

Yutong Dai

☎ 217.721.9646 · ✉ rothdyt@gmail.com · 🏠 Sunnyvale, CA, 94089 · 🌐 roth.rbind.io

EDUCATION

Lehigh University , PA, USA <i>Ph.D.</i> in Industrial and Systems Engineering	Sept.2019 – Dec.2023
University of Illinois at Urbana-Champaign , IL, USA <i>M.S.</i> in Statistics	Sept.2017 – May.2019
Sichuan University , Chengdu, China <i>B.S.</i> in Mathematics with honors (concentration in Statistics)	Sept.2013 – Jun.2017

FULL TIME & INTERNSHIP

Salesforce <i>Position: Applied Research Scientist</i>	Jan.2024 – Now Palo Alto, CA
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- Productionize LLM
- Pretrain multimodal LLM

Adobe <i>Position: Machine Learning Engineer Intern</i>	May.2023 – Aug.2023 San Jose, CA
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- Benchmarked personalized ranking algorithms based on implicit feedback data from Adobe's products
- Developed a multi-objective optimization framework to improve the current ranking algorithms to accommodate the diverse needs of business partners
- Applied the multi-objective optimization method to Adobe's production data to not only improve the ranking lists' quality (with hit@k metric increased from 8% to 20%) but also improve the ranking lists' diversity (with the diversity score increased by at most 43%)

Salesforce <i>Position: Research Intern</i>	May.2022 – Aug.2022 Palo Alto, CA
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- Conducted research in personalized Federated Learning to tackle data heterogeneity with the class imbalance
- Developed a unified and extensible framework to test the state-of-the-art Federated Learning algorithms
- Pulished the work at AAAI 2023 conference

Anheuser-Busch InBev <i>Position: Data Scientist Intern</i>	Jan.2018 – May.2019 Urbana, IL
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- Provided analytics and benchmarks of farmer production performance for global agronomist and procurement teams to improve barley productivity
- Revised machine learning algorithms with agronomists' on field knowledge to formulate a global barley production environment model that accounts for complex weather and soil systems
- Developed predictive models to suggest optimal management packages that help growers to hit highest barley yield
- Designed Smart Barley UI/UX prototype in Rshiny to dynamically visualize analytic results, like growers' production performance and highest yield management packages, and delivered it to agronomist teams

SELECTED PUBLICATIONS [\[FULL LIST\]](#)

Federated Learning

Tackling Data Heterogeneity in Federated Learning with Class Prototypes [Link]	2023
<i>Collaborators: Zeyuan Chen, Junnan Li, Shelby Heinecke, Lichao Sun, and Ran Xu</i>	Accepted by AAAI'23
<ul style="list-style-type: none">• Proposed a novel method to tackle data heterogeneity with the class imbalance in personalized Federated Learning by combining the uniformity and semantics of class prototypes• Developed a unified and extensible framework to test the state-of-the-art Federated Learning algorithms	

Memory-adaptive Depth-wise Heterogenous Federated Learnings [Link]	2023
<i>Collaborators: Kai Zhang, Hongyi Wang, Eric Xing, Xun Chen, Lichao Sun</i>	arXiv preprint
<ul style="list-style-type: none">• Proposed a memory-adaptive depth-wise training paradigm to tackle devices heterogeneity with a particular focus on edge devices that has varying memory capabilities• Conducted experiments on computer vision tasks and outperformed state-of-the-art algorithms by 5%~10%	

*Collaborators: Lichao Sun et. al.*Accepted by *IEEE Transactions on Computers*

- Proposed a new learning algorithm (FedGKD) to address the data heterogeneity in federated learning via the knowledge distillation and proved FedGKD's sub-linear convergence rate
- Conducted extensive experiments on various CV and NLP datasets to valid the FedGKD's superior performance compared with five state-of-the-art methods

Structured Sparse Optimization**A Variance-Reduced Proximal Stochastic Gradient Method with Support Identification Guarantees** [\[Link\]](#) 2023*Collaborators: Guanyi Wang, Franke E. Curtis, and Daniel P. Robinson*Accepted by *AISTATS'23*

- Proposed a stochastic algorithm for minimizing a class of composite functions with the structured sparse solutions by utilizing variance reduction and support identification; the novel variance reduction technique does not need either any full gradient evaluation or storages of past stochastic gradients
- Derived the complexity bound on identifying the solution support
- Conducted extensive experiments to suggest the theoretical complexity bound predicts the algorithm's performance well

Inexact Proximal Gradient Methods with the Certified Support Identification Property [\[Link\]](#) 2022*Collaborators: Daniel P. Robinson**arXiv preprint*

- Proposed adaptive termination conditions for inexact proximal gradient subproblems by monitoring reduction in the function value and optimality measure
- Proved the algorithm's certified ability to find a stationary point with structured sparsity patterns
- Conducted extensive experiments to validate algorithms' support identification property and its superior performance over the state-of-the-art inexact proximal gradient algorithms

A Subspace Acceleration Method for Minimization Involving a Group Sparsity-Inducing Norm [\[Link\]](#) 2022*Collaborators: Daniel P. Robinson and Frank E. Curtis*Accepted by *SIAM Journal on Optimization*

- Proposed a new optimization paradigm (GroupFaRSA) for minimizing a class of composite functions with the structured sparse solutions by utilizing support identification, domain decomposition, and subspace acceleration techniques
- Proved GroupFaRSA's super-linear local convergence rate
- Conducted extensive numerical experiments on solving large scale group- ℓ_1 regularized logistic regression and linear regression problems to validate GroupFaRSA's superior performance over four state-of-the-art methods

SERVICE**Reviewer**

- Conference
 - Artificial Intelligence and Statistics (AISTATS)
 - International Conference on Computer Vision (ICCV)
 - Special Interest Group on Knowledge Discovery and Data Mining (SIGKDD)
 - International World Wide Web Conference (WWW)
- Journal
 - Mathematical Programming (MP)
 - Journal of Scientific Computing (JOTA)
 - Optimization Letters (OPTL)

Conference Sessions Organizer

- MOPTA Conference: Bethlehem, PA, USA, August 2023: Nonlinear and Stochastic Optimization Algorithms