PhD of Business Economics: Business Engineering

Ergodicity and Human Decision Making: On the Impact of Path Dependencies on Decision-Makers

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Abstract

Expected values are at the foundation of scientific models across diverse fields dealing with uncertainty. Unfortunately, the reliability of the expected value approach relies heavily on the ergodic hypothesis.

In our research, we question the validity of the ergodic hypothesis and propose a paradigm shift, arguing that the implicit assumption of ergodicity is at the root of many discrepancies between theoretical models and the real world. We explore the mechanics of ergodicity breaking, examining its manifestations in self-reinforcing systems, the presence of absorbing barriers, and its overlooked role in science. In particular, we will focus on economics, decision-making, and reinforcement learning, which all rely heavily on expected values in their computations and predictions.

In this thesis, we aim to bridge the gap between theoretical understanding and practical applications of ergodicity by adapting theoretical foundations to better reflect discrete processes and real-world dynamics. Additionally, we will use theoretical models and (thought) experiments to test and apply this new framework to the decision-making challenges humans and machines encounter.