

# 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, 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: 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

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

## Publications

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### 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 ([ArXiv](#)) ([OpenReview](#)) ([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

- Shamsian†, Aviv, Zhang†, David W, Navon, Aviv, Zhang, Yan, **Kofinas, Miltiadis**, Achituve, Idan, Valperga, Riccardo, Burghouts, Gertjan, Gavves, Efstratios, Snoek, Cees, Fetaya, Ethan, Chechik, Gal, and Maron, Haggai. “Data Augmentations in Deep Weight Spaces”. In: *Workshop on Symmetry and Geometry in Neural Representations (NeurReps), NeurIPS*. 2023 ([ArXiv](#))
- 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

## Teaching Experience

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### TEACHING ASSISTANT

|                           |                                 |                                 |
|---------------------------|---------------------------------|---------------------------------|
| <b>Machine Learning I</b> | University of Amsterdam, MSc AI | <a href="#">2020 &amp; 2021</a> |
| <b>Deep Learning</b>      | University of Amsterdam, MSc AI | <a href="#">2020</a>            |
| <b>Deep Learning II</b>   | University of Amsterdam, MSc AI | <a href="#">2022 &amp; 2023</a> |

### THESIS SUPERVISION

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

## Talks

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| <b>Geometric Deep Learning Study Visit</b>                                | <a href="#">Vrije Universiteit, Amsterdam</a> |
| ROTO-TRANSLATED LOCAL COORDINATE FRAMES FOR INTERACTING DYNAMICAL SYSTEMS | <a href="#">2 June, 2022</a>                  |
| – <a href="#">Slides</a>  |   |
| <b>Amsterdam Applied ML Meetup</b>  | <a href="#">Hyperion Lab, Amsterdam</a>       |
| ROTO-TRANSLATED LOCAL COORDINATE FRAMES FOR INTERACTING DYNAMICAL SYSTEMS | <a href="#">6 Apr, 2022</a>                   |
| – <a href="#">Slides</a>  |   |
| <b>LoGaG: Learning on Graphs and Geometry Reading Group</b>               | <a href="#">Virtual</a>                       |
| ROTO-TRANSLATED LOCAL COORDINATE FRAMES FOR INTERACTING DYNAMICAL SYSTEMS | <a href="#">1 Feb, 2022</a>                   |
| – <a href="#">Video</a> , <a href="#">Slides</a>                          |   |

## Honors & Awards

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### 2nd Best Autonomous Robot

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

*Robocup Rescue Competition, 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.