Yangfan Deng

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Education

- **University of Pittsburgh**, *Pittsburgh*,*PA* — *2023 - present*
  M.S. in Electrical and Computer Engineering, Swanson School of Engineering — GPA: 3.93/4.00
- **Ocean University of China**, *Qingdao*, *Shandong*, *China* — *2018 - 2022*
  B.S. in Information and Computing Science, School of Mathematical Sciences — GPA: 3.42/4.00

Publications

[J1] **Yangfan Deng**, Hamad Albidah, Ahmed Dallal, JijunYin, and Zhi-Hong Mao, "Two-Stage Hierarchical and Explainable Feature Selection Framework for Dimensionality Reduction in Sleep Staging", **IEEE Transactions on Biomedical Engineering**, *currently under review*, submitted in August 2024. arXiv link: https://arxiv.org/abs/2409.00565.

[C1] **Yangfan Deng**, Hamad Albidah, Haoliang Cheng, Ahmed Dallal, JijunYin, and Zhi-Hong Mao, "UMAP for Dimensionality Reduction in Sleep Stage Classification Using EEG Data", **Proceedings of the 46th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC 2024)**, Orlando, Florida, USA, *accepted for publication*, July 2024.

[C2] **Yangfan Deng**, Lulu Wu, and Yong Zhao, "Robust Loss Functions for Object Grasping under Limited Ground Truth", **arXiv preprint**. arXiv link: https://arxiv.org/abs/2409.05742.

[C3] Ariel Yin, David Zhang, David Mao, Sichuang Li, Haoliang Cheng, **Yangfan Deng**, Yifan Guo, Helen Mao, Jijun Yin, and Zhi-Hong Mao, "Design concept of a wearable device for sleep related brain wave detection and stimulation", **Proceedings of the 4th IEEE International Conference on Data Science and Computer Application (ICDSCA 2024)**, Dalian, China, *accepted for publication*, October 2024.

[C4] Junjie Huang, **Yangfan Deng**, Qinghua Guo, Yizhou Xu, Qingtao Pan, and Yong Zhao, "Smile Recognition Based on Comprehensive Dataset Construction and Bayesian Neural Architecture Search", **Proceedings of 6th International Conference on Image and Graphics Processing (ICIGP 2023)**, Chongqing, China, *accepted for publication*, January 2023.

[C5] **Yangfan Deng**, Qinghua Guo, Yong Zhao, and Junji Xu, "A Lightweight Object Grasping Network using GhostNet", **Proceedings of 2nd International Workshop on Frontiers of Graphics and Image Processing (FGIP 2022)**, Beijing, China, *accepted for publication*, November 2022.

Research Experience

Topological and Interpretable Dimensionality Reduction Techniques for EEG Signal Analysis

Advisor: Professor Zhi-Hong Mao, University of Pittsburgh — *Sep. 2023 - present*

- **Topological and Spectro-temporal Analysis for Dimensionality Reduction Using EEG Signal**
  - Conducted Topological Data Analysis on EEG signals corresponding to different sleep stages to validate the effectiveness of topological features.
  - Designed an advanced analysis of EEG signals by extracting features using a combination of topological and spectro-temporal analysis techniques, providing feature candidates for dimensionality reduction algorithms.
  - Proposed a two-stage feature selection framework to enhance the performance of explainable dimensionality reduction algorithms.
  - The journal paper resulting from this project is currently under review by **IEEE Transactions on Biomedical Engineering**.
- **Interpretable Dimensionality Reduction Algorithms Using EEG Signal**
  - Applied algorithms with a strong mathematical foundation, such as UMAP, to EEG signals.
  - Achieved 2D visualization of EEG data and performed mathematical analysis and derivation of clustering results.
  - Led the progress of the project and efficiently collaborated with group members with different technical backgrounds.
  - Collaborated with Professor Mao to guide high school student David Zhang in completing his research project.
  - One conference paper resulting from this project has been accepted by **EMBC 2024**. Another conference paper has been accepted by **ICDSCA 2024**.

Innovative Approaches to Object Grasping and Recognition Based on Deep Learning

Advisor: Professor Yong Zhao, Ocean University of China — *Jun. 2021 - May. 2024*

- **Object Grasping Algorithm under Limited Condition**
  - Proposed two loss functions for grasping algorithms based on inaccurate or missing ground truth in training data, filling a gap in the field.
  - Enhanced the robustness of the grasping network under different conditions of missing and inaccurate training data.

- The conference paper resulting from this project has been posted on arXiv (planned submission for **CASA 2025**).

- **Lightweight Object Grasping Algorithm**
  - Proposed a new lightweight neural network for object grasping based on GhostNet, filling a gap in the field at that time.
  - Generate 2D grasp visualizations on RGB-D images, achieving a 94% grasp success rate.
  - The conference paper resulting from this project has been accepted by **FGIP 2022**.
- **Smile Recognition Based on Bayesian Methods**
  - Deployed Python web crawler to construct smile comprehensive dataset.
  - Cooperated to design the routine of the Bayesian classifier for smile recognition.
  - The conference paper resulting from this project has been accepted by **ICIGP 2023**.

Professional Experience

- **IBM**, AI Research Intern *Jun. 2021 - Sept. 2021*
  - Led a three-person intern team in Pressfit project to design algorithm and display results.
  - Designed a neural network to predict the deformation force during the Pressfit process.
  - Utilized IBM cloud, DB2 to establish a front-end platform to display the curve of press force.
  - Participated in defending the IBM patent applications.
  - Presented the internship defense to the Global Vice President of IBM Supply Chain and received the title of Outstanding Intern.
- **China Mobile**, Intern Assistant of Project Manager *Jan. 2019 - Feb. 2019*
  - Assisted the project manager in managing and ensuring the smooth operation of all departments involved in the project.
  - Participated in infrastructure construction of Wuhan Internet of Things Project, and promoted the adoption of smart home technology and healthcare solutions.
  - Contributed in the popularization of the base station in Hongshan District in Wuhan, and participated in deciding the layout of base station signal transmitters.

Honors

- Contemporary Undergraduate Mathematical Contest in Modeling (MCM): **Won the National Second Prize**, 2021
- MathorCup University Mathematical Modeling Challenge: **Won the Third Prize**, 2020
- Contemporary Undergraduate Mathematical Contest in Modeling (MCM): **Won the Second Prize in Shandong Province**, 2019
- First-Class Academic Scholarship: **GPA Top 5%**, 2019
- Mathematical Contest in Ocean University of China: **Won the Third Prize**, 2019

Academic Activities

- **Graduate School Summer Camp of Wuhan National Laboratory for Optoelectronics**
  Advisor: Professor Li Wang *Aug. 2021*
  - Gave a presentation at lectures on AI and smart manufacturing, and passed the interview defense of the Mechanical Artificial Intelligence group.
  - Won the Outstanding Camper Award (return offer).
- **Math Top Course Summer Program of Nanjing University**
  Advisor: Professor Qiang Zhang *Jul. 2019 - Sep. 2019*
  - Attended the numerical solutions of partial differential equations course, and passed the final course project defense.
  - Won the Outstanding Course Graduate Award (Top 10%).

Professional Skills

- Programming language: Python, C++, MATLAB, SQL.
- AI frameworks: PyTorch and TensorFlow.
- Language: Native in Chinese and fluent in English.