

NAIBO WANG

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Research Interests: Federated Learning, Cloud/Edge Computing, Big Data, Distributed System, Machine Learning, Database.

EDUCATION

- National University of Singapore (NUS)** • Singapore Aug 2020 – Present
PhD Candidate • Data Science
- Zhejiang University (ZJU)** • Zhejiang, China Sept 2017 – June 2020
Master of Science • Computer Science and Technology • GPA: 4.0/4.0
- Xidian University (XDU)** • Xi'an, China Aug 2013 – June 2017
Bachelor of Science • Computer Science and Technology • GPA: 3.6/4.0 • Major GPA 3.8/4.0

RESEARCH EXPERIENCE

- Federated Learning System Design** – System & Networking Research Lab 1 Aug 2019 – Present
Advisor: Professor Bingsheng He, National University of Singapore, Singapore
- Identified two important features for the applying federated learning on real cases, heterogeneity and autonomy, that are rarely considered in the existing federated learning systems.
 - Compared and contradicted the current frameworks that support federated learning.
 - Concentrated on the design of model, definitions of terminologies.
 - Concentrated on standard pipeline to benchmark distinctive FL frameworks to evaluate the efficiency and accuracy.
- A Scenario-based Requirement Model for Crossover Healthcare Service** – CCNT Lab Jan 2019 – May 2019
Advisor: Professor Jianwei Yin, Zhejiang University, Zhejiang, China
- Built up Scenario-Based Requirement Model (SBRM) which assisted product manager (PM) or middle-end to describe and locate the requirements more quickly and accurately.
 - Verified our SBRM on a real case of a MEH (medical, eldercare and healthcare) crossover service. SBRM shows satisfactory efficiency, effectiveness, and reusability.
 - Assisted SBRM by designing the Domain Specific Language (DSL) and a prototyping system. During prototyping, SBRM+DLS enables the PMs and the elders to design requirements together. SBRM+DLS transforms requirement into executable code in a semi-automated way which could help shorten the development cycle.
 - Concentrated on the design of model, grammars in DSL, definitions of terminologies.
- Service Wrapper: A System for Converting Web Data into Web Services** – CCNT Lab Sept 2018 – Jun 2019
Advisors: Professor Jianwei Yin and Algorithm Expert Zhiling Luo, Zhejiang University, Zhejiang, China
- Constructed a service wrapper system to convert available data on web pages into web services. A user can convert web data into web services with easy operations and invoke these services through one simple step.
 - Outstripped the traditional crawler program on the efficiency of data collection. The service wrapper will automatically analyze the page, generate crawler rules, and return the corresponding structured data.
 - Tested the proposed service wrapper on three types of websites, List Structure (success rate: 96.3%), Text Information (92.3%) and Dynamic Form (93.4%).
 - Responsible for system design, backend module design for the service extractor, and patent application.
- Feelings-aware RNN Model for User Churn Prediction** – CCNT Lab Dec 2017 – Oct 2018
Advisor: Algorithm Expert Zhiling Luo, Zhejiang University, Zhejiang, China
- Proposed an RNN model, LaFee, in order to generate latent feelings while predicting user churn, which mitigates the challenge of lacking users' real feelings.
 - Introduced BMM-UCP method to help models predict user churn when it needs to be completed with only behavioral data.
 - Evaluated the model's performance on UNO dataset from NetEase.com. Proposed method outperforms baselines by applying the BMM-UCP and LaFee model on them, showing that LaFee is more suitable for long-term sequential learning.
 - Contributed to the implementation of the model, training and evaluation with TensorFlow.
- Parallel acceleration for Convolution Neural Network based on OpenCL** Oct 2016 – Jan 2017
System-on-a-chip design & research laboratory Advisor: Jianxian Zhang, Xidian University, Xi'an, China
- Completed the parallelization design of Convolutional Neural Network (CNN) based on OpenCL and verified the feasibility and correctness of the designed algorithm on heterogeneous parallel platforms.
 - Proposed optimizations in OpenCL such as parallelism for a single convolution and multiple convolutions, data parallelism and batch processing.

- Benchmarked proposed parallel computation on Intel CPU, AMD GPU, and NVIDIA GPU. The proposed algorithm is 375 times faster than serial execution conditioned on similar training accuracy.
- Contributed to the implementation of the model, training and evaluation with C++. Submitted the work in form of undergraduate thesis for publication.

PUBLICATIONS

Published

- Meng Xi, Zhiling Luo, **Naibo Wang**, Jianwei Yin (2019) *A Latent Feelings-aware RNN Model for User Churn Prediction with Behavioral Data*. [J] IEEE SmartDataServices 2020 [**Best Paper Award**]
- Meng Xi, Ying Li, Yongna Wei, **Naibo Wang**, Yuyu Yiny, Zhiling Luo, Shuiguang Deng, Yihua Mao, Jianwei Yin (2019) *A Scenario-based Requirement Model for Crossover Healthcare Service*. [C] The 2019 IEEE World Congress on Services (SERVICES)
- **Naibo Wang**, Jianxian Zhang (2017) *Parallel design of convolution neural network based on OpenCL*. Journal of Xidian University

RECENTLY SUBMITTED

- **Naibo Wang**, Xiya Lyu, Zitong Yang, Jianwei Yin (2019) *Service Wrapper: A system for converting web data into web services*. IEEE Transactions on Network and Service Management
- Qinbin Li, Zeyi Wen, Zhaomin Wu, Sixu Hu, **Naibo Wang**, Bingsheng He (2019) *Federated Learning Systems: Vision, Hype and Reality for Data Privacy and Protection* [J] IEEE Transactions on Knowledge and Data Engineering (TKDE).
- Junxiang Wang, Jianwei Yin, Ting Jin, Ying Li, Shuiguang Deng, Zhiling Luo, Xiya Lyu and **Naibo Wang** (2019) *Advertising in Instant Games: Effects of Ad Formats on Player Experience and Ad Effectiveness*. [C] Special Interest Group on Computer-Human Interaction (CHI 2020)
- Junxiang Wang, Jianwei Yin, Ting Jin, Ying Li, Shuiguang Deng, Zhiling Luo, Xiya Lyu and **Naibo Wang** (2018) *Should An App be An Agent? Exploring User Satisfaction with Embedded Conversational Agents in Mobile Apps*. [C] TheWebConf 2020 (WWW)

WORK EXPERIENCE

Research Assistant National University of Singapore, Singapore Sep 2019 - Present
Project: Development of Federated Learning (FL) Systems

- Worked as full-time researcher for the School of Computing, National University of Singapore.
- Composed literature review, system building, evaluation and implementation.
- Composed paper on Federated Learning Systems, which enable the collaborative training of machine learning models among different organizations under the privacy restrictions.

Software Development Engineer Xidian University, Xi'an, China Jan 2016 - May 2018
Project: Development of Three-Thinking Website

- Worked as part-time software engineer for the School of Computer Science, Xidian University
- Developed an information hub for students in Xidian University to allow them to access academic information. The website provides information including GPA, ranking, grade certificates, appointment of official transcript, enrollment statements, etc.
- Assisted professors with online grading for students' graduation projects, and teachers to recruit good students by posting announcements on the website.
- Individually responsible for all development on back-end system, front-end design, UI design and testing.

HONORS AND AWARDS

- **Graduate Star (2017)**
Awarded along with 10 students from the whole grade (about 5000 students)
- **National Scholarship (2016)**
Top 1% among competitors, awarded by the Ministry of Education of PRC
- **Graduate of Merit (2018)**
Top 15% among competitors, Awarded by Zhejiang University
- **Honor for Graduate Student (2018)**
Top 30% among competitors, Awarded by Zhejiang University
- **Outstanding Graduate Student Leader (2018)**
Top 2% among competitors, Awarded by Zhejiang University
- **Excellent Student and First-class Scholarship (2014, 2015)**
Top 10% among competitors, Awarded by Xidian University
- **Excellent Student Leader (2015)**
Top 1% among competitors, Awarded by Xidian University
- **Recognition Award in the CCSP contest (2016)**
Top 10% among competitors, Awarded by China Computer Federation (CCF)
- **First prize in the ACM contest (2015)**
Top 10% among competitors, Awarded by Xidian University

- **Internet Plus Contest Second Prize (2016)**

Top 30% among competitors, Awarded by Xidian University

- **Excellent team and leader in summer social practice (2015)**

Top 5% among competitors, Awarded by Xidian University

TECHNICAL SKILLS

- Programming languages: Python, C, C++, Java, Android, PHP, HTML, CSS, JavaScript, C#, .net Framework, VHDL, MATLAB, ActionScript, Shell
- Frameworks: TensorFlow, Keras, Vue.js, MySQL