

Non linear preference models: why, how?

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Abstract. Literature involving preferences of artificial agents or human beings often assume their preferences are linear, that is, the preference can be represented using a complete transitive antisymmetric binary relation. Much has been written however on more complex, or more interesting, models of preferences. In this article we review some of the reasons that have been put forward to justify more complex modeling, and review some of the techniques that have been proposed to obtain models of such preferences. (Optional: we connect to various related literature about argumentation, ...)

1 Introduction

Here is a possible approach we might want to use.

- What's a model of preference? Example with weighted sum. But: forbids some possibly interesting evaluations; need to recode evaluations and hence is dependent of irrelevant alternatives; $w_1 > w_2$ unclear.
- Utility: is holistic. Forbids incomparability. Mandates transitivity.
- Models of preferences can have (at least) two interpretations: normative or descriptive. Goals and (sometimes) tools to model preferences and reasonable hypothesis that can be postulated about the shape of the preferences vary according to these two lines.
- (Reasonable) hypothesis about descriptive preferences. Why it's more difficult than can be thought naïvely.
- Reasonable hypothesis about normative preferences. Why it's more difficult than can be thought naïvely. Talk about incompleteness. Applying normative approaches: talk about prescription à la Roy...
- Focus on incompleteness rather than non-transitivity. Can be lack of information or intrinsic.
- Present usual models (Savage? MAVT?) and alternative ones (belief functions? Electre?)
- Talk about choice under uncertainty wrt incompleteness.
- Impact of relaxations on problems of choice, ranking, classification.
- How to obtain information under incompleteness hypothesis, meaning and interpretation.
- (If space permits) Links to argumentation theory: build argumentative models that explain / justify a decision.?
- (If space permits) Path to validation of normative models. Talk about empirical social choice; reflective equilibrium. Use the resulting indeterminacy (lability). Maximizing without transitivity or completeness?