Hang-Cheng Dong

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Research Interests

My interests lie in explainable AI (XAI) and its applications. My research focuses on the understanding of deep learning, with the aim of advancing neural networks in mission-critical applications. Currently, my work has been shown to successfully improve the performance of deep learning in the areas of surface defect detection and bearing fault detection.

Education

Harbin Institute of Technology — Heilongjiang, China
PH.D. in Instrumentation Science and Technology — *Expected Jul 2023*

Harbin Institute of Technology — Heilongjiang, China
M.S. in Instrumentation Science and Technology — *Jul 2017 - Sept 2019*

Harbin Institute of Technology — Heilongjiang, China
B.S. in Instrumentation Science and Technology — *Jul 2013 - Sept 2017*

Publications

1. **Hangcheng Dong**, Jingxiao Liao, Yang Wang, Yixin Chen, Bingguo Liu, Dong Ye, Guodong Liu.
"Training neural networks for solving 1-D optimal piecewise linear approximation". Neurocomputing, 2022. [paper]
2. **Hangcheng Dong**, Bingguo Liu, Fupeng Wei, Fengdong Chen, Dong Ye and Guodong Liu.
"How to Explain Neural Networks: an Approximation Perspective". arXiv preprint arXiv:2105.07831v2, 2021. [arxiv]
3. Yang Xiao[#], **Hang-Cheng Dong**[#], Tieyong Zeng, Tinghao Ma, Feng-Lei Fan, Deng-Tao Yang.
"Predicting Propellant Properties of Boron-Based Hypergolic Ionic Liquids via Machine Learning". ChemRxiv, 2022. [ChemRxiv]
(# contributed equally to this work.)
4. Jing-Xiao Liao, Bo-Jian Hou, **Hang-Cheng Dong**, Hao Zhang, Jianwei Ma, Jinwei Sun, Shiping Zhang and Feng-Lei Fan.
"Heterogeneous Autoencoder Empowered by Quadratic Neurons". arXiv preprint arXiv:2204.01707, 2021. [arxiv]
5. Jing-Xiao Liao, **Hang-Cheng Dong**, Zhi-Qi Sun, Jinwei Sun, Shiping Zhang, Feng-Lei Fan.
"Attention-embedded Quadratic Network (Qttention) for Effective and Interpretable Bearing Fault Diagnosis". arXiv preprint arXiv:2206.00390, 2022. [arxiv]
6. Bingguo Liu, Zhuo Gao, Binghui Lu, **Hangcheng Dong**, Zeru An.
"SAL-CNN: Estimate the Remaining Useful Life of Bearings Using Time-frequency Information". arXiv preprint arXiv:2204.05045, 2022. [arxiv]

Projects

- **Theory and methods for mathematical interpretation of multi-layer intelligent recognition networks**: This project aims to provide an explanation of the deep neural networks used in the special applications towards improving the reliability of the model.

Awards and Honors

Graduate Scholarship 2017,2018
Top 10 Graduate Student Team of the Year 2021-2022

Computer Skills

- Deep Learning, Machine Learning, Image Processing
- Python, Matlab
- PyTorch, TensorFlow

Invited Talk

- Jing-Xiao Liao, **Hang-Cheng Dong**, Zhi-Qi Sun, Jinwei Sun, Shiping Zhang, Feng-Lei Fan. "Attention-embedded Quadratic Network (Qttention) for Effective and Interpretable Bearing Fault Diagnosis". At the 2nd International Highlevel Forum on High-end Measurement Instruments & 12th International Symposium on Precision Engineering Measurements and Instrumentation, Guilin, China, 8-10 August, 2022.

Academic Service

- Peer Reviewer: IEEE Transactions on Industrial Informatics