Dong He

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EDUCATION

University of Washington, **Ph.D. in Computer Science** — USA

- Advisor: Prof. Magdalena Balazinska — Sep 2019 – present

Fudan University, **B.Sc. in Computer Science (Honors)** — China

- Cumulative GPA: 3.6 / 4.0, School Rank: 6 / 118 — Sep 2015 – Jul 2019

University of Birmingham, **Exchange Undergraduate Student** — UK

- First Class Honors' Grades — Sep 2017 – Dec 2017

RESEARCH EXPERIENCE

Accelerating Declarative Top-k Queries for Deep Neural Network Interpretation — @UW

Advisor: Prof. Magdalena Balazinska — Sep 2019 – present

- Proposed a system that makes DNN interpretation usable and scalable, which focuses on accelerating dataset-level interpretation queries, such as "find the top-k nearest neighbors in the dataset using the activation values of a group of neurons based on the proximity in the latent space learned by the DNN".
- Designed and developed an efficient indexing and query execution algorithm that accelerates the query execution by reducing the number of activation values computed at query time with low storage overhead. Our algorithm is guaranteed to return the precise and accurate query results.
- Preliminary results show that our system accelerates DNN interpretation queries up to 15x, with a storage overhead at 31.6% of the storage size of full materialization of all activation values.

The VisualWorld Video Data Management Project — @UW

with the VisualWorld team — Sep 2019 – present

- **TASM**: a new tile-based storage manager for video data which enables spatial random access into encoded videos. TASM speeds up content retrieval queries by an average of over 50% and up to 94%, and also improves the throughput of the full scan phase of object detection queries by up to 2x.
- **VFS**: a system that decouples application design from video data's physical layout and compression optimizations. This decoupling allows application and system developers to focus on their relevant functionality, while VFS handles the low-level details associated with video data persistence. VFS also improves read performance by up to 54%, and reduces storage costs by up to 45%.

Improving the Prediction of Real-Time Taxi Demand with External Information — @Fudan

Advisor: Prof. Yang Chen — Sep 2018 – Jan 2019

- Proposed a deep learning-based approach which incorporates user check-in data from a Location-Based Social Network to improve the prediction of the taxi demand in different regions at different times.
- Integrated the taxi trip data with around 1 million user check-ins collected from the Swarm App, and applied a state-of-the-art Phased Long Short-term Memory network for modeling.
- Evaluated our approach on a dataset containing 35 million taxi trip records. Compared to the traditional LSTM method that does not integrate external information, our method achieves 21.27% lower MAPE and 6.96% lower RMSE.

FPGA-Based Edge Computing for the Acceleration of Mobile Applications — @PKU

Advisor: Prof. Chenren Xu — Jul 2017 – Aug 2017

- Leveraged the advantages of both edge offloading and FPGA-based computational acceleration, to make the first attempt to propose the FPGA-based edge computing model, which can effectively reduce the response time and energy consumption of interactive mobile applications.
- Designed and implemented a proof-of-concept FPGA-based edge computing system, and conducted experiments in a case study using 3 computer vision-based interactive applications desigend by us.
- Experimental results demonstrate that our system can reduce the response time and execution time by up to 3x/15x respectively over CPU-based edge/cloud offloading and achieve up to 29.5%/16.2% improvement on energy efficiency respectively on mobile device/edge nodes.

PUBLICATIONS

TASM: A Tile-Based Storage Manager for Video Analytics [preprint]

- In submission.

VFS: A File System for Video Analytics

- In submission.

Accelerating Mobile Applications at the Network Edge with Software-Programmable FPGAs [PDF]

- Shuang Jiang, **Dong He**, Chenxi Yang, Chenren Xu, Guojie Luo, Yang Chen, Yunlu Liu, Jiangwei Jiang
- Proc. of IEEE International Conference on Computer Communications (INFOCOM'18), Honolulu, HI, USA, Apr. 2018. (Acceptance ratio: $309/1606 = 19.24\%$)

Incorporating Location Based Social Networks in the Prediction of Real-Time Taxi Demand with Deep Learning [PDF]

- **Dong He**, Yang Chen
- Poster Session of the 14th International Conference on emerging Networking EXperiments and Technologies (CoNEXT'18), Heraklion, Greece, Dec. 2018.

Incorporating External Information in the Prediction of Real-Time Taxi Demand with Deep Learning

- In submission.

WORK EXPERIENCE

Goldman Sachs, **Technology Summer Analyst** — Hong Kong, China

- Worked in the Product Accounting and Risk Analysis team. — Jul 2018 – Sep 2018
- The Global Winner for Goldman Sachs 2018 Intern Engineering Challenge.
- Re-designed and re-implemented the Java logic of the True-Up job which reconciles the estimated PnL (profit and loss) with the actual PnL. My enhancement enables the True-Up job to resume from where it failed, which accelerates the job re-run. It also reduces the memory usage considerably, which significantly reduces the chances of job failure.

Tencent, **Engineering Intern** — Shenzhen, China

- Worked at YouTu Lab led by Prof. Jiaya Jia and Prof. Yu-Wing Tai. — Jan 2018 – Feb 2018
- Analyzed the liveness and dependencies of the nodes in the neural networks, and reduced the memory consumption of such models in real-world products by memory sharing.
- Developed tools for the collection and annotation of large-scale image data, and collected massive image data for the training of image classification models in real-world products.

SELECTED AWARDS

- Paul G. Allen Fellowship, Paul G. Allen School of Computer Science & Engineering — 2019
- Outstanding Undergraduate Graduates, Shanghai Region — 2019
- Honors Student Award, Top Talent Undergraduate Training Program, Fudan University — 2019
- Wangdao Scholar, Undergraduate Research Opportunities Program, Fudan University — 2018
- Elite, Liu Yong-Ling (First Class) Scholarship, Fudan University — 2017
- First Prize, Honor Program Scholarship, Fudan University — 2017
- First Prize, the National Mathematical Contest in Modeling, Shanghai Division — 2016
- Second Prize, the National Mathematical Contest in Modeling, National Finals — 2016
- Silver Medal, the ACM International Collegiate Programming Contest, Asia Regional — 2015
- Silver Medal, National Olympiad in Informatics, National Finals — 2014
- First Prize, National Olympiad in Informatics, Guangdong Division — 2009 – 2014

PROFESSIONAL SKILLS

- **Programming Languages:** C/C++, Java, Python, ...
- **Deep Learning Libraries:** PyTorch, Tensorflow, Keras, ...
- **Others:** SQL, LaTeX, Git, SVN, Gnuplot, ...