

# **New approaches to Stochastic Modeling in Economics via Bayesian Nonparametrics**

## **Summary**

The main objective of the present research project is the introduction of novel stochastic modeling approaches and new estimation procedures in Economics via Bayesian Nonparametrics (BNP). The theoretical foundation of BNP dates back to de Finetti in the 30s: rather than a mere body of estimation procedures BNP is actually a coherent way of inductive reasoning or, as de Finetti himself termed it, it represents a "logic for uncertainty". The BNP viewpoint naturally allows for a rich probabilistic modeling and for accurate estimation procedures via conditional (or posterior) distributions. The mathematical complexity required by such a paradigm prevented its development for a long time. Only recently, crucial theoretical and computational advances made it possible to concretely implement BNP on real world problems. As a result of these innovations, the popularity of the Bayesian nonparametric way of reasoning is steadily growing within both the academic community and practitioners, especially in life sciences.

However, BNP models and methods are still rarely exploited within Economics, which is probably due to the peculiarity of the problems to be faced. The aim of this project is to develop a rigorous theoretical framework in which to embed a plenty of modeling and estimation problems in Economics, and to apply the derived techniques to concrete problems. Specifically, we will deal with fully nonparametric regression, hierarchical models, prediction in static and dynamic environments, interacting particle systems and collections of measure-valued diffusions. Furthermore, we plan applications to stochastic modeling and clustering for macroeconomic phenomena, microdata disclosure risk assessment, market share and portfolio dynamics.