CURRICULUM VITAE

Massimiliano Patacchiola, PhD

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Date of birth	---
Citizenship	Italian (with UK settled status - indefinite leave to remain)

Profile

Postdoctoral fellow at the University of Cambridge, Machine Learning Group. New methods for efficient deep learning, with "efficient" meaning: less data, less supervision, less computation. *Research interests*: deep learning (few-shot, continual, and self-supervised learning), Bayesian methods (Gaussian Processes, meta-learning), robotics (perception, decision making).

Research Experience

2021-Present — Postdoctoral Researcher. University of Cambridge, Department of Engineering.
Member of the *"Machine Learning Group (MLG)"*. Working in collaboration with Microsoft Reasearch on the EPSRC prosperity grant "Machine Learning for Tomorrow" with the aim of developing efficient, flexible, and robust methods for real-world applications (http://mlg.eng.cam.ac.uk)
Supervisor: Richard Turner

2018-2021 — Postdoctoral Researcher. University of Edinburgh, School of Informatics.
Member of the *"Bayesian and Neural Systems"* group. Research project on efficient learning in deep neural networks (funded by Huawei). Gaussian Processes for Bayesian meta-learning, robust few-shot learning in realistic scenarios (e.g. online and with class imbalance), unsupervised learning via self-supervised relational reasoning. The work produced in this period has been published in top-tier machine learning conferences, e.g. NeurIPS with spotlight (www.bayeswatch.com)
Supervisor: Amos Storkey

2018 — Intern. Snapchat, London/Los Angeles (June-August).
Member of the *"Camera Platform"* team. Working on the disentanglement of latent representations in deep generative models for applications such as style transfer and manipulation of image attributes. Published in a journal (www.snapchat.com)
Supervisors: Edward Rosten, Patrick Fox-Roberts

2011-2012 Intern. Institute of Cognitive Sciences and Technologies, Rome, Italy.
Member of the *"Laboratory of Artificial Life and Robotics (LARAL)"*. Working on evolutionary robotics, neural networks, and multi-agent systems. Results presented and defended in the master dissertation (http://laral.istc.cnr.it)
Supervisor: Domenico Parisi

2008-2009 Placement. La Sapienza University, Rome, Italy.
Member of the *"Research Centre for Cognitive Elaboration on Natural and Artificial Systems"*. Research project on visual perception and memory. Results presented and defended in the bachelor dissertation (https://web.uniroma1.it/econa)

Work/Teaching Experience

2015-2018 Teaching assistant and demonstrator. University of Plymouth, United Kingdom.
Preparation and presentation of individual lessons on Deep Learning, Bayesian Networks and Robotics. Students coordinator during the practical sessions of the following courses: Artificial Intelligence and Computational Theory, Parallel Computation and Distributed Systems, Robotics and Electronics.

2012-2015 Robotics Engineer (R&D Skunkworks). Eurolink Systems, Rome, Italy.
Design and implementation of algorithms for the control of UGV (Unmanned Ground Vehicle) and UAV (Unmanned Aerial Vehicle) for critical applications such as bomb disposal. Integration of ROS (Robotic Operating System) and SLAM (Simultaneous Localization And Mapping) for autonomous navigation. Design of a micro tethered drone tested by the Italian Army for missions of search-and-rescue and patrolling.
(www.eurolinksystems.com)

Education

2015-2018 PhD in *"Machine Learning and Robotics"*. University of Plymouth, School of Computing, Electronics and Mathematics. United Kingdom.
Project THRIVE (Trust in Human-Robot Interaction), funded by the US Air Force. Effective machine learning methods for human-robot interaction via inference of user's intentions. At the time of writing, the core contribution of this work has been cited >160 times, the repository has 1500 stars and 400 forks on GitHub.
Supervisors: Angelo Cangelosi, Torbjorn Dahl, Giorgio Metta

2009-2011 MSc in *"Neuroscience"*. La Sapienza University. Rome, Italy.
Main subjects: artificial and biological neural networks, cognitive models, advanced statistics, neurobiology. Dissertation title: Artificial neural networks for body perception in simulated robots.
Supervisors: Stefano Puglisi Allegra, Gianluca Baldassarre, Domenico Parisi

2006-2009 BSc in *"Experimental Cognitive Psychology"*. La Sapienza University. Rome, Italy.
Main subjects: scientific methodology, statistics, probability theory, analysis of cognitive processes, neurobiology and genetics. Dissertation title: Effects of perceptual load on visual search and visuospatial memory tasks.
Supervisor: Marta Olivetti Belardinelli

1999-2004	Secondary School. Scientific Course: National Plan of Computer Science. Rieti,Italy. It gives entry to university. Main subjects: mathematics (linear algebra, pre-calculus, calculus), physics, computer science, biology, English, French.

Technical Skills

Machine Learning	-Extensive programming experience (~2 years) with PyTorch and TensorFlow. -Solid experience with the most recent deep learning techniques: fully-supervised architectures (ResNet, ResNeXt, WideResNet, DenseNet, etc), meta-learning (MAML, Protonets, etc), self-supervised learning (SimCLR, RotationNet, DeepCluster, etc), generative models (GANs, VAEs), probabilistic models (Gaussian Processes, Deep Kernels, Mixture Density Networks). -Experience with a variety of machine learning algorithms (regression, clustering), genetic algorithms, reinforcement learning (Q-learning, SARSA, Deep RL), density estimation (Gaussian Mixture Models).
Robotics	-Development of libraries for the control of humanoid robots (Aldebaran NAO, iCub, Scitos G5), drones and autonomous ground rover. -Experience with the most important software tools for Robotics: ROS, YARP, NAOqi, Choregraphe, OpenAI Gym. -Experience with the computer vision library OpenCV for object detection and tracking, pose estimation. -Experience in developing basic web interfaces (HTML, PHP and JavaScript) and graphical user interfaces (Qt, pyQt, Visual Studio) for robot control . -Hands on experience with LIDAR, stereo-cameras, perception sensors, actuators.
IT	-Proficiency in Python (~5 years, primary language). -Past exposure to several programming languages such as C/C++, C#, Java, Visual Basic, HTML, PHP, JavaScript, tools for source code management (GitHub). -Daily usage of Unix OS (~10 years) and related tools (Shell, Bash scripting, SSH).

Languages

Italian: native speaker; English: advanced; French: intermediate

Awards, Fellowships and Scholarships

06-2020	Distinguished Service Award as an Outstanding Reviewer for the IEEE Robotics and Automation Letters (RA-L). Announced at ICRA 2020 award ceremony. [link]
2018-present	Associate Fellowship, Higher Education Academy (HEA). Programme that supports early career researchers who have responsibility for teaching and learning.
01-2016	Associate Fellowship, Marie Sklodowska-Curie programme. Project APRIL (Applications of Personal Robotics for Interaction and Learning).
2012-present	Member, Mensa International. Society for people with high intelligence quotient.

2006-2011 Scholarship, Laziodisu. Grant for university students which every year offers a limited number of scholarships based on accademic merit.

Talks, Conferences, Workshops, Media

29-09-2020 (Invited Speaker) “Bayesian meta-learning for the few-shot setting”. Huawei Russian Research Institute, Nizhny Novgorod Research Center. Workshop on Deep Learning/ Machine Learning for Computer Vision.

08-05-2020 (Invited Speaker) “Benchmarking Continual Few-Shot Learning”. Presentation at the ContinualAI group [YouTube]

10-01-2020 (Organizer) University of Edinburgh, Informatics workshop (~40 participants).

27-07-2017 (Extra) BBC documentary. Hyper Evolution: Rise of the Robots. Episode 1 and 2, the iCub humanoid robot at CRNS lab.

17-02-2017 (Organizer) University of Plymouth, Robotics Hackathon (~20 paricipants).

18-10-2016 (Participant) Hackathon, robot at your service. European robotics week. Amsterdam.

2015-present (Reviewer) NeurIPS (2020, 2021), ICLR (2021, 2022), AISTATS (2019), ICRA (2018), IROS (from 2017 to 2021), IEEE RA-L (2019).

Grants

2020 Huawei grant (obtained). Assisted prof. Amos Storkey at University of Edinburgh in writing a grant on efficient deep learning for Huawei research funding.

2016 US Air Force Office of Scientific Research (~500K£, obtained). Assisted prof. Angelo Cangelosi at University of Manchester in writing a grant for the project Trust in Human-Robot Interacton via Embodiment and Theory of Mind (THRIVE++).

2016 Academic Hardware Grant, NVIDIA corporation (~5K$, obtained). Applied and received a Tesla K40 GPU in support of a project on head pose estimation via convolutional neural networks.

Publications [scholar profile]

Peer-review conferences

Bronskill*, J., Massiceti*, D., **Patacchiola*, M.**, Hofmann, K., Nowozin, S., & Turner, R.E. (2021). “Memory Efficient Meta-Learning with Large Images”. *Advances in Neural Information Processing Systems (NeurIPS). *Co-first authors.* [arXiv]

Sendera, M., Tabor, J., Nowak, A., Bedychaj, A., **Patacchiola, M.**, Trzcinski, T., Spurek, P., & Zieba, M. (2021). “Non-Gaussian Gaussian Processes for Few-Shot Regression”. *Advances in Neural Information Processing Systems (NeurIPS).*

Patacchiola, M., Turner, J., Crowley, E. J., O'Boyle, M., Storkey, A. (2020). "Bayesian Meta-Learning for the Few-Shot Setting via Deep Kernels". *Advances in Neural Information Processing Systems (NeurIPS).* Spotlight (top 3%). [arXiv] [GitHub] [Poster]

Patacchiola, M., Storkey, A. (2020). "Self-Supervised Relational Reasoning for Representation Learning". *Advances in Neural Information Processing Systems (NeurIPS).* Spotlight (top 3%). [arXiv] [GitHub] [Poster]

Ochal, M., **Patacchiola, M.**, Vazquez, J., Storkey, A., & Wang, S. (2021). "How Sensitive are Meta-Learners to Dataset Imbalance?". *International Conference on Learning Representations (ICLR), Learning to Learn Workshop*. [arXiv]

Antoniou, A., **Patacchiola, M.**, Ochal, M., & Storkey, A. (2020). "Defining Benchmarks for Continual Few-Shot Learning". *Advances in Neural Information Processing Systems (NeurIPS), Workshop on Meta-Learning.* [arXiv] [YouTube]

Thabet, M., **Patacchiola, M.**, & Cangelosi, A. (2019). "Sample-efficient Deep Reinforcement Learning with Imaginary Rollouts for Human-Robot Interaction". *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. [arXiv]

Zanatto, D., **Patacchiola, M.**, Goslin, J., Thill, S., & Cangelosi, A. (2020). "Do humans imitate robots? An investigation of strategic social learning in human-robot interaction". *ACM/IEEE International Conference on Human-Robot Interaction (HRI)*.

Polvara* R., **Patacchiola* M.**, Sharma, S., Wan J., Manning, A., Sutton R., Cangelosi, A. (2018) "Toward End-To-End Control for UAV Autonomous Landing Via Deep Reinforcement Learning". *International Conference on Unmanned Aircraft Systems (ICUAS)*. *Co-first authors. [PDF]

Surace, L., **Patacchiola, M.**, Battini Sonmez, E., Spataro, W. Cangelosi, A. (2017). "Emotion Recognition in the Wild using Deep Neural Networks and Bayesian Classifiers". *Emotion Recognition in the Wild (EmotiW) Challenge*. [arXiv]

Zanatto, D., **Patacchiola, M.**, Goslin, J., Cangelosi, A. (2016). "Priming antropomorphism: Can the credibility of humanlike robots be transferred to non-humanlike robots?". *ACM/IEEE International Conference on Human Robot Interaction (HRI)*. [PDF]

Patacchiola, M., Cangelosi, A. (2016). "A Developmental Bayesian Model of Trust in Artificial Cognitive Systems". *International Conference on Development and Learning on Epigenetic Robotics (ICDL-EpiRobt)*. [PDF]

Journal articles

Patacchiola, M., Fox-Roberts, P., & Rosten, E. (2020). "Y-Autoencoders: disentangling latent representations via sequential-encoding". *Pattern Recognition Letters*, vol. 70, pp. 59-65. [arXiv] [DOI]

Patacchiola, M., & Cangelosi, A. (2020). "A Developmental Cognitive Architecture for Trust and Theory of Mind in Humanoid Robots". *IEEE Transactions on Cybernetics*. [DOI]

Polvara*, R., **Patacchiola*, M.**, Hanheide, M., & Neumann, G. (2020). "Sim-to-Real quadrotor landing via sequential deep Q-Networks and domain randomization". *Robotics*, 9(1), 8. *Co-first

authors. [PDF]

Zanatto, D., **Patacchiola, M.**, Goslin, J., & Cangelosi, A. (2019). “Investigating cooperation with robotic peers”. *PloS one*, 14(11).

Zanatto, D., **Patacchiola, M.**, Cangelosi, A., & Goslin, J. (2019). “Generalisation of Anthropomorphic Stereotype”. *International Journal of Social Robotics*, 1-10.

Vinanzi, S., **Patacchiola, M.**, Chella, A., Cangelosi, A. (2019), “Would a Robot Trust You? Developmental Robotics Model of Trust and Theory of Mind”. *Royal Society of London. Philosophical Transactions B. Biological Sciences.* [PDF]

Patacchiola, M., Cangelosi, A. (2017). “Head Pose Estimation in the Wild using Convolutional Neural Networks and Adaptive Gradient Methods”. *Pattern Recognition*, vol. 71, pp. 132-143. [PDF] [GitHub]

Paglieri, F., Parisi D., **Patacchiola, M.**, Petrosino, G. (2015). “Investigating intertemporal choice trough experimental evolutionary robotics”. *Behavioural Processes*, vol. 115, pp. 1-18. [PDF]

Technical reports

Polvara* R., **Patacchiola* M.**, Sharma, S., Wan J., Manning, A., Sutton R., Cangelosi, A. (2019). “Autonomous Quadrotor Landing using Deep Reinforcement Learning”. *Co-first authors, [arXiv]

Under review

Ochal, M., **Patacchiola, M.**, Vazquez, J., Storkey, A., & Wang, S. (2020). “Few-Shot Learning with Class Imbalance”. [arXiv]