Kaichuang Zhang

kaichuang.zhang01@utrgv.edu kaichuangzhang.github.io +1-(956)651-8637

Research Interests

- **FEDERATED LEARNING**
  - Communication-efficiency, Privacy-preservation, Byzantine-robustness and Fairness in Decentralized Federated Learning.
- **COMPUTER VISION**
  - Unsupervised Visual Representation Learning, Contrastive Learning.

Education

University of Texas Rio Grande Valley *Sep.2023 - Present*
Master of Electrical Engineering Overall GPA: 4.00 / 4.00

Beijing University of Technology *Sep.2017 - Jul.2020*
Master of Computer Technology Overall GPA: 3.58 / 4.00

Nanyang Institute of Technology *Sep.2012 - Jul.2016*
Bachelor of Computer Science and Technology Overall GPA: 3.10 / 4.00

Research & Work Experience

Dr.Ping Xu's Lab *Oct.2023 - Present*
Research Assistant Advisor: Ping Xu

Decentralized Federated Learning

- Communication-Efficient, privacy-Preservation, Communication-Efficient, Fairness in Decentralized Federated Learning, .

Institute of Software Chinese Academy of Sciences *Apr.2022 - Oct.2023*
Research Assistant Advisor: Pengpeng Hou

The issues with applications that deployed in cloud are cost and performance. Large-scale configures parameters tuning must use methods, like Bayesian Optimization, Intelligence Algorithms.

- Researched the methods on PT(performance tuning) and applied a patents for PT under kubernetes.
- Developed the K8sTune (the tool our group deployed using OperatorSDK) - a performance&cost tuning tool under kubernetes.

Baidu Inc. *May.2020 - Apr.2022*
Research & Develop Engineer

In online advertising, Advertising Mechanisms and Keywords Recommendation are two main topics.

- Dynamic Keywords-Package Recommendation: Recommend Dynamic Keyword-Package which includes keywords that have the same business to advertiser base their advertising promotion. After multiple iterations, the accuracy is over 95%.
  - Designed a statistical based method for Keywords-Package recommendation
  - Developed the recommendation system using python, spark, bigflow(a distributed computing framework), ERNIE(the base NLP model of Baidu) etc.
- Uplift: Show advertisement to user base on the uplift of conversion rate instead of the absolute value of conversion rate, which improves the conversion in all promotion channels of advertisers.
  - Designed and implemented a model to predict the uplift of cvr.
- CvMax: Advertisers only need to set a budget to advertising in Baidu, which greatly reduces the maintenance cost of advertisers.

Pattern Recognition 409 Laboratory *Sep.2017 - July.2020*
Master Student Advisor: Bo Liu

Learn the image's feature representation from the object which has many static images, like videos. The

image samples of the same object belong to the same category, which is used as self-supervised information.
- Propose a sampling algorithm called the object-based triple sampling algorithm.
- Design a loss function called the object-based triple loss function.

Others *Sep.2015 - July.2020*

Internships as intern in Bytedance, Face++, LLVISON etc.

Publications

- **Kaichuang Zhang**, Long Jiao, Ping Xu "Decentralized Federated Learning under Meta Computing" ICMC 2024 (in process)
  This paper propose a novel DFL algorithm termed Communication-efficient Privacy-preserving, and Byzantine-robust DFL (CPB-DFL) which simultaneously considered communication bottleneck, privacy concerns, Byzantine attacks.

Patents

- Xinyuan Wang, PengPeng Hou, Jiatai He, ***Kaichuang Zhang***, Chenyu Ma, Jiatai He, Jiageng Yu, Yanjun Wu. 2022. Linux system kernel configuration policy optimization method based on machine. CN Patent, CN117172093A filed July 24, 2023 and issued Dec 5, 2023.
- PengPeng Hou, ***Kaichuang Zhang***, Chenyu Ma, Jiatai He, Jiageng Yu, Yanjun Wu. Software parameter tuning methods, container management platform, storage media, and systems. CN Patent, CN11562860A filed Oct 21,2022 and issued Jan 20, 2023.
- Pengpeng Hou, Guo Chen, ***Kaichuang Zhang***, Jiageng Yu, Yanjun Wu. An automated kernel configuration item classification method and device. CN Patent, CN115422361A filed Sep 29,2022 and issued Dec 2, 2022.
- Bo Liu, ***Kaichuang Zhang*** . 2020. An unsupervised learning method of deep neural network based on similarity distance between objects and within objects. CN Patent, CN111401519A filed March 6, 2020 and issued July 10, 2020.

Tech Stack

- ***Programming Language:*** C, C++, Python, Shell, Golang and other programming languages
- ***Deep Learning Framework:*** Pytorch, Tensorflow, Caffe
- ***Distributed Computation:*** Hadoop, Spark
- ***Virtualization:*** Docker, Kubernetes

Honors & Awards

- **UTRGV ECE outstanding student of the year 2024** Feb. 2024
- **Presidential Research Fellowship of EECE in UTRGV** Sep. 2023
- ***The Second Prize***, The 3nd Master Algorithm Contest of BJUT Apr. 2019
- ***The Second Prize***, The 7th China Software Cup College Student Software Design Cup May. 2018
- ***The Second Prize***, The 2nd Master Algorithm Contest of BJUT Apr. 2018
- Outstanding Graduate of the School of Computer Science, NYIST July. 2016
- ***The Third Prize***, The 2nd ACM Nanyang Institute of Technology Competition July. 2015
- ***The Third Prize***, The 6th Blue Bridge Cup Programming Contest Henan Province May. 2015
- ***Gold Prize***, The 6th ACM-ICPC Henan Province May 2014
- ***The Third Prize***, The 5th Bule Bridge Cup Programming(C/C++) Contest Finals May. 2014
- ***The Second Prize***, The 5th Bule Bridge Cup Programming(C/C++) Contest Henan Prov. May. 2014
- ***Excellence Prize***, The 36th ACM-ICPC Regional Invitational Contest, NWPU May. 2013
- ***Silver Prize***, The 4th ACM-ICPC Henan Province May. 2012