

Preference learning through robust ordinal regression

Keynote speaker: Roman Słowiński

Identification of Decision Maker's (DM's) preferences is crucial for decision aiding. We present a constructive preference learning methodology, called Robust Ordinal Regression, for Multiple Criteria Decision Aiding. It is known that the dominance relation established in the set of alternatives evaluated on multiple criteria is the only objective information that comes from the formulation of a multiple criteria decision problem (ordinal classification, or ranking, or choice – with multiobjective optimization being a particular case). While it permits to eliminate many irrelevant (i.e., dominated) alternatives, it does not compare completely all of them, resulting in a situation where many alternatives remain incomparable. This situation may be addressed by taking into account preferences of the DM. Therefore, decision aiding methods require some preference information elicited from a DM or a group of DMs. This information is used to build more or less explicit preference model, which is then applied on a non-dominated set of alternatives to arrive at a recommendation presented to the DM. In practical decision aiding, the process composed of preference elicitation, preference modeling, and DM's analysis of a recommendation, loops until the DM accepts the recommendation or decides to change the problem setting. Such an interactive process is called constructive preference learning. We will focus on processing DM's preference information concerning multiple criteria ranking and choice problems. This information has the form of pairwise comparisons of selected alternatives, and/or comparisons of intensities of preference between pairs of some alternatives. Research indicates that such preference elicitation requires less cognitive effort from the DM than direct assessment of preference model parameters (like criteria weights, comparison thresholds, or trade-offs between conflicting criteria). We will describe how to construct from this input information a preference model being a utility function or an outranking relation, via Robust Ordinal Regression (ROR). An important feature of ROR is identification and use of all instances of the preference model that are compatible with the input preference information – this permits to draw robust conclusions in terms of necessary and possible relations in the set of considered alternatives. The methodology will be presented along with some examples of their application.