invaluable for several reasons:

- It provided a platform to receive feedback from other researchers in the field
- The discussions helped identify potential new improvements for our method such as the running time performance comparison of the candidate algorithms

- We gained insights into current trends and challenges in distributed neural network training

Acknowledgments

I would like to express my sincere gratitude to the Computational Science Alliance for their generous support, which made this valuable opportunity possible. This experience has been instrumental in advancing our research and establishing connections with the international research community. We plan to further develop our method based on the feedback received and publish the results in international journals.

