

LITAO QIAO

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Available for a full-time internship from January 2024 with any start and end date

EDUCATION

PhD in Computer Engineering

University of California San Diego

- **Advisor:** Bill Lin / **Research interest:** explainable AI, statistical learning theory, logic synthesis

09/2020 – Present

La Jolla, CA

MS in Computer Science

University of California San Diego

- **GPA:** 3.714 / **Thesis:** Learning Accurate and Interpretable Decision Rule Sets from Neural Networks

01/2019 – 06/2020

La Jolla, CA

BS in Computer Engineering

University of California San Diego

- Overall GPA: 3.815 / Major GPA: 3.937

09/2015 – 12/2018

La Jolla, CA

EXPERIENCE

Graduate Student Researcher

Electrical and Computer Engineering Department, UCSD

- Conduct independent research study on the topic of explainable machine learning and deep learning. Examined a wide range of state-of-the-art explainable machine learning models, exploring their advantages and disadvantages by reading public source code and publications.
- Developed an agnostic method for explaining the decisions from black-box models by representing the decisions as tractable boolean circuits using Binary and Zero-suppressed Decision diagrams, from which the interpretable decision rules with the desired properties can be efficiently queried by the users.
- Improved the performance of the traditional Logic Minimization algorithm by a maximum of 10% as a supervised rule learning algorithm on the tabular datasets by proposing a rigorous statistical framework as a preprocessing mechanism. Work published at IEEE Transactions on Artificial Intelligence 2022.
- Designed an interpretable machine learning model by customizing a three-layer perceptron model where the explanation of the prediction can be readily extracted from the model. Experiments show that our methods beat other state-of-the-art interpretable machine learning methods by 3% on average.
- Proposed a novel multi-layer perceptron structure that can be directly mapped to a set of decision rules. A set of accurate and interpretable decision rules can be obtained by using traditional neural network training methods (SGD), which supersedes all other state-of-the-art rule learners in terms of accuracy-complexity trade-off. Work published at AAAI 2021.

04/2019 – Present

La Jolla, CA

Spark Teaching Assistant

Computer Science and Engineering Department, UCSD

- Perform individual and group tutoring for the online class Big Data Analytics Using Spark on Open edX by promptly answering student questions submitted through the online discussion forum.
- Provide guidance and feedback to students on their code and data analysis techniques, such as methods to optimize the efficiencies of the Spark programs for solving problems on large-scale datasets.
- Developed and delivered supplementary materials such as practice exercises, exam questions, study guides, and code examples

06/2019 – Present

La Jolla, CA

Data Analyst

David Kleinfeld Laboratory, UCSD

- Worked closely with many professors on building an automatic and interactive online mouse brain atlas alignment system using an interpretable machine learning method.
- Implemented new functionalities in an open-source web-based volume viewer Neuroglancer to facilitate the process of annotation on brain images, which saved our neuroscientists more than 20 hours per week on average.
- Designed new Python scripts to facilitate the pipelines used internally in the lab.

09/2019 – 09/2020

La Jolla, CA

PUBLICATIONS

- **Qiao, Litao**, Weijia Wang and Bill Lin. “Learning Accurate and Interpretable Decision Rule Sets from Neural Networks.” *AAAI Conference on Artificial Intelligence* (2021).
- **Qiao, Litao**, Weijia Wang, Sanjoy Dasgupta and Bill Lin. “Rethinking Logic Minimization for Tabular Machine Learning.” *IEEE Transactions on Artificial Intelligence* (2022).
- Wang, Weijia, **Litao Qiao** and Bill Lin. “Tabular Machine Learning Using Conjunctive Threshold Neural Networks.” *Machine Learning with Applications* (2022).
- Wang, Weijia, **Litao Qiao** and Bill Lin. “Disjunctive Threshold Networks for Tabular Data Classification.” *IEEE Open Journal of the Computer Society* 4 (2023): 185-194.
- **Qiao, Litao**, Weijia Wang and Bill Lin. “Alternative Formulations of Decision Rule Learning from Neural Networks.” *Mach. Learn. Knowl. Extr.* 5 (2023): 937-956.

SKILLS

Research / Machine Learning: Python, PyTorch, Numpy, Pandas, Scikit-learn, Spark, CVXPY, Z3, CUDD.

Software / Full Stack Web Development: JavaScript, HTML/CSS, Node.js, React.js, Java, C, C++, Android.

Technical Skills: AWS, Vim, Git, Unix Command, Microsoft Office, Photoshop.