Yutong Wang

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Research interests

Machine learning, multiclass learning, loss functions, kernel methods, applications to genomics.

Education

Sep'16–present	**University of Michigan, Ann Arbor**	3.9 GPA

Ph.D. candidate in electrical engineering & computer science (EECS)
Courses: Machine learning, statistical signal processing, approximation algorithms, random graphs, multi-armed bandits, mathematical biology.

Sep'14–Jun'16	**University of California, Davis**	3.9 GPA

M.A. in mathematics

Sep'10–Apr'14	**University of Michigan, Ann Arbor**	3.7 GPA

B.S.E. in EECS with minor in mathematics

Programming

Python/Pytorch, C/C++, R, MATLAB.

Publications

Yutong Wang and Clay Scott. **"Reflection code for multiclass support vector machines."** *In preparation for JMLR.* `https://github.com/YutongWangUMich/liblinear`. We present a new solver which extends the library `LIBLINEAR` for the linear Weston-Watkins multiclass support vector machine.

Yutong Wang and Clay Scott. **"Weston-Watkins Hinge Loss and Ordered Partitions."** *Accepted to NeurIPS 2020.*

Tasha Thong, Yutong Wang, Michael D. Brooks, Christopher T. Lee, Clayton Scott, Laura Balzano, Max S. Wicha, Justin A. Colacino. **"Hybrid Stem Cell States: Insights Into the Relationship Between Mammary Development and Breast Cancer Using Single-Cell Transcriptomics"** *Frontiers in Cell and Developmental Biology, vol. 8, article 288, 2000.*

Technical reports

Y. Wang, T. Thong, V. Saligrama, J. Colacino, L. Balzano, and C. Scott. **"A Gene Filter for Comparative Analysis of Single-Cell RNA-Sequencing Trajectory Datasets."** BioRxiv, `https://doi.org/10.1101/637488`.

We present a heuristic algorithm for unsupervised feature selection, also known as a gene filter in bioinformatics. The heuristic attempts to solve a difficult combinatorial optimization. Future work includes finding a more theoretically justified approach to the combinatorial optimization problem.

Y. Wang, M. Reyes, and D. Neuhoff. **"Correct Convergence of Min-Sum Loopy Belief Propagation in a Block Interpolation Problem"** arXiv, `https://arxiv.org/abs/1702.06391`.

Belief propagation is a powerful heuristic for solving problems in probabilistic graphical model. We present a proof that a variant of belief propagation converges for the grid graph. For future work, we plan to generalize our result to a larger family of graphs with loops.

Y. Wang, L. Balzano, and C. Scott. **"Matrix completion for integrative analysis of bulk and single-cell RNA-sequencing data"**.

Single-cell RNA-seq data suffer from high amount of dropouts. We model these dropouts as missing data and apply matrix completion to infer them. Using our approach, we found that incorporating bulk RNA-seq as side-information empirically boosts the performance of matrix completion.

Poster presentations

Dec'19   **Domain adaptation for spatial and dissociated gene expression data integration**
Learning Meaningful Representations of Life Workshop at NeurIPS 2019

Jan'19   **Unsupervised feature selection for manifold alignment of scRNA-seq data**
Single Cell Biology - Keystone Symposia

Jun'17   **Joint analysis of bulk and single-cell RNA-Seq data via matrix factorization**
Midwest Machine Learning Symposium

Oct'17   **A convex clustering formulation using the similarity matrix**
3rd Annual MIDAS Symposium
Won the "Most Interesting Methodological Advancement" poster award.

Course projects

Fall 2017   **Community detection in multilayer graphs using spectral methods and core-finding** with D. Zhang
EECS 598: Random Graphs
Proposed a model for time-varying random graph model and a "core finding" algorithm for detecting communities in the proposed model. We demonstrate our algorithm is able to detect time-invariant communities in certain cases.

Fall 2016   **Coordinating message-passing algorithms using contextual bandits**
STATS 710: Sequential Decision Making With MHealth Applications
Applied contextual bandits to improve the convergence property of message-passing algorithms. I find that applying contextual bandits slightly decreased the number of iterations needed for the message-passing algorithm to converge.

Professional Experience

Sep'16–present   **Graduate student research assistant** — Advisors: C. Scott and L. Balzano
Department of EECS, University of Michigan

Jun'16–Sep'16   **Research assistant** — Advisors: D. Neuhoff and V. Subramanian.
Department of EECS, University of Michigan

Jun'15-Sep'15   **Research in algebraic geometry** — Advisor: B. Osserman.
Department of Mathematics, UC Davis