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July 3, 2023

Dear Dr. Jones and Dr. Liang,

I am writing to submit our manuscript titled "Variance-Reduced Stochastic Optimization for Efficient Inference of Hidden Markov Models" for consideration in the Journal of Computational and Graphical Statistics. The research presented in this paper has not been previously published and is not under consideration by any other journal.

In our manuscript, we introduce a new inference method for hidden Markov (HMMs) models based on variance-reduced stochastic optimization and the expectation-maximization algorithm. Our algorithm mitigates the computational burden associated with fitting complex HMMs to large and high-dimensional data sets. We provide a theoretical analysis demonstrating the convergence of our algorithm under standard regularity assumptions. Furthermore, we compare the efficiency of our method with traditional optimization techniques through simulation studies and a case study involving kinematic data of killer whales (*Orcinus orca*).

We believe that the Journal of Computational and Graphical Statistics is an ideal venue for our manuscript because it combines statistical inference, computational optimization, and ecological applications, which we believe would be of great interest to the journal's readership. Our manuscript is written for readers with a strong background in statistics, but it introduces variance-reduced optimization methods for non-experts in computing.

The manuscript has not been previously published and is not currently under consideration by any other journal. All authors have reviewed the manuscript and consent to its submission to the Journal of Computational and Graphical Statistics. We have no competing interests to disclose.

Thank you for considering our manuscript for publication. We appreciate the opportunity to contribute to the scientific discourse in the field of computational and graphical statistics. Please address all correspondence concerning this manuscript to me at [evan.sidrow@stat.ubc.ca](mailto:evan.sidrow@stat.ubc.ca).

Sincerely,

Evan Sidrow