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Education

- **University of California, San Diego** — La Jolla, CA
  PhD in Computer Science; Advisor: Prof. Arun Kumar — *Sept. 2017 – June. 2023(expected)*

  Courses taken: Advanced Compilers, Principles of Programing Languages, Database Systems, Advanced Algorithms, Machine Learning, Data Mining & Analytics, Advanced Data Analytics, Computer Vision, Introduction to Robotics

Professional Experience

- **ADALab, University of California, San Diego** — La Jolla, CA
  PhD research, deep learning systems — *Sept. 2017 - Present*
  - **Panorama**:
    - Developed the first data system for tackling the unbounded vocabulary issue (labels that were not present during training) in video querying
    - Designed an end-to-end, domain-agnostic and efficient system, allowing the user to generalize beyond bounded vocabularies without tedious manual re-training of DNNs
    - Implemented the prototype with TensorFlow. Tested with applications including face recognition, pedestrian re-identification, car model recognition, animal species recognition, etc. It can achieve between 2x to 20x higher efficiency and generalizes well to unbounded vocabularies
  - **Cerebro**:
    - Developed Cerebro, a resource-efficient deep learning model selection and training system
    - Proposed a novel form of parallelism for deep learning training called model hopper. This approach improves resource-efficiency drastically
    - In terms of resource efficiency, it can be the optimal choice over the TensorFlow parameter server, Horovod, or task parallelism tools like Dask, Vizier, or Ray. Built a prototype to support both TensorFlow and PyTorch
    - Extended the system with various execution backends including Greenplum Database and Apache Spark
    - Presented the work in Spark Summit 2020
- **Greenplum R&D at VMware, Inc.** — Palo Alto, CA
  Software Engineer Intern, in-database deep learning — *Summer 2019*
  - Worked on the first in-DBMS deep learning system, allowing training and inference of deep learning models with TensorFlow on database-resident data
  - Integrated my research project, Cerebro, into the deep learning training infrastructure of Greenplum Database, boosting the efficiency by 10x
  - Contributed to Apache MADlib project. Lead the development of a major release
  - This project has been incorporated into Greenplum and shipped to VMware's enterprise customers for use
- **University of California, San Diego** — San Diego, CA
  Teaching Assistant of Course: Systems for Scalable Analytics — *Winter 2019*
  - TAed the course which is about large-scale data analytics with Big Data tools and machine learning
  - Developed the first edition of course assignments and auto-grading programs, involving Dask, Spark, AWS EC2/S3/EBS, and Kubernetes. These assignments have been adopted by the course ever since and used by 500+ students

Recent Publications

1. A. Kumar, S. Nakandala, **Y. Zhang**, S. Li, A. Gemawat, and K. Nagrecha Cerebro: A Layered Data Platform for Scalable Deep Learning, CIDR (2021)
2. S. Nakandala, **Y. Zhang**, and A. Kumar Cerebro: a data system for optimized deep learning model selection, PVLDB (2020)
3. **Y. Zhang** and A. Kumar, *Panorama: A Data System for Unbounded Vocabulary Querying over Video*, PVLDB (2020)
4. S. Nakandala, **Y. Zhang**, and A. Kumar, *Cerebro: Efficient and Reproducible Model Selection on Deep Learning Systems*, ACM SIGMOD DEEM Workshop (2019)