

Random lift of set-valued map and applications to MFG

Antonio Marigonda

University of Verona, Italy

email: antonio.marigonda@univr.it

Abstract

We introduce an abstract framework for the study of general mean field game and mean field control problems. Given a multiagent system, its macroscopic description is provided by a time-depending probability measure, where at every instant of time the measure of a set represents the fraction of (microscopic) agents contained in it. The trajectories available to each of the microscopic agents are affected also by the overall state of the system. By using a suitable concept of random lift of set-valued maps, based on measurable selection theorems, together with fixed point arguments, we are able to derive properties of the macroscopic description of the system from properties of the set-valued map expressing the admissible trajectories for the microscopical agents. We apply the results in the case in which the admissible trajectories of the agents are the minimizers of a suitable integral functional depending also from the macroscopic evolution of the system. Joint work with Rossana Capuani (University of Tuscia, Italy, and Michele Ricciardi, KAUST, Saudi Arabia)