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: Professor Cees G.M. Snoek & Assistant Professor Efstratios Gavves *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, 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).

Diploma Thesis

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

Aristotle University of Thessaloniki

Supervisors: Associate Professor Anastasios Delopoulos & Postdoctoral research associate Christos Diou *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

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

- **Kofinas**, **Miltiadis**, Bekkers, Erik J, Nagaraja, Naveen Shankar, and Gavves, Efstratios. "Latent Field Discovery in Interacting Dynamical Systems with Neural Fields". In: *Advances in Neural Information Processing Systems 36 (NeurIPS)*. 2023 (Github)
- Liu, Yongtuo, Magliacane, Sara, **Kofinas**, **Miltiadis**, and Gavves, Efstratios. "Graph Switching Dynamical Systems". In: *International Conference on Machine Learning (ICML)*. 2023 (ArXiv) (Github)
- **Kofinas**, **Miltiadis**, Nagaraja, Naveen Shankar, and Gavves, Efstratios. "Roto-translated Local Coordinate Frames For Interacting Dynamical Systems". In: *Advances in Neural Information Processing Systems 34 (NeurIPS)*. 2021 (ArXiv) (OpenReview) (Github)

Workshop Papers

- Papa, Samuele, Knigge, David M., Valperga, Riccardo, Moriakov, Nikita, **Kofinas**, **Miltiadis**, Sonke, Jan-jakob, and Gavves, Efstratios. "Neural Modulation Fields for Conditional Cone Beam Neural Tomography". In: *SynS and ML Workshop, International Conference on Machine Learning (ICML)*. 2023 (ArXiv)
- Zhang, David W, **Kofinas**, **Miltiadis**, Zhang, Yan, Chen, Yunlu, Burghouts, Gertjan J, and Snoek, Cees GM. "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)
- Bagad†, Piyush, Eijkelboom†, Floor, Fokkema†, Mark, Goede†, Danilo de, Hilders†, Paul, and **Kofinas**, **Miltiadis**. "C-3PO: Towards Rotation Equivariant Feature Detection and Description". In: *3rd Visual Inductive Priors for Data-Efficient Deep Learning Workshop*. 2022 (OpenReview)
- **Kofinas**, **Miltiadis**, Bekkers, Erik J, Nagaraja, Naveen Shankar, and Gavves, Efstratios. "Neural Fields for Latent Force Field Discovery in Interacting Systems". In: *ICLR 2023 Neural Fields across Fields Workshop*. 2023

Preprints

- **Kofinas**, **Miltiadis**, Bekkers, Erik J, Nagaraja, Naveen Shankar, and Gavves, Efstratios. "Neural Fields Discovery Disentangles Equivariance in Interacting Dynamical Systems". In: *Preprint*. 2022 (OpenReview)

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

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

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

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.