

Carlo Ciliberto

Curriculum Vitae

Research

- 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).
- 2012–2016 **Postdoctoral Fellow**, *Massachusetts Institute of Technology*, Cambridge, MA, USA, Poggio Lab.
Developing algorithms and theory for structure learning and Multi-task Learning
- 2012–2016 **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 student in Mathematics**, *Universita' Roma Tre*, Rome, Italy, Master Thesis - Algebraic Geometry: *The Jacobian ideal of a Hypersurface*.
110/110 cum laude
- 2004–2006 **Bachelor student in Mathematics**, *Universita' Roma Tre*, Rome, Italy, 110/110 cum laude.

Experience

Teaching Experience

- 2015 **Teaching Graduated Topics in Machine Learning**, *MIT 9.520 - Statistical Learning Theory*, Graduate Class at the *Massachusetts Institute Technology* - Fall semester, Two Monographic lectures on Functional analysis and Multi-task learning, Course website: <http://www.mit.edu/9.520/fall15/>.
- 2015 **Robotics & Machine Learning Teaching Assistant at the 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. Supervising students for laboratories on machine learning, School website: <http://cbmm.mit.edu/summer-school/2014>.

- 2014 **Teaching Graduated Topics in Machine Learning**, MIT 9.520 - *Statistical Learning Theory, Graduate Class at the Massachusetts Institute Technology - Fall semester*, Two Monographic Lectures on Functional Analysis and Manifold Learning, Course website: <http://www.mit.edu/9.520/fall14/>.
- 2014 **Machine Learning Teaching Assistant at the 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, Supervising students for laboratories on machine learning, School website: <http://cbmm.mit.edu/summer-school/2014>.

International Projects

- 2013–Present **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.
- 2009–2011 **CHRIS, European Project**, Involved in the CHRIS FP7 European project for Human Robot Interaction, Developed part of the demonstration for the final review meeting of the project.

Organization of Scientific Events

- 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>.
- 2016 **Data Learning and Inference (DALI), Machine learning workshop**, Organization of the Workshop in collaboration with Prof. Lorenzo Rosasco, Prof. Thomas Hofmann, Prof. Zoubin Ghahramani, Prof. Neil Lawrence and Prof. Bernhard Schölkopf., Website of the event: <http://dalimeeting.org/>.
- 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://lcs1.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://lcs1.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**, Instituto 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
- Intermediate Interior Point methods

Computer Vision

- Advanced Feature Learning and Feature Extraction
- Advanced Object Learning and Recognition
- Intermediate Tracking

Robotics

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

Mathematics

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

Computational skills

- Advanced C++, MATLAB
- Intermediate PYTHON, JAVASCRIPT (and NODE.JS), HTML & CSS, JAVA, L^AT_EX
- Basic JULIA, Adobe Suite

Languages

- Italian **Mothertongue**
- English **Fluent**

Publications

Machine Learning Theory

- 2017 **Consistent Multi-task Learning with Non-linear Output Relations**, *Carlo Ciliberto, Alessandro Rudi, Lorenzo Rosasco*, (submitted to the International Conference on Machine Learning (ICML) 2017).

- 2017 **Structured Prediction with Strong Theoretical Guarantees**, *Carlo Ciliberto, Alessandro Rudi, Lorenzo Rosasco*, (in Preparation).
- 2016 **A Consistent Regularization Approach to Structured Prediction**, *Carlo Ciliberto, Alessandro Rudi, Lorenzo Rosasco*, Neural Information Processing Systems (NIPS) 2016.
- 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.
- Machine Learning Applications**
- 2016 **Learning Objects from Few Examples by Improving the Invariance of a Deep Convolutional Learning Network**, *Giulia Pasquale, Carlo Ciliberto, Lorenzo Rosasco, Lorenzo Natale*, Intelligent Robots and Systems (IROS), 2011 IEEE/RSJ International Conference on (to appear).
- 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*, Fronteers.
- 2015 **Characterizing the Input-Output Function of the Olfactory-Limbic Pathway in the Guinea Pig**, *Gian Luca Breschi*, Carlo Ciliberto*, Thierry Nieuw, 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*, Intelligent Robots and Systems (IROS), 2012 IEEE/RSJ International Conference on.

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