

Seminario Aleatorio

Sesión 369

Von Neumann-Morgenstern and Savage Theorems for Causal Decision Making

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Abstract

Causal thinking and decision making under uncertainty are fundamental aspects of intelligent reasoning. Decision making under uncertainty has been well studied when information is considered at the associative (probabilistic) level. The classical Theorems of von Neumann-Morgenstern and Savage provide a formal criterion for rational choice using purely associative information. Causal inference often yields uncertainty about the exact causal structure, so we consider what kinds of decisions are possible in those conditions. In this talk, we will consider decision problems in which available actions and consequences are causally connected. After recalling a previous causal decision making result, which relies on a known causal model, we consider the case in which the causal mechanism that controls some environment is unknown to a rational decision maker. In this setting we state and prove a causal version of Savage's Theorem, which we then use to develop a notion of causal games with its respective causal Nash equilibrium. These results highlight the importance of causal models in decision making and the variety of potential applications.

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