

# 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

- 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, CIE Lab) 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

### Reviewer

I have served as reviewer for the following venues: [LoG 2023](#), [NeurIPS 2023](#), [CVPR 2023](#), [ICLR 2023](#), [LoG 2022](#), [CDS 2022](#), [CVIU 2022](#), [PAMI 2022](#), [ICML 2021](#), [ECCV 2020](#).

## 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, L<sup>A</sup>T<sub>E</sub>X, 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 Rangelova, 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 Moriaikov, 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

|                           |                                 |            |
|---------------------------|---------------------------------|------------|
| <b>Machine Learning I</b> | University of Amsterdam, MSc AI | 2020, 2021 |
| <b>Deep Learning</b>      | University of Amsterdam, MSc AI | 2020       |
| <b>Deep Learning II</b>   | University of Amsterdam, MSc AI | 2022, 2023 |

### THESIS SUPERVISION

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| <b>Daniël (Stijn) Hamerslag</b><br>DRIVING ON DATA, OBJECT DETECTION IN URBAN DRIVING SCENES        | University of Amsterdam, BSc AI<br>Oct. 2020 - Jan. 2021 |
| <b>Daniel Perez Jensen</b><br>PREDICTING RIVER FLOW IN ATACAMA REGION WATERSHEDS                    | University of Amsterdam, MSc AI<br>Nov. 2021 - July 2022 |
| <b>Victor Kyriakou</b><br>EQUIVARIANT TRAJECTORY FORECASTING WITH LATENT ORIENTATION GRAPH NETWORKS | University of Amsterdam, MSc AI<br>Nov. 2022 - July 2023 |

## Talks

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| <b>Learning on Graphs Conference Amsterdam Meetup</b><br>NEURAL NETWORKS ARE GRAPHS! GRAPH NEURAL NETWORKS FOR EQUIVARIANT PROCESSING OF NEURAL NETWORKS | Elsevier, Amsterdam<br>29 November, 2023      |
| <b>Geometric Deep Learning Study Visit</b><br>ROTO-TRANSLATED LOCAL COORDINATE FRAMES FOR INTERACTING DYNAMICAL SYSTEMS                                  | Vrije Universiteit, Amsterdam<br>2 June, 2022 |

## Amsterdam Applied ML Meetup

ROTO-TRANSLATED LOCAL COORDINATE FRAMES FOR INTERACTING DYNAMICAL SYSTEMS

 [Hyperion Lab, Amsterdam](#)

6 Apr, 2022

## LoGaG: Learning on Graphs and Geometry Reading Group

ROTO-TRANSLATED LOCAL COORDINATE FRAMES FOR INTERACTING DYNAMICAL SYSTEMS

 [Virtual](#)

1 Feb, 2022

— [Recording \(YouTube\)](#)

## Honors & Awards

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### 2nd Best Autonomous Robot, Robocup Rescue Competition

P.A.N.D.O.R.A. ROBOTICS TEAM

 [Hefei, China](#)

July 2015

## Languages

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**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

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Available upon request.