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The beauty of linear models in modern machine learning

Abstract. Recent progress in machine learning has lead to a host of unprecedented successes for artificial intelligence. For example, complex machine learning architectures power audio/vision recognition systems now common in mobile devices, win complex games such as go, while possibly making self-driving car a reality. The list of AI other powered technologies is currently increasing at a frantic pace.

As different AI systems and empirical results come out everyday, there is an urgent need of theoretical results to guide and speed up engineering practices, while certifying the reliability of the proposed methods. Indeed, this is an exciting opportunity for mathematical developments that can have important practical impacts.

The purpose of this talk is twofold. On the one hand, to recall how there is a well established machine learning theory touching upon a verity of different mathematical fields. On the other hand, to argue that, for tackling many fundamental questions in modern machine learning, simple linear models can lead to substantial progress.

To support this view I will discuss some recent results studying the learning properties of implicitly regularization and interpolating solutions.

Bio. Lorenzo Rosasco is professor at University of Genova. He is also visiting professor at the Massachusetts Institute of Technology (MIT) and external collaborator at the Italian Technological Institute (IIT). He coordinates the Machine Learning Genova center (MaLGa) and the Laboratory for Computational and Statistical Learning focused on theory, algorithms and applications of machine learning.

Rosasco received his PhD in 2006 from the University of Genova, after being a visiting student at the Center for Biological and Computational Learning at MIT, the Toyota Technological Institute at Chicago (TTI-Chicago) and the Johann Radon Institute for Computational and Applied Mathematics. Between 2006 and 2013 he has been a postdoc and research scientist at the Brain and Cognitive Sciences Department at MIT.

He is a fellow in Ellis, where he is co-director of the "Theory, Algorithms and Computations of Modern Learning Systems" program and the Ellis Genoa unit. He is a recipient of a number of grants, including a FIRB and an ERC consolidator.