

JIA ZHANG

✉ joycezhangjia@gmail.com | 🌐 [joycezhangjia](https://joycezhangjia.com) | 📞 +86 13121958631

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

- **WiseTrans: Adaptive Transport Protocol Selection for Mobile Web Service (WWW'21)**
To improve the performance of mobile web service, a new transport protocol, QUIC, has been recently proposed. However, for large-scale real-world deployments, deciding whether and when to use QUIC in mobile web service is challenging. Complex temporal correlation of network conditions, high spatial heterogeneity of users in a nationwide deployment, and limited resources on mobile devices all affect the selection of transport protocols. In this paper, we present WiseTrans to adaptively switch transport protocols for mobile web service online and improve the completion time of web requests.
WiseTrans introduces machine learning techniques to deal with temporal heterogeneity, makes decisions with historical information to handle spatial heterogeneity, and switches transport protocols at the request level to reach both high performance and acceptable overhead. We implement WiseTrans on two platforms (Android and iOS) in a popular mobile web service

application of Baidu. Comprehensive experiments demonstrate that WiseTrans can reduce request completion time by up to 26.5% on average compared to the usage of a single protocol.

- **Practically Deploying Heavyweight Adaptive Bitrate Algorithms With Teacher-Student Learning (ToN'21)**

Major commercial client-side video players employ adaptive bitrate (ABR) algorithms to improve the user quality of experience (QoE). With the evolution 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.

- **Sentence-level Sentiment Classification with Weak Supervision (SIGIR'17)**

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.

- **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 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 algorithm BBR. 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.

Teaching and Tutoring

Teaching Assistant

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

Undergraduate Tutor

Department of Electrical Engineering

Fall 2020

Fall 2018 - Fall 2020

Tsinghua University