UNIVERSITÀ DEGLI STUDI FIRENZE

FLORENCE center for DATA SCIENCE

ABSTRACTS

14th Seminar D^2 Seminar Series

Florence Center for Data Science 'Double' Seminar Series

Brunero Liseo - Department of Methods and Models for Economics, Territory and Finance of the Sapienza University

Title: *ABCC: Approximate Bayesian Conditional Copulae (with Clara Grazian and Luciana Dalla Valle)*

Abstract: Copula models are flexible tools to represent complex structures of dependence for multivariate random variables. According to Sklar's theorem (Sklar, 1959), any d-dimensional absolutely continuous density can be uniquely represented as the product of the marginal distributions and a copula function that captures the dependence structure among the vector components. In real data applications, the interest of the analyses often lies on specific functionals of the dependence, which quantify aspects of it in a few numerical values. A broad literature exists on such functionals, however, extensions to include covariates are still limited. This is mainly due to the lack of unbiased estimators of the copula function, especially when one does not have enough information to select the copula model. Recent advances in computational methodologies and algorithms have allowed inference in the presence of complicated likelihood functions, especially in the Bayesian approach, whose methods, despite being computationally intensive, allow us to better evaluate the uncertainty of the estimates. In this work, we present several Bayesian methods to approximate the posterior distribution of functionals of the dependence, using nonparametric models which avoid the selection of the copula function. These methods are compared in simulation studies and in two realistic applications, from civil engineering and astrophysics.

Ernesto De Vito - Department of Mathematics of the University of Genova.

Title: *Understanding Neural Networks with Reproducing Kernel Banach Spaces*

Abstract: Characterizing the function spaces corresponding to neural networks can provide a way to understand their properties. The talk is devoted to show how the theory of reproducing kernel Banach spaces can be used to characterize the function spaces corresponding to neural networks. In particular, I will show a representer theorem for a class of reproducing kernel Banach spaces, which includes one hidden layer neural networks of possibly infinite width. Furthermore, I will prove that, for a suitable class of ReLU activation functions, the norm in the corresponding reproducing kernel Banach space can be characterized in terms of the inverse Radon transform of a bounded real measure. The talk is based on on joint work with F. Bartolucci, L. Rosasco and S. Vigogna.