Khiem Pham

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http://drproduck.github.io/

Education

- **San Jose State University**, B.S. Computer Science   2019
  (3.71 cumulative, 3.92 major)

Employment

- **VinAI Research**, Research Resident   2020
  Theory and applications of (unbalanced) optimal transport.
  Improving approximate inference for deep probabilistic models.
  Supervisors: Hung Bui, Nhat Ho.

- **Stanford University (CSLI REU)**, Research Intern   2018
  Approximate inference for Mixture of Hierarchical Dirichlet Processes
  with application to network inference.
  Supervisors: Jure Leskovec, Baharan Mirzasoleiman.

- **San Jose State University**, Research Assistant   2018
  Ethereum 2.0 beacon chain.
  Supervisor: Yan Zhang.

- **San Jose State University**, Research Assistant   2017
  Scalable Spectral Clustering.
  Supervisor: Guangliang Chen.

Publications

1. **On Unbalanced Optimal Transport: Analysis of Sinkhorn Algorithm**. Presented at *The 37th International Conference on Machine Learning, 2020*. [with K. Le, N. Ho, T. Pham and H. Bui]

   Proved the near-linear time, input dimension-independent complexity of the Sinkhorn algorithm for solving ϵ-approximation of the Unbalanced Optimal Transport problem.

2. **Combining Ghost and Casper**. *Preparing to be submitted to Stanford Blockchain Conference, 2021*. [with V. Buterin, D. Hernandez, T. Kamphefner, Z. Qiao, D. Ryan, J. Sin, Y. Wang and Y. X. Zhang]

   Proposed and analyzed "Gasper", a proof-of-stake-based consensus protocol that will be used in the Ethereum 2.0 beacon chain.

3. **Large-Scale Spectral Clustering Using Diffusion Coordinates on Landmark-Based Bipartite Graph**. *Presented at the Twelfth Workshop on Graph-Based Methods for Natural Language Processing, NAACL-HLT, 2018*. [with G. Chen]

Scaled up spectral clustering by running a diffusion process on a bipartite graph between original data and few adaptively-selected landmarks.

4. **Evaluating Grammaticality in seq2seq Models with a Broad Coverage HPSG Grammar: A Case Study on Machine Translation**. *Presented at the 2018 EMNLP Workshop BlackboxNLP: Analyzing and Interpreting Neural Networks for NLP, 2018*. [with J. Wei, B. O'Connor and B.Dillon]

Analyzed the parseability and grammatical constructions of language generated from neural seq2seq models by employing the English Resource Grammar.

Ongoing Research

- **Semi-Unbalanced Optimal Transport for Crowd Counting**
  Designing and experimenting with a new unbalanced optimal transport loss to train a neural network to estimate crowd count. Preparing to be submitted to International Conference on Machine Learning, 2021.

- **Sparse and Robust Variants of Unbalanced Optimal Transport**
  Designing large-scale first-order methods to solve the sparse UOT problem. Studying robust variants of UOT that are less sensitive to noise.

Teaching Experience

Teaching Assistant | San Jose State University

- MATH 196W: Cryptography   2019
- CS 146: Data Structures and Algorithms   2019
- MATH 142: Combinatorics   2018

Grader, Workshop Facilitator | San Jose State University

- MATH 19 (Precalculus), MATH 71 (Calculus for Business and Aviation),
  MATH 31 (Calculus II), MATH 178 (Mathematical Modeling).   2015-2019

Awards, Grants and Competitions

- Ethereum Summer Research Grant ($2,000)   2020
- SJSU Central Research, Scholarship and Creative Activity Grant ($2,400) 2018
- SJSU Undergraduate Research Grant ($1000)   2018
- SJSU Student Research Competition ($500)   2018
- Putnam Competition (552.5/3240)   2016