**Yutong Wang** 248-635-8780 1301 Beal Ave, Ann Arbor, MI 48109
yutongw@umich.edu github.com/YutongWangUMich web.eecs.umich.edu/~yutongw

## 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*
Courses: Integer and numerical optimization, algebraic geometry.
Teaching assistant: calculus, differential equations.

Sep'10–Apr'14 **University of Michigan, Ann Arbor** 3.7 GPA
*B.S.E. in EECS with minor in mathematics*
Courses: Programming and data structure, computer organization, information theory, algebraic topology, differential and Riemannian geometry.

## 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. However, few theory results are available when the underlying graph is not a tree. 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*

## Skills

*Programming languages/libraries* — Python/Pytorch, R, MATLAB, C/C++.

*Softwares* — LaTeX, graphic design in Adobe Photoshop and Illustrator.