

# 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

*Ph.D. in Instrumentation Science and Technology*

Heilongjiang, China

*Expected Jul 2023*

### Harbin Institute of Technology

*M.S. in Instrumentation Science and Technology*

Heilongjiang, China

*Jul 2017 - Sept 2019*

### Harbin Institute of Technology

*B.S. in Instrumentation Science and Technology*

Heilongjiang, China

*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. 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](#)]
4. Jing-Xiao Liao, **Hang-Cheng Dong**, Zhi-Qi Sun, Jinwei Sun, Shiping Zhang, Feng-Lei Fan.  
"Attention-embedded Quadratic Network (Qtention) for Effective and Interpretable Bearing Fault Diagnosis". *arXiv preprint arXiv:2206.00390*, 2022. [[arxiv](#)]
5. 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 (Qtention) 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*