

Miltiadis Kofinas

DEEP LEARNING RESEARCH SCIENTIST

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Education

PhD in Computer Science

Amsterdam, The Netherlands

UvA (UNIVERSITY OF AMSTERDAM)

April 2020 - present

- Title: Deep Future Spatio-temporal Forecasting
- Supervisor: Efstratios Gavves

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

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 (see Diploma Thesis)

Research Experience

Scene Graph Generation using Graph Transformer Networks

University of Amsterdam

RESEARCH ASSISTANT · SUPERVISORS: ASSISTANT PROFESSOR EFSTRATIOS GAWVES & PROFESSOR CEES G.M. SNOEK

Mar. 2019 - May 2019

- 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.

P.A.N.D.O.R.A. Robotics Team

Aristotle University of Thessaloniki

COMPUTER VISION & MACHINE LEARNING ENGINEER

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).

Diploma Thesis

Scene Graph Generation using Message Passing Neural Networks and Graph Convolutional Networks

Aristotle University of Thessaloniki

SUPERVISORS: POSTDOCTORAL RESEARCH ASSOCIATE CHRISTOS DIOU & ASSOCIATE PROFESSOR ANASTASIOS DELOPOULOS

May 2017- Oct. 2018

- Image semantic content representation using scene graphs that model objects and their relationships.
- Scene graph generation using an end-to-end model that incorporates a message passing scheme, propagating contextual information between objects and their relationships to iteratively refine its predictions.
- Experiments on message propagation architectures, including a modified version of Graph Convolutional Networks.
- Introduction of a relationship pruning network that learns to identify and dismiss unlikely relationships.
- Performance evaluation on scene graph generation and other auxiliary evaluation tasks using Visual Genome dataset.

Links to thesis:

- [Greek \(Original\)](#), [English \(Translated\)](#)

Technical Skills

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| Programming Languages | Python, C++, C, MATLAB/Octave, Java |
| Deep Learning Frameworks | PyTorch, TensorFlow |
| Deep Learning Tools | PyTorch Lightning, PyTorch Geometric, WandB, Tensorboard, Hydra |
| Computer Vision Libraries | OpenCV |
| Robot Software Development Frameworks | ROS |

Publications

CONFERENCE PAPERS

- **Miltiadis Kofinas**, Boris Knyazev, Yan Zhang, Yunlu Chen, Gertjan J Burghouts, Efstratios Gavves, Cees GM Snoek, and David W Zhang. “Graph Neural Networks for Learning Equivariant Representations of Neural Networks”. In: *12th International Conference on Learning Representations (ICLR)*. 2024 ([OpenReview](#)) [[Oral](#)]
- **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: *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](#)]
- 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 GM 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](#)]
- **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

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|---|---------------------------------|
| 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

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| 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 |
| – Slides | |
| Amsterdam Applied ML Meetup | Hyperion Lab, Amsterdam |
| ROTO-TRANSLATED LOCAL COORDINATE FRAMES FOR INTERACTING DYNAMICAL SYSTEMS | 6 Apr, 2022 |
| – Slides | |

Honors & Awards

2nd Best Autonomous Robot

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

Robocup Rescue Competition, Hefei, China

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.