Miltiadis **Kofinas**

Deep Learning Research Scientist

Amsterdam, The Netherlands

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Education

PhD in Computer Science (Artificial Intelligence)

Amsterdam, The Netherlands

UvA (University of Amsterdam)

Apr. 2020 - June 2024 (expected)

- **Title**: Deep Future Spatio-temporal Forecasting
- **Supervisor**: Efstratios Gavves
- **Expected graduation**: September 2024

Diploma (M.Sc. equivalent) in Electrical and Computer Engineering

Thessaloniki, Greece

AUTh (Aristotle University of Thessaloniki)

Oct. 2010 - Nov. 2018

- **Specialization Field**: Electronics and Computer Engineering
- **GPA**: 7.57/10
- **ECTS**: 307
- **Thesis**: Scene Graph Generation using Message Passing Neural Networks and Graph Convolutional Networks
  - Supervisors: Postdoctoral research associate Christos Diou & Associate Professor Anastasios Delopoulos
  - Visual scene graph generation using an end-to-end neural network that incorporates a message passing neural network, propagating contextual information between objects and their relationships to iteratively refine its predictions, as well as a relationship pruning network that learns to identify and dismiss unlikely relationships.
  - Links to thesis: Greek (Original), English (Translated)

Research Experience

Research Assistant

Amsterdam, The Netherlands

University of Amsterdam

Mar. 2019 - May 2019

Project: Scene Graph Generation using Graph Transformer Networks

Supervisors: Assistant Professor Efstratios Gavves & Professor Cees G.M. Snoek

- Mathematical formulation of a novel abstract Graph Network layer for visual scene graph generation that explicitly utilizes both local and global information on the graph space.
- Experiments on various architectures to maximize relevant information propagation across graph vertices and edges.
- Implementation of a multilayer Graph Network that effectively stacks Graph Network layers to increase network performance.
- Use of global information via Transformer blocks that attentively gather global context.
- Introduction of a self-attentive relationship pruning network that effectively samples meaningful relationships.

Keywords: Visual Scene Graph Generation · Graph Neural Networks · Transformers · Graph Pruning

Computer Vision & Machine Learning Engineer

Thessaloniki, Greece

P.A.N.D.O.R.A. Robotics Team, Aristotle University of Thessaloniki

Oct. 2014 - Oct. 2015

- Development of a general-purpose image classification API using RGB-D sensor data to tackle victim detection.
  - Classification using a combination of HOG features, color histogram features from different color spaces (e.g. HSV, CIELab) and SIFT features with bag-of-words models.
  - Data augmentation using affine transformations, random sampling and color jittering.
  - Training and evaluation using support-vector machines (linear and non-linear), random forests and multilayer perceptrons.
- Motion detection using Gaussian mixture-based background/foreground segmentation algorithms.
- Soft obstacle detection from RGB-D sensor data using Haar wavelets and Hough transform.
- Hard obstacle detection from RGB-D sensor data using point cloud transformations for the creation of local elevation maps and various convolutional kernels for the creation of traversability maps.
- Development of a benchmark testing API for performance evaluation of computer vision algorithms under various environmental conditions (e.g. room lighting).

Keywords: Image Classification · Neural Networks · SVMs · Benchmarking · Motion Detection · Obstacle Detection

Technical Skills

Programming Languages	Python, C++, C, MATLAB/Octave, Java
Deep Learning Frameworks	PyTorch, TensorFlow
Deep Learning Libraries	PyTorch Geometric, PyTorch Lightning, WandB, Tensorboard, Hydra
Miscellaneous	Git, Linux, SLURM, LaTeX, TikZ, OpenCV, ROS

Publications

Conference Papers

- Yongtuo Liu, Sara Magliacane, Miltiadis Kofinas, and Efstratios Gavves. **Amortized Equation Discovery in Hybrid Dynamical Systems**.

In: *The Forty-first International Conference on Machine Learning (ICML)*. 2024 (ArXiv) (Github)

- Samuele Papa, Riccardo Valperga, David M. Knigge, Miltiadis Kofinas, Phillip Lippe, Jan-jakob Sonke, and Efstratios Gavves. **How to Train Neural Field Representations: A Comprehensive Study and Benchmark**. In: *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*. 2024 (ArXiv) (Github)
- Miltiadis Kofinas†, Boris Knyazev, Yan Zhang, Yunlu Chen, Gertjan J. Burghouts, Efstratios Gavves, Cees G.M. Snoek, and David W. Zhang†. **Graph Neural Networks for Learning Equivariant Representations of Neural Networks**. In: *12th International Conference on Learning Representations (ICLR)*. 2024 (ArXiv) (OpenReview) (Github) [Oral] †: Joint first and last authors
- Qi Huang†, Emanuele Mezzi†, Osman Mutlu†, Miltiadis Kofinas, Vidya Prasad, Shadnan Azwad Khan, Elena Ranguelova, and Niki van Stein. **Beyond the Veil of Similarity: Quantifying Semantic Continuity in Explainable AI**. in: *2nd World Conference on eXplainable Artificial Intelligence (XAI)*. 2024 †: Equal contribution
- Miltiadis Kofinas, Erik J. Bekkers, Naveen Shankar Nagaraja, and Efstratios Gavves. **Latent Field Discovery in Interacting Dynamical Systems with Neural Fields**. In: *Advances in Neural Information Processing Systems 36 (NeurIPS)*. 2023 (ArXiv) (OpenReview) (Github)
- Yongtuo Liu, Sara Magliacane, Miltiadis Kofinas, and Efstratios Gavves. **Graph Switching Dynamical Systems**. In: *The Fortieth International Conference on Machine Learning (ICML)*. 2023 (ArXiv) (Github)
- Miltiadis Kofinas, Naveen Shankar Nagaraja, and Efstratios Gavves. **Roto-translated Local Coordinate Frames For Interacting Dynamical Systems**. In: *Advances in Neural Information Processing Systems 34 (NeurIPS)*. 2021 (ArXiv) (OpenReview) (Github)

Workshop Papers

- Aviv Shamsian†, David W. Zhang†, Aviv Navon, Yan Zhang, Miltiadis Kofinas, Idan Achituve, Riccardo Valperga, Gertjan Burghouts, Efstratios Gavves, Cees Snoek, Ethan Fetaya, Gal Chechik, and Haggai Maron. **Data Augmentations in Deep Weight Spaces**. In: *Workshop on Symmetry and Geometry in Neural Representations (NeurReps), NeurIPS*. 2023 (ArXiv) [Oral] †: Equal contribution
- Samuele Papa, David M. Knigge, Riccardo Valperga, Nikita Moriakov, Miltiadis Kofinas, Jan-jakob Sonke, and Efstratios Gavves. **Neural Modulation Fields for Conditional Cone Beam Neural Tomography**. In: *SynS and ML Workshop, International Conference on Machine Learning (ICML)*. 2023 (ArXiv)
- David W. Zhang, Miltiadis Kofinas, Yan Zhang, Yunlu Chen, Gertjan J. Burghouts, and Cees G.M. Snoek. **Neural Networks Are Graphs! Graph Neural Networks for Equivariant Processing of Neural Networks**. In: *Workshop on Topology, Algebra, and Geometry in Machine Learning (TAG-ML), ICML*. 2023 (OpenReview)
- Piyush Bagad†, Floor Eijkelboom†, Mark Fokkema†, Danilo de Goede†, Paul Hilders†, and Miltiadis Kofinas. **C-3PO: Towards Rotation Equivariant Feature Detection and Description**. In: *3rd Visual Inductive Priors for Data-Efficient Deep Learning Workshop*. 2022 (OpenReview) [Oral] †: Equal contribution
- Miltiadis Kofinas, Erik J. Bekkers, Naveen Shankar Nagaraja, and Efstratios Gavves. **Neural Fields for Latent Force Field Discovery in Interacting Systems**. In: *ICLR 2023 Neural Fields across Fields Workshop*. 2023

Teaching Experience

Teaching Assistant

Machine Learning I	University of Amsterdam, MSc AI	*2020, 2021*
Deep Learning	University of Amsterdam, MSc AI	*2020*
Deep Learning II	University of Amsterdam, MSc AI	*2022, 2023*

Thesis Supervision

Daniël (Stijn) Hamerslag — *University of Amsterdam, BSc AI*
Driving on Data, Object Detection in Urban Driving Scenes — *Oct. 2020 - Jan. 2021*

Daniel Perez Jensen — *University of Amsterdam, MSc AI*
Predicting River Flow in Atacama Region Watersheds — *Nov. 2021 - July 2022*

Victor Kyriakou — *University of Amsterdam, MSc AI*
Equivariant Trajectory Forecasting with Latent Orientation Graph Networks — *Nov. 2022 - July 2023*

Talks

Learning on Graphs Conference Amsterdam Meetup — *Elsevier, Amsterdam*
Neural Networks are Graphs! Graph Neural Networks for Equivariant Processing of Neural Networks — *29 November, 2023*

Geometric Deep Learning Study Visit — *Vrije Universiteit, Amsterdam*
Roto-translated Local Coordinate Frames For Interacting Dynamical Systems — *2 June, 2022*

Amsterdam Applied ML Meetup — *Hyperion Lab, Amsterdam*
Roto-translated Local Coordinate Frames For Interacting Dynamical Systems — *6 Apr, 2022*

LoGaG: Learning on Graphs and Geometry Reading Group — *Virtual*
Roto-translated Local Coordinate Frames For Interacting Dynamical Systems — *1 Feb, 2022*

– Recording (YouTube)

Honors & Awards

2nd Best Autonomous Robot, Robocup Rescue Competition — *Hefei, China*
P.A.N.D.O.R.A. Robotics Team — *July 2015*

Languages

Greek	Native Language	
English	Certificate of Proficiency in English, University of Michigan	*Level C2*
French	Diplôme d'études en langue française B2, Centre international d'études pédagogiques (CIEP)	*Level B2*

Academic References

Available upon request.