CHING-YUAN BAI

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I am currently a second year PhD student at UCLA Computer Science Department advised by Prof. Cho-Jui Hsieh. My research interests involve understanding how machine learning models function. My current focus is on developing practical model interpretation methods to facilitate adoption of machine learning models in critical domains.

EDUCATION

University of California, Los Angeles Sep 2021 – Exp. Jun 2027
Ph.D. in Computer Science (advised by Prof Cho-Jui Hsieh).

National Taiwan University (Taipei, Taiwan) Sep 2016 – Jan 2021
B.S. in Computer Science and Information Engineering. (GPA: 4.2/4.3)
Minor in Mechanical Engineering.

RWTH Aachen (Aachen, Germany) Oct 2019 – Mar 2020
Undergraduate exchange student

PUBLICATIONS

- **C.-Y. Bai**, C.-K. Yeh, P. K. Ravikumar, N. Lin, and C.-J. Hsieh "Concept Gradient: Concept-based Interpretation Without Linear Assumption." Under review.
- **C.-Y. Bai**, C.-J. Hsieh, W. Kan, and H.-T. Lin "Reducing Training Sample Memorization in GANs by Training with Memorization Rejection" Under review.
- **C.-Y. Bai**, H.-T. Lin, C. Raffel, and W. Kan "On training sample memorization: Lessons from benchmarking generative modeling with a large-scale competition." In *Proceedings of the 27th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD)*, August 2021.
- S.-L. Wu*, **C.-Y. Bai***, K.-C. Chang, Y.-T. Hsieh, C. Huang, C.-W. Lin, E. Kang, and Q. Zhu "Efficient system verification with multiple weakly-hard constraints for runtime monitoring." In *Proceedings of the International Conference on Runtime Verification*, Oct 2020.
- **C.-Y. Bai**, B.-F. Chen, and H.-T. Lin "Benchmarking Tropical Cyclone Rapid Intensification with Satellite Images and Attention-based Deep Models." In *Proceedings of the The European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases*, Sep 2020.

RESEARCH EXPERIENCE

Dept. of Computer Science, UCLA (Los Angeles, CA) Sep 2021 – Present
Graduate Student Researcher (advised by Prof. Cho-Jui Hsieh)

- Designed concept-based interpretability methods for general differentiable models (e.g. neural networks) by propagating gradients through shared input feature representation.

Dept. of Computer Science and Engineering, NTU (Taipei, Taiwan) Mar 2020 – Jan 2021
Research Assistant (advised by Prof. Chung-Wei Lin)

- Designed falsification algorithms for discrete, switch controllers compatible with various controller types including neural network-based.
- Designed verification algorithms for systems subject to weakly-hard fault models achieving state-of-the-art performance and easily extendable to system runtime monitoring.

* These authors contributed equally to this work

Dept. of Computer Science and Engineering, NTU (Taipei, Taiwan) Jun 2018 – Jan 2021
Research Assistant (advised by Prof. Hsuan-Tien Lin)

- Conducted research on investigating the relationship between learning and memorization for Generative Advesarial Networks (GANs) training.
- Conducted joint research with Kaggle on generative advesarial model performance metric design and successfully held the first-ever public large-scale generative modeling competition.
- Proposed novel deep learning model inspired by meteorology domain knowledge for tropical cyclone rapid intensification prediction using only satellite image data and achieved comparable performance.

Institute of Information Science, Academia Sinica (Taipei, Taiwan) Mar 2018 – Feb 2019
Research Assistant (advised by Prof. Wen-Lian Hsu)

- Improved algorithms for zero-anaphora rewriting in Chinese elementary school mathematics problems, achieving 85% accuracy.
- Designed novel algorithms for NLP syntactic sentence clustering with multi-labeled data based on recursive longest common sequence generation.

GRANTS AND FELLOWSHIP

Kaggle, Alphabet Inc. Jul 2019 – Aug 2019
Generative Adversarial Network Research Grant

- Funding for holding the Kaggle Generative Dog Images competition

Taiwan Ministry of Science and Technology (MOST) Jul 2019 – Feb 2020
MOST Research Grant for University Students

- Funding for tropical cyclone rapid intensification prediction resesarch

HONORS AND AWARDS

Dean's List Award for 6 semesters Sep 2016 – Jun 2020

- GPA ranked top 5% in the department.

WORK EXPERIENCE

Amazon (Palo Alto, California) Jun 2022 – Sep 2022
Applied Scientist Intern

- Implemented efficient factorization machine training and inferencing in C++ and merged into open source extreme multi-label classification library, PECOS.
- Conducted experiments on improving two-tower retrieval models by replacing typical inner product search with cross-attention methods (e.g. factorization machine).

WorldQuant Research LLC, Taiwan Branch (Taipei, Taiwan) Aug 2020 – Feb 2021
Quantitative Analysis Research Intern

- Conducted research on application of deep learning techniques on alpha design with robust performance.

Taiwan Artificial Intelligence Lab (Taipei, Taiwan) Jan 2019 – Aug 2019
Machine Learning Research Intern

- Experimented with techniques to improve object detection on medical images based on Retina-Unet.
- Experimented with sparse segmentation model in medical image annotation task and proposed modification to better detect soft boundaries. The models are now online in the largest hospitals in Taiwan.