# An Ontology of Decision Models

**Lisheng He**
University of Pennsylvania, Philadelphia, Pennsylvania, United States

**Wenjia Joyce Zhao**
University of Pennsylvania, Philadelphia, Pennsylvania, United States

**Sudeep Bhatia**
University of Pennsylvania, Philadelphia, Pennsylvania, United States

**Abstract**

Decision models are formal algorithms that are used to represent decision processes and predict choice across a wide range of disciplines. These models are often highly complex, which makes it difficult to understand the relationships between different models, the unique features of individual models and, in turn, the fundamental properties of choice behavior captured by these models. We address this issue in a large-scale computational analysis that uses parameter bootstrapping cross-fitting techniques to derive pairwise measures of decision model distances. Our analysis includes over 80 prominent models of risky and intertemporal choice, and results in an ontology of decision models, with data-driven model clusters and hierarchies that synthesize over seven decades of quantitative research on human choice behavior.