Pavlo Melnyk

Researcher, Linköping University

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EDUCATION

- PhD in Electrical Engineering with a specialization in Computer Vision (Machine Learning, Geometric Deep Learning)
  Advisor: Michael Felsberg
  Funded by Wallenberg AI, Autonomous Systems and Software Program (WASP)
  Computer Vision Laboratory, Linköping University, Linköping, Sweden
  WASP Graduate School, Sweden *August 2019 – September 2024*
  Thesis "Spherical NeurO(*n*)ns for Geometric Deep Learning"
- MEng in Computer Science and Technology
  Hunan University, Changsha, China *September 2016 – June 2019*
  Master's thesis "Deep Learning for Offline Handwritten Chinese Character Recognition"
- Bachelor's in Information Security Systems (Engineering)
  Donets'k National Technical University, Pokrovs'k, Ukraine *September 2012 – June 2016*

RESEARCH PUBLICATIONS

PEER-REVIEWED

- **Pavlo Melnyk**, Michael Felsberg, Mårten Wadenbäck, Andreas Robinson, Cuong Le (2024), "On Learning Deep O(*n*)-Equivariant Hyperspheres", *Proceedings of the 41st International Conference on Machine Learning,* **ICML 2024**, pp. 35324–35339
- **Pavlo Melnyk**, Andreas Robinson, Michael Felsberg, Mårten Wadenbäck (2024), "TetraSphere: A Neural Descriptor for O(3)-Invariant Point Cloud Analysis", *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition,* **CVPR 2024**, pp. 5620–5630
- **Pavlo Melnyk**, Michael Felsberg, Mårten Wadenbäck (2022) "Steerable 3D Spherical Neurons", *Proceedings of the 39th International Conference on Machine Learning*, **ICML 2022 (spotlight)**, pp. 15330-15339
- **Pavlo Melnyk**, Michael Felsberg, Mårten Wadenbäck (2021) "Embed Me If You Can: A Geometric Perceptron", *Proceedings 2021 IEEE/CVF International Conference on Computer Vision*, **ICCV 2021**, pp. 1256-1264
- **Pavlo Melnyk**, Zhiqiang You, Keqin Li (2020), "A High-Performance CNN Method for Offline Handwritten Chinese Character Recognition and Visualization", *Soft Computing*, volume 24, pages 7977–7987

PREPRINTS

- Qiyu Sun, **Pavlo Melnyk**, Michael Felsberg, Yang Tang (2023), "Learning to Augment: Hallucinating Data for Domain Generalized Segmentation", arXiv preprint arXiv:2307.01703

AWARDS AND HONORS

- Honorable mention, ICML Topological Deep Learning Challenge, 2023
- Award by Ministry of Science and Education of Ukraine, 2016: recipient (1/50) of the Chinese Government Scholarship to pursue a Master's in China
- Award by the Verkhovna Rada of Ukraine, 2014: recipient of a two-term stipend as recognition of excellent achievements in studies

TEACHING EXPERIENCE

TEACHING ASSISTANT

- Teaching conducted in English and Swedish
- Laboratory exercises in the Multidimensional Signal Analysis, Neural Networks and Deep Learning, and Computer Vision courses
- Lessons in the Signal- and Image-Processing course
- Course projects in the Computer Vision and CDIO (Conceive-Design-Implement-Operate) courses

SUPERVISOR OF MASTER'S THESES

- 18 Master's theses conducted at Computer Vision Laboratory (Linköping University) and Maxar, Saab, Qualcomm, Ericsson, Bosch, Wikipedia, RISE (Research Institute of Sweden), SICK, FOI (Swedish Defence Research Agency), and others

RESEARCH EXPERIENCE

- Computer Vision Laboratory, LiU, Linköping, Sweden *February 2024 – present*

  Researcher in a WASP-WISE collab. project with Mårten Wadenbäck and Jonas Björk as PIs

  - Developing an equivariant ML framework to be combined with DFT in a holistic approach enabling exploration of a broad range of materials and catalytic processes

- Computer Vision Laboratory, LiU, Linköping, Sweden *August 2019 – September 2024*

  Doctoral student advised by Michael Felsberg

  - Developed a geometric deep learning approach by injecting geometry into the network on the level of a single neuron, i.e., O(n)-equivariant neurons with spherical decision surfaces (spherical neurons)

- Key Laboratory of Embedded and Network Computing of Hunan Province, Hunan University, Changsha, China *December 2016 – June 2019*

  Master's student advised by Zhiqiang You

  - Developed a state-of-the-art CNN-based method for offline handwritten Chinese character recognition (3755 classes)

ADDITIONAL EXPERIENCE (selection)

- The DEMINE Foundation, London, UK deminefoundation.com *January 2023 – present*

  Co-founder, Head of Research

  - A not-for-profit organization with the main goal of developing ML-assisted humanitarian demining tools
  - Part of the ML team; assisting in the development and data collection/annotation; managing international connections

- Ukrainska Föreningen Östergötland, Linköping, Sweden ukrfo.se *March 2022 – present*

  Co-founder, Chairman

  - Current chairman at a non-profit (charitable) NGO conducting humanitarian and advocacy-related work to help Ukrainians and Ukraine

- UNESCO Youth Forum, Changsha, China *May 2018*

  Representative of Ukrainian students

LANGUAGES

- Ukrainian (native),
- English (full professional proficiency),
- Chinese (certified – HSK5 (advanced), 2019),
- Swedish (certified – C1 (advanced), 2021)

PROGRAMMING

- Currently use: Python, PyTorch, LaTeX, Git
- See code examples at github.com/pavlo-melnyk
- Other experience: TensorFlow, Keras, Theano, MATLAB

REVIEWING SERVICE

- European Conference on Computer Vision (ECCV), 2024
- IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2022, 2024
- International Conference on Learning Representations (ICLR), 2024
- IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), 2024
- International Conference on 3D Vision (3DV), 2024
- Conference on Neural Information Processing Systems (NeurIPS), 2021, 2023

INTERNATIONAL CONFERENCES

- ICML 2024 (published paper, poster presentation), CVPR 2024 (published paper, poster presentation), CVPR 2023 (visitor), ICML 2022 (published paper, spotlight), ICCV 2021 (published paper, poster)
- DeepLearn 2023 Summer (research presentation)

REFERENCES

- Prof. Dr. Michael Felsberg — michael.felsberg@liu.se
- Dr. Mårten Wadenbäck, Asst. Prof., Docent — marten.wadenback@liu.se
- Dr. Bastian Wandt, Asst. Prof. — bastian.wandt@liu.se