Yichen Ruan

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My name is Yichen Ruan, a Ph.D. student in the ECE Department at CMU. My research focuses on distributed machine learning and optimization. Visit https://ycruan.github.io to learn more about me on my personal site.

education

Jan 2018 - **Ph.D. in Electrical and Computer Engineering (3.89/4.00)** - *Carnegie Mellon University*
Intro. to Machine Learning (Ph.D.), Statistical Learning, Adv. Algorithms, Deep Learning

2016-2017 **M.S. in Systems Engineering (3.94/4.00)** - *UC Berkeley*
Convex Optimization, Algorithms, Operating Systems, Database, Security, Machine Structure

2012-2016 **B.S. in Civil Engineering (90/100)** - *Tsinghua University*
Intro. to AI, Computer Network, Data Structure, Discrete Math

2014-2016 **Secondary Bachelor's Degree in Economics** - *Tsinghua University*
Intermediate Micro/Macro Economics, Econometrics, Theory of Finance

projects

Edge Machine Learning for Resource-constrained IoT Devices

- Proposed an edge computing solution to run classification tasks on resource-constrained IoT devices.
- Designed a tree-based model containing several nodes. Each node contains a pre-trained classifier. Implemented an algorithm to prune the tree structure such that the number of nodes matches that of edge devices.
- Implemented the system on 8 Raspberry PIs and tested with the Cifar-100 dataset. Observed that the edge system obtained higher accuracy and more throughput compared to the fully centralized system.

Deep Learning Projects - *PyTorch*

- Built from scratch a MLP class supporting backprob, batchnorm, softmax and momentum, using only Numpy.
- Generated speaker embeddings using ResNet based deep CNN, trained with N-way classification.
- Built a Seq2Seq model for phonemes prediction of unaligned utterances with CTC loss and beam search.
- Implemented the LAS speech translation model with pBiLSTM encoder and attention aided decoder.

Computer System Course Projects - *system design and functionality implementation*

- Operating System (C Language): scheduler, thread, process, syscall, buffer cache, synchronized file system etc.
- Database (Java): file management, B+ tree, join algorithm, query optimization, concurrency control etc.
- Secure Cloud Storage (Golang): secure file store/load/edit/append/share/receive/rename/revoke etc.
- Homemade Numpy (C with SIMD/OpenMP): cache-optimized parallel matrix computations etc.

More projects - *see my homepage*

computer skills

- Programming Languages: C, C++, C#, Java, Python, SQL, JavaScript, Matlab, GoLang
- Parallel/Distributed Computing: Hadoop, Spark, OpenMP, SIMD
- Others: Bash, Git, Vim, Docker, Maven, Postgres, LaTeX, Pytorch, Keras

publications

- **Y. Ruan**, L. Zheng, M. Gorlatova, M. Chiang and C. Joe-Wong, The Economics of Fog Computing: Pricing Trade-offs for Data Analytics, to appear in Fog and Fogonomics: Challenges and Practices of Fog Computing, Networking, Strategy and Economics, Wiley, 2018.