Haoyang **Qin**

Machine Learning · High Performance Computing

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Education Background

I am currently studying in the Department of Intelligent Medical Engineering at Southern University of Science and Technology, under the guidance of assistant professor **Quanying Liu**. My overall GPA is **3.78/4** and my major ranking is **14/42**. In 2024, I participated in the summer school of the School of Computer Science at NUS and achieved an **A** grade.

Publication

Li, D., **Qin, H.**, Wu, M., Cao, Y., Wei, C., & Liu, Q (2024). RealMind: Zero-Shot EEG-Based Visual Decoding and Captioning Using Multi-Modal Models. arXiv preprint arXiv:2410.23754. **Submitted to ICASSP 2025**

Li, D., Wei, C., Li, S., Zou, J., **Qin, H**., & Liu, Q. (2024). Visual decoding and reconstruction via eeg embeddings with guided diffusion. arXiv preprint arXiv:2403.07721. **Accepted at NeuralPS 2024**

Research Experience

RealMind: Zero-Shot EEG-Based Visual Decoding and Captioning Using Multi-Modal Models

SUSTech NCClab

CO-AUTHOR *Jul. 2024 - Oct. 2024*

- **Introduction of RealMind:** RealMind is a novel EEG-based visual decoding framework that addresses the limitations of fMRI by leveraging multi-modal models to interpret semantic information efficiently.
- **Improved Decoding Performance:** By integrating semantic and geometric consistency learning, RealMind enhances feature alignment, achieving 58.42% Top-5 accuracy in a 200-way retrieval task and a 26.59% BLEU-1 score in a 200-way visual captioning task, marking the first successful zero-shot visual captioning using EEG data.
- **Advantages of RealMind:** RealMind offers a robust, adaptable, and cost-effective alternative to fMRI-based methods, providing scalable solutions for EEG-based visual decoding in practical applications.

Visual Decoding and Reconstruction via EEG Embeddings with Guided Diffusion

SUSTech NCClab

AUTHOR *Jun. 2024 - Jul. 2024*

- **EEG-based Visual Reconstruction Framework:** This study presents a novel EEG-based visual reconstruction zero-shot framework for decoding human vision, overcoming the limitations of fMRI in brain-computer interfaces (BCIs).
- **Two-stage EEG-to-Image Generation:** The framework incorporates a tailored brain encoder (Adaptive Thinking Mapper, ATM) and a two-stage multi-pipe EEG-to-image generation strategy, where EEG embeddings are aligned with high-level clip embeddings and refined into image priors using a diffusion model, followed by further refinement in a pre-trained diffusion model.
- **State-of-the-Art Performance:** Demonstrated on MEG data, the framework achieves state-of-the-art performance in classification, retrieval, and reconstruction, offering portability, low cost, and high temporal resolution, making it suitable for a wide range of BCI applications.

Honors & Awards

International

2024	**First Prize**, ASC Student Supercomputer Challenge	*Shanghai, China*
2024	**Finals**, Indy Student Clusters Competition	*Atlanta, U.S.A*
2023	**Second Place**, APAC HPC-AI Competition	*Sydney, Australia*

Domestic

2024	**Second Prize**, Guangdong Biomedical Engineering Competition	*Shenzhen, China*
2024	**First Prize**, Outstanding Student Scholarships	*Shenzhen, China*
2023	**Second Prize**, Outstanding Student Scholarships	*Shenzhen, China*

Presentation

China Biomedical Engineering Conference

Shenzhen, China

Presenter for <RealMind: Zero-Shot EEG-Based Visual Decoding and Captioning Using Multi-Modal> *2024*

- Briefly introduced the project background, implementation methods, and final results