

# JIA ZHANG

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## Education

### Tsinghua University

China

*Ph.D. Student with Department of Computer Science and Technology*

2018 – 2023

- Advisor: Prof. Mingwei Xu.

### Tsinghua University

China

*B.Eng. with Department of Electronic Engineering, minor in Business Administration*

2014 – 2018

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## Work Experience

### Research Intern | Baidu Inc., China

Fall 2019 - Now

- BFE Team, Mentor: Mr. Sijie Yang.

### Visiting Research Assistant | University of Surrey, UK

Summer 2019

- 5G Innovation Centre, Advisor: Prof. Ning Wang.

### Research Assistant | Tsinghua University, China

Fall 2016 - Spring 2017

- Lab of New Generation Network Technology & Applications, Advisor: Prof. Yongfeng Huang

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## Research

### Research Interest

- Learning-based Network Systems
- Transport Layer Performance Measurement and Improvement
- Wireless Networks

### Publications

- **(WWW'21) Jia Zhang**, Enhuan Dong, Zili Meng, Yuan Yang, Mingwei Xu, Sijie Yang, Miao Zhang Yang Yue. WiseTrans: Adaptive Transport Protocol Selection for Mobile Web Service, TheWebConf 2021.
- **(ToN'21) Zili Meng**, Yaning Guo, Yixin Shen, Jing Chen, Chao Zhou, Minhu Wang, **Jia Zhang**, Mingwei Xu, Chen Sun, Hongxin Hu, Practically Deploying Heavyweight Adaptive Bitrate Algorithms With Teacher-Student Learning, IEEE/ACM Transactions on Networking (ToN), 2021.
- **(SIGIR'17) Fangzhao Wu**, **Jia Zhang**, Zhigang Yuan, Sixing Wu, Yongfeng Huang, and Jun Yan. 2017. Sentence-level sentiment classification with weak supervision. In Proceedings of the 40th International ACM SIGIR Conference on Research and Development in Information Retrieval, SIGIR 2017. 973–976.

### Research Experience

- **Extend BBR congestion control algorithm into MPQUIC**

Under the background of the Internet development in the future, emerging applications such as connected vehicles and eHealth have proposed low-latency requirements. However, traditional protocols such as TCP cannot meet such new requirements well, while traditional congestion control mechanisms which are based on packet losses are difficult to make full use of network resources. Therefore, researchers turned their attention to the new transmission protocol QUIC and the new congestion control technology BBR proposed by Google recently. QUIC has been preliminarily deployed and its multi-path extension MPQUIC is still in its infancy. Research on its congestion control is far from enough.

This paper studies the congestion control in MPQUIC, extends BBR congestion control algorithm into MPQUIC. It contributes to improving the speed of page download and reduces network delay when using MPQUIC in the environment with random loss. Then a series of experiments

were performed to test and analyze the performance of the implementation of BBR in MPQUIC. It was verified that it can effectively deal with random packet loss and it is more robust to different path states. Also, MPQUIC and MPTCP 's performances have been tested. Those experiments verified its ability to deal with packet loss and the necessity of the study of MPQUIC. In general, this paper enriched the study of QUIC and MPQUIC and provided some data support and guidance of further deployment and improvement.

- **Practically Deploying Heavyweight Adaptive Bitrate Algorithms With Teacher-Student Learning**

Major commercial client-side video players employ adaptive bitrate (ABR) algorithms to improve the user quality of experience (QoE). With the evolvement of ABR algorithms, increasingly complex methods such as neural networks have been adopted to pursue better performance. However, these complex methods are too heavyweight to be directly deployed in client devices with limited resources, such as mobile phones. Existing solutions suffer from a trade-off between algorithm performance and deployment overhead. To make the deployment of sophisticated ABR algorithms practical, we propose PiTree, a general, high-performance, and scalable framework that can faithfully convert sophisticated ABR algorithms into decision trees with teacher-student learning. In this way, network operators can train complex models offline and deploy converted lightweight decision trees online. We also present theoretical analysis on the conversion and provide two upper bounds of the prediction error during the conversion and the generalization loss after conversion. Evaluation on three representative ABR algorithms with both trace-driven emulation and real-world experiments demonstrates that PiTree could convert ABR algorithms into decision trees with <3% average performance degradation. Moreover, compared to original deployment solutions, PiTree could save considerable operating expenses for content providers.

- **WiseTrans: Adaptive Transport Protocol Selection for Mobile Web Service**

Recently, a new transport protocol, QUIC, has been proposed. Existing studies have shown that QUIC achieves higher performance than TCP under poor network conditions, while TCP is better in other network conditions. We believe that transport protocols used for mobile web service should be carefully selected between TCP and QUIC. We identify slow nets, which have poor network conditions, and one should use QUIC over them.

In this paper, we present a measurement study including, According to the results, we reveal that slow nets cannot be recognized merely based on the type of access networks, and more factors have to be considered. Then, we propose WiseTrans, the first solution that wisely selects transport protocols. Based on statistics of previous requests of the current user, WiseTrans employs machine learning techniques to recognize slow nets and alternates between QUIC (for slow nets) and TCP (for other network conditions). We have implemented WiseTrans within a popular mobile web service provider's network library. Our evaluations show that WiseTrans can accurately recognize slow nets and reduce request completion time by 26.5% for TCP.

- **Sentence-level Sentiment Classification with Weak Supervision**

Sentence-level sentiment classification is important to understand users' fine-grained opinions. Existing methods for sentence-level sentiment classification are mainly based on supervised learning. However, it is difficult to obtain sentiment labels of sentences since manual annotation is expensive and time-consuming. In this paper, we propose an approach for sentence-level sentiment classification without the need of sentence labels. More specifically, we propose a unified framework to incorporate two types of weak supervision, i.e., document-level and word-level sentiment labels, to learn the sentence-level sentiment classifier. In addition, the contextual information of sentences and words extracted from unlabeled sentences is incorporated into our approach to enhance the learning of sentiment classifier. Experiments on benchmark datasets show that our approach can effectively improve the performance of sentence-level sentiment classification.

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## Teaching and Tutoring

### Teaching Assistant

Computer Network Architecture, Department of Computer Science and Technology Tsinghua University

Fall 2020

### Undergraduate Tutor

Department of Electrical Engineering

Fall 2018 - Fall 2020

Tsinghua University