# Tianyu Zhang

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## EDUCATION

**Carnegie Mellon University School of Computer Science** — Pittsburgh, PA
*B.S. in Artificial Intelligence; GPA: 3.9/4.0, Dean's List.* — *Expected May 2022*

- **Relevant courses**: *Distributed Systems, *Algorithms Design & Analysis, *Scalable ML, Parallel Data Structures & Algorithms, AI: Representation and Problem Solving, Software Design & Concurrency, Theoretical CS

## EXPERIENCE

**ByteDance** — Beijing
*Software Engineering Intern* — *June 2020 - Aug 2020*

- **Live Streams Recommendation, Graph Embedding**:
  * Improved the performance of the internal ML trainer (C++) by reducing communication overhead. Reduced the mini-batch forward latency by over 100% in certain training circumstances that involve graph embedding.
  * Extracted relations from Petabyte log data to build distributed user-author graphs using MapReduce and designed graph encoders to train an embedding of graph nodes using Tensorflow and ByteDance ML API.
  * Integrated end-to-end embedding to CTR prediction and significantly increased online user staytime (+3.5%), comment rate (+3.8%), and other metrics in AB tests for Douyin and TikTok.
- **Systems for Engineering Efficiency**:
  * Designed and developed a system from scratch in Django with RESTful APIs that creates and manages alerts for 100+ online models of 5 products and presents model health status on a dashboard. Attracted 70+ internal users and developers. Reduced the usual day-long response time to less than an hour in a recent dataflow accident.
  * Developed a pipeline that analyzes the importance of 300+ features in a Monte Carlo fashion and performs feature modification on Terabyte model checkpoints on clusters based on the results. Saved 2hr+ manual labor per iteration and 35k+ core-hour computing resources in total than hand-tuning.

**Tsinghua Tongfang Nuctech** — Beijing
*Machine Learning Intern* — *May 2019 - Jul 2019*

- **Baggage Re-Identification for Smart Security Inspection**: Surveyed past architectures for person and vehicle re-identification (re-ID). Implemented 5 architectures in Tensorflow and PyTorch and evaluated their performance for baggage re-ID. Achieved a 0.76 accuracy of CMC rank-1 on the overall re-ID task of image retrieval from a 500-baggage gallery, improving the baseline by 80.9% in accuracy and about 10x in speed.
- **Research Framework Development**: Developed a framework to speed up the team's research workflow, including features such as activation visualization, checkpointing, and metrics platform integration.

**Yuanfudao (EdTech Unicorn)** — Beijing
*Software Engineering Intern* — *Jun 2017 - Jul 2017*

- **Full-Stack Development**: Designed and developed from scratch a mobile event website in HTML, JavaScript, and Java that encourages high-school users to set up goals for their new academic year and share them as images to their social networks. Reached 80k+ visits on the event page and collected 10k+ responses.
- **Data Analytics**: Performed regression analysis using random forests on data of 8k+ students who improved their Gaokao practice scores by using the company's AI-enabled tutoring service. Summarized findings and generated proposals for the team's marketing strategy over the next academic year.

## PROJECTS

- **BitcoinMiner**: A failure-recoverable distributed Bitcoin miner with the homegrown Live Sequence Protocol that supports reliable communication under the server-client model. (Go)
- **TimeSeries**: An extensible analysis and visualization framework for time series data that allows plugins to provide custom data sources, analysis methods, and visualization methods. (Java(Swing))
- **Pop!**: A crowd-sourcing notification app that allows users to send signals into a group and all members of that group will be notified of the event in real-time (e.g. a pop quiz for 15-251). (JS(React)+Python(Django))
- **Zebrafish**: Pattern analysis and identification of stimuli-induced neural activity of a larval zebrafish using feature-based aggregation and distributed PCA. (Python(Spark))
- **LangDist**: Proposed a variant of the SIR model from epidemiology to predict future geographical distributions of language speakers. Generated proposals to inform global office site selection for multinational firms. (Python+MATLAB)
- **MagUnity**: An electromagnetism engine implementation for Unity (using Maxwell's equations) that enables game developers to integrate electromagnets and electron beams into their gameplay. ($C^\#$/Unity, CASTIC 2017 Second Prize)

## SKILLS

- **Systems**: Java, Go, C/C++, SQL, Spark/Hadoop, HDFS, RPC, Protobuf, Apache Kafka
- **Data & ML**: Python (pandas, sklearn, Tensorflow, PyTorch), MATLAB, Recommender Systems (Distributed LR, FFM, GraphSAGE), Reinforcement Learning (MDP, Q-learning), Computer Vision (CNN, ResNet, Attention)