Carlo Ciliberto

Research positions

2017–Present **Research Associate**, *University College London*, London, UK, Computer Science Department.
Research in machine learning with focus on structured problems (e.g Structured Prediction, Multi-task learning).

2013–2016 **Postdoctoral Fellow**, *Massachusetts Institute of Technology and Istituto Italiano di Tecnologia*, Cambridge, MA, USA, Poggio Lab.
Developing algorithms and theory for structure learning and Multi-task Learning

2012–2013 **Postdoctoral Fellow**, *Istituto Italiano di Tecnologia*, Genova, Italy, Laboratory for Computational and Statistical Learning.
Developing algorithms and applications for structure learning and visual recognition in Robotics

Education

2009–2012 **PhD student in Robotics and Computer Vision**, *Istituto Italiano di Tecnologia*, Genova, Italy, PhD Thesis: *Self-supervised Robots: A path towards Autonomous Learning*.

2006–2008 **Master of science in Mathematics**, *Universita' Roma Tre*, Rome, Italy, Master Thesis - Algebraic Geometry: *The Jacobian ideal of a Hypersurface*.
110/110 cum laude

2004–2006 **Bachelor in Mathematics**, *Universita' Roma Tre*, Rome, ITaly, 110/110 cum laude.

Teaching

2017 **Instructor for Advanced Topics in Machine Learning**, *Course for the Master in Machine Learning at University College London, UK - Fall Semester*, Course on Statistical Learning Theory, course website: https://cciliber.github.io/intro-slt/.

2016–2014 **Teaching Graduate Topics in Machine Learning**, *MIT 9.520 - Statistical Learning Theory, Graduate Class at the Massachusetts Institute Technology*, Lectures on Statistical Learning Theory, Multitask Learning, Functional analysis and Manifold Learning, Course website: http://www.mit.edu/ 9.520.

2013-2015 **Teaching Assistant for Robotics & Machine Learning - CBMM Summer School**, *Summer school organized by the Center For Brain Mind and Machines (NSF founded project) at the Marine Biological Laboratory in Woods Hole, MA, USA*, Tutorials on Robotics. Supervising students for final projects and on machine learning, School website: http://cbmm.mit.edu/summer-school/2014.

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Other experience

International projects

2013–2016 **Center for Brains Minds and Machines**, *NSF Founded Project (USA)*, Developing theory and algorithms for Transfer and Multi-task Learning. Assisting in the organization of summer schools.

2009–2010 **Poeticon**, *European Project*, Involved in the *Poeticon* FP7 European project for Semantic Learning in Robotics, Developed the demonstration for the final review meeting of the project.

Organization of scientific events

2016 **Data Learning and Inference (DALI)**, *Machine learning workshop*, Organization of the Workshop in collaboration with Prof. Lorenzo Rosasco, Prof. Thomas Hofmann, Prof. Zoubin Ghaharamani, Prof. Neil Lawrence and Prof. Bernhard Scholkopf., Website of the event: `http://dalimeeting.org/`.

2015 **Brains Minds and Machines**, *Workshop on the science of intelligence*, Organization of the Workshop, Website of the event: `http://cbmm.mit.edu/bmm-workshop-sestri`.

2015 **Workshop: Robotics Afternoon at MBL**, *Workshop on Robotics with talks by leaders of the research in the field*, Organization of the Workshop, Website of the event: `http://lcsl.mit.edu/courses/cbmmss/robotics/`.

2015 **Machine Learning Crash Course (MLCC)**, *One-week course on Machine Learning. Taught by Prof. Lorenzo Rosasco and Francesca Odone*, Organization of the course, Website of the event: http://lcsl.mit.edu/courses/mlcc/mlcc2015/.

Summer Schools

2010 **MLSS 2010 - Summer School on Cognitive Science and Machine Learning.**, *Co-organized by Pascal2, University College London, Cambridge University, UC Berkeley, Manchester University, Max Planck Institute for Biological Cybernetics, and MIT.*, Pula, Italy.

2009 **Robot Learning Summer School**, *Summer school on Machine Learning applications to Robotics*, Istituto de Sistemas e Robotica (ISR), Lisbon, Portugal.

Expertise

Machine Learning

Advanced Statistical Learning Theory, Machine Learning in Reproducing Kernel Hilbert Spaces

Advanced Kernel methods for Supervised learning: RLS, SVM, Boosting, Logistic Regression

Advanced Unsupervised Learning: K-means, LDA, KPCA, spectral clustering

Intermediate Feature selection: LASSO, Group Lasso, Structured sparsity

Optimization

Advanced Smooth convex optimization (first/second order methods)

Advanced Proximal Algorithms for non-smooth optimization

Intermediate Stochastic optimization, Interior Point methods

Computer Vision

Advanced	Feature Learning and Feature Extraction
Advanced	Object Learning and Recognition, Tracking

Robotics

Advanced	Multi-sensory integration of visual, haptic and kinematic data
Advanced	Independent Motion Detection for actuated visual sensors
Intermediate	Kinematics and Dynamics, Control Theory

Mathematics

Advanced	Linear Algebra, Topology, Functional Analysis, Statistics
Intermediate	Differential Geometry, Algebraic Geometry

Computional skills

Advanced	`c++`, `MATLAB`, `python`, LaTeX, `JavaScript` (and `Node.js`)
Intermediate	`html` & `CSS`, `java`, `julia`, Adobe Suite

Languages

Italian	**Native**
English	**Fluent**

Active Collaborations

Prof. Lorenzo Rosasco and Prof. Tomaso Poggio, *Massachusetts Institute of Technology, Cambridge, USA*.

Prof. Francis Bach and Dr. Alessandro Rudi, *INRIA & Ecole Normale Superieure, Paris*.

Prof. Massimiliano Pontil, *University College London, London, United Kindom & Istituto Italiano di Tecnologia, Genoa, Italy*.

Prof. Francesco Nori, *DeepMind, London, UK*.

Prof. Giorgio Metta, Prof. Lorenzo Natale, *Istituto Italiano di Tecnologia, Genoa, Italy*.

Dr. Sean Fanello, *Perceptive IO (now Google Daydream), San Francisco, USA*.

Dr. Youssef Mroueh, *IBM Watson, New York, USA*.

Publications

2018 **Quantum machine learning: a classical perspective**, *Carlo Ciliberto, Mark Herbster, Alessandro Davide Ialongo, Massimiliano Pontil, Andrea Rocchetto, Simone Severini, Leonard Wossnig*, Proceeding of the Royal Society A.

2017 **Consistent Multitask Learning with Nonlinear Output Relations**, *Carlo Ciliberto, Alessandro Rudi, Lorenzo Rosasco, Massimiliano Pontil*, Neural Information Processing Systems (NIPS) 2017.

2017 **Low Compute and Fully Parallel Computer Vision with HashMatch**, *Sean Ryan Fanello, Julien Valentin, Adarsh Kowdle, Christoph Rhemann, Vladimir Tankovich, Carlo Ciliberto, Philip Davidson, Shahram Izadi*, International Conference on Computer Vision (ICCV) 2017 (to appear).

2017 **Visual recognition for humanoid robots**, *Sean Ryan Fanello, Carlo Ciliberto, Nicoletta Noceti, Giorgio Metta, Francesca Odone*, Robotics and Autonomous Systems.

2017 **Incremental Robot Learning of New Objects with Fixed Update Time**, *Raffaello Camoriano Giulia Pasquale, Carlo Ciliberto, Lorenzo Rosasco, Lorenzo Natale, Giorgio Metta*, International Conference on Intelligent Robotics and Automation (ICRA) 2017.

2017 **Connecting YARP to the Web with yarp. js**, *Carlo Ciliberto*, Frontiers in Robotics and AI.

2016 **A Consistent Regularization Approach to Structured Prediction**, *Carlo Ciliberto, Alessandro Rudi, Lorenzo Rosasco*, Neural Information Processing Systems (NIPS) 2016.

2016 **Combining sensory modalities and exploratory procedures to improve haptic object recognition in robotics**, *Bertrand Higy, Carlo Ciliberto, Lorenzo Rosasco, Lorenzo Natale*, International Conference on Humanoid Robots (Humanoids) 2016.

2016 **Active perception: Building objects' models using tactile exploration**, *Nawid Jamali, Carlo Ciliberto, Lorenzo Rosasco, Lorenzo Natale*, International Conference on Humanoid Robots (Humanoids) 2016.

2016 **Object identification from few examples by improving the invariance of a Deep Convolutional Neural Network**, *Giulia Pasquale, Carlo Ciliberto, Lorenzo Rosasco, Lorenzo Natale*, International Conference on Intelligent Robots and Systems (IROS) 2016.

2016 **Enabling depth-driven visual attention on the iCub humanoid robot: instructions for use and new perspectives**, *Giulia Pasquale, Tanis Mar, Carlo Ciliberto, Lorenzo Rosasco, Lorenzo Natale*, Frontiers in Robotics and AI.

2015 **Convex Learning of Multiple Tasks and their Structure** , *Carlo Ciliberto, Youssef Mroueh, Tomaso Poggio, Lorenzo Rosasco*, International Conference on Machine Learning (ICML), 2015.

2015 **Learning Multiple Visual Tasks while Discovering their Structure** , *Carlo Ciliberto, Lorenzo Rosasco, Silvia Villa*, Computer Vision and Pattern Recognition (CVPR), 2015 IEEE Conference on.

2015 **Characterizing the Input-Output Function of the Olfactory-Limbic Pathway in the Guinea Pig** , *Gian Luca Breschi*, Carlo Ciliberto*, Thierry Nieus, Lorenzo Rosasco, Stefano Taverna, Michela Chiappalone, Valentina Pasquale*, Computational intelligence and neuroscience, $*$ = equal contribution.

2014 **Exploiting global force torque measurements for local compliance estimation in tactile arrays**, *Carlo Ciliberto, Luca Fiorio, Marco Maggiali, Lorenzo Natale, Lorenzo Rosasco, Giorgio Metta, Giulio Sandini, Francesco Nori*, Intelligent Robots and Systems (IROS 2014), 2014 IEEE/RSJ International Conference on.

2014 **Ask the image: supervised pooling to preserve feature locality**, *Sean Ryan Fanello, Nicoletta Noceti, Carlo Ciliberto, Giorgio Metta, Francesca Odone*, Computer Vision and Pattern Recognition (CVPR), 2014 IEEE Conference on.

2013 **On the impact of learning hierarchical representations for visual recognition in robotics**, *Carlo Ciliberto, Sean Ryan Fanello, Matteo Santoro, Lorenzo Natale, Giorgio Metta, Lorenzo Rosasco*, Intelligent Robots and Systems (IROS), 2013 IEEE/RSJ International Conference on.

2013 **Weakly supervised strategies for natural object recognition in robotics**, *Sean Ryan Fanello, Carlo Ciliberto, Lorenzo Natale, Giorgio Metta*, Robotics and Automation (ICRA), 2013 IEEE International Conference on.

2012 **A heteroscedastic approach to independent motion detection for actuated visual sensors**, *Carlo Ciliberto, Sean Ryan Fanello, Lorenzo Natale, Giorgio Metta*, International Conference on Intelligent Robots and Systems (IROS) 2012.

2011 **Online multiple instance learning applied to hand detection in a humanoid robot**, *Carlo Ciliberto, Fabrizio Smeraldi, Lorenzo Natale, Giorgio Metta*, International Conference on Intelligent Robots and Systems (IROS) 2011.

2011 **Reexamining lucas-kanade method for real-time independent motion detection: Application to the icub humanoid robot**, *Carlo Ciliberto, Ugo Pattacini, Lorenzo Natale, Francesco Nori, Giorgio Metta*, International Conference onIntelligent Robots and Systems (IROS) 2011.