KAIXIN ZHU

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EDUCATION

9/2021 - 6/2025 **Hong Kong Baptist University (Zhuhai campus)** Guangdong, China
B.S. in Artificial intelligence
· First class honors degree

PERSONAL PROFILE

I am pursuing an undergraduate degree in Artificial Intelligence at Hong Kong Baptist University, focusing on deep learning, computer vision, and third-generation neural networks (spiking neural networks). My current research goals are to advance and extend the applications of spiking neural networks and to explore transfer learning to inspire their greater potential. To deepen my research, I joined Dr Wentao Zhang's lab at the International Machine Learning Research Centre at Peking University as an intern.

As an undergraduate student, I am endeavoring to study and explore to continuously improve my knowledge and skills in the field of artificial intelligence. I participate in courses and projects, actively engage in academic discussions, and try collaborating with my peers to expand my research horizons and collaborative skills.

I am passionate about the development of AI science and want to contribute to the development and application of AI technology through continuous learning and practice. I have ambitions to become an influential AI researcher and hope to contribute to solving complex problems in the real world. I believe that through diligence and hard work, I can continue to grow in this rapidly evolving field and contribute positively to future research and innovation.

ACHIEVEMENTS

2024 **Undergraduate Group Provincial First Prize** Great Bay Area, China
Cross-Strait and Hong Kong-Macao College Student Computer Innovation Competition

2024 **Best Poster Award of Computer Science and Technology** University
The Twelfth Science & Technology Poster Presentation

2024 **Certificate of Achievement** Shenzhen, China
ICMLC2024 Oral Presentation

2023 **Best Poster Award** University
The First Computer Science Related Poster Exhibition

EXPERIENCE

4/2023 – 7/2023 **Medical Image Classification Task for Predicting Pneumonia Based on Chest X-ray Images** University
· Won the best poster award in the First Computer Science Related Poster Exhibition conducted by the university
· Independent research in a group project in the specialized course Machine Learning, using transfer learning to implement a medical image classification task to predict pneumonia based on chest X-ray images
`Tensorflow / Keras`

7/2023 – 9/2023 **Medical Image Classification Task for Predicting Monkey Pox Based on RGB Skin Images** University
· Followed by Professor Wentao Fan, continued research on medical image classification tasks in transfer learning and proposed a novel transfer learning framework.
· Co-first author of a paper accepted by the 2024 16th International Conference on Machine Learning and Computing.
· Completed an oral presentation as a presenter at ICMLC2024.
`Tensorflow / Keras`

7/2023 – 8/2023 **Fujian Face Network Technology Co.** Quanzhou, China
· Intern Engineer (Algorithm)
· Using the Acute Kidney Injury (AKI) dataset provided by the internship, the data was analysed and interpreted using big data techniques and classification algorithms were used to enable prediction of the prevalence of AKI based on underlying physical indicators.
`Pytorch / Hadoop / Spark`

| 9/2023 – now | **Guangdong Provincial Key Laboratory of Interdisciplinary Research and Application for Data Science (IRADS)** |
| | Zhuhai, China |

- Research student
- I formally joined Professor Wentao Fan Natural Science Foundation of Guangdong Province project team, the topic of which was the research on clustering algorithm of high-dimensional spherical data based on deep variational autoencoder, focusing on Spiking Neural Networks and Variational Auto-Encoder.

`Pytorch / Latex / Git`

| 9/2023 – 5/2024 | **Research on Spiking Neural Network** | University |

- Within the final project of our major course in Deep Learning, under the mentorship of Professor Wentao Fan, I collaborated with research partner to innovate upon the tokenizer architecture within the SNN-Transformer model. We introduced a novel concept: the Custom Advance-Membrane Shortcuts (AMS) blocks. This blocks are meticulously engineered to enhance the computational efficiency and performance of the model, while concurrently minimizing energy expenditure through an optimized residual connection design. The integration of AMS modules not only augments the model's capacity to process spike-timing encoded information but also refines the overall architecture by streamlining the pathways of information transfer.

`Pytorch / Spikingjelly`

PUBLICATIONS

PUBLICATION CONFERENCE PROCEEDINGS

Mpox-PyramidTransferNet: A Hierarchical Transfer Learning Framework for Monkeypox and Dermatological Disease Classification

Juanxi Tian[*], **Kaixin Zhu[*]**, Wentao Fan

Accepted by ICMLC '24: Proceedings of the 16th International Conference on Machine Learning and Computing, 2024

PRE-PUBLICATION CONFERENCE PROCEEDINGS

Spiking Graph Transformer: Bridging Energy Efficiency and Graph Data Processing with Spiking Neural Networks

Wenchuan Zhang, Juanxi Tian, **Kaixin Zhu**, Wentao Fan

Submit to the IEEE Transactions on Neural Networks and Learning Systems.

SKILLS

Programming: Python(Pandas, PyTorch, NumPy, Scikit-learn, etc.), R, Java, HTML, SQL.

Miscellaneous: Linux, LATEX (Overleaf/R Markdown), Microsoft Office, Git.

Soft Skills: Paper Graphics, Teamwork, Time Management, Communication, Presentation skills

LANGUAGES

English Professional proficiency (University education is all in English)

Mandarin Native proficiency

INTERESTS

Reading I enjoy going for various types of books to enrich my daily life and to add various types of knowledge.

Writing I like to try to do some writing in my downtime, such as poetry as well as prose.

Travel I love traveling on holiday to experience the life of different cities and the wonders of nature.

DETAILED INFORMATION

- **Mpox-PyramidTransferNet: A Hierarchical Transfer Learning Framework for Monkeypox and Dermatological Disease Classification**

Abstract: During the COVID-19 pandemic, the global immunity of human populations was adversely affected, posing threats for other contagious diseases. Monkeypox cases have surged recently, bringing new challenges to global public health. In this study, we propose Mpox-PyramidTransferNet, a novel hierarchical transfer learning architecture equipped with various attention mechanisms for accurate classification of monkeypox and other skin conditions. Our model takes advantage of the pyramid network composed of InceptionResnet-V2, ResNet152V2 and DenseNet121, which have been pre-trained on large-scale image recognition tasks, thereby extracting multi-scale features. The classification performance is further improved by the attention mechanisms. Furthermore, we fine-tune the model with monkeypox datasets. The performance of our proposed method is evaluated on the latest MSLDv2 dataset and compared with several state-of-the-art methods. Results show validation and classification accuracy of Mpox-PyramidTransferNet exceeds 98.5%, significantly outperforming other models.