MALOTEC

Séminaire de MAthématique et LOgique pour l'exTraction et le traitEment de Connaissances

2nd Symposium Mathematics for Decision and Discovery (M4D2)

30 of January, 2019

Description: The main goal of M4D2 is to bring together researchers from fields of computer science that may seem at first glance rather distant but that share in fact several common points. This is particularly the case for topics pertaining to

decision making and social choice,
complex and multi-agent systems,
knowledge discovery and machine learning,
game theory and operations research, etc.

and that share the same interest in mathematical tools coming from

ordered sets and lattice theory, knowledge spaces,
clone theory and aggregation functions,
Boolean and pseudo-Boolean functions,
graph and hypergraph theory, combinatorial optimisation, etc.

With this event we hope to lay ground to fruitful discussions and expertise exchanges, and to provide a space where participants will have the chance, not only to present their recent achievements, but most importantly to share and discover different perspectives, to acquire new ideas, and to become involved in new research efforts where their expertise is welcome and needed.

M4D2 is organized by M. Couceiro and A. Napoli in the framework of the MALOTEC seminar (the French acronym for « Seminar of mathematics and logic for knowledge discovery ») held in the ORPAILLEUR Team, at LORIA.

The main topic of the 2nd symposium M4D2 will be *preference modeling, reasoning and learning* and it will take place on 30 of January, 2019.

All members of LORIA, IECL, CRAN and other computer science and mathematics laboratories, are most welcome!

Localization: B013, LORIA

PROGRAM:

10h00-10h45: Henri Prade (IRIT)

Title: Analogical prediction of preferences

Abstract: Given a set of preferences between items taken by pairs and described in terms of nominal or numerical attribute values, the problem considered is to predict the preference between the items of a new pair. We propose and compare two approaches based on analogical proportions, which are statements of the form « a is to b as c is to d ». The first one uses triples of pairs of items for which preferences are known and which make analogical proportions, altogether with the new pair. These proportions express attribute by attribute that the change of values between the items of the first two pairs is the same as between the last two pairs. This provides a basis for predicting the preference associated with the fourth pair, also making sure that no contradictory trade-offs are cre- ated. Moreover, we also consider the option that one of the pairs in the triples is taken as a k--nearest neighbor of the new pair. The second approach exploits pairs of compared items one by one: for predicting the preference between two items, one looks for another pair of items for which the preference is known such that, attribute by attribute, the change between the elements of the first pair is the same as between the elements of the second pair. As discussed in the paper, the two approaches agree with the postulates underlying weighted averages and more general multiple criteria aggregation models. The reported experiments, both on real data sets and on generated datasets suggest the effectiveness of the approaches. This a joint work, in progress, with Myriam Bounhas, Marc Pirlot, and Olivier Sobrie.

11h00-11h45: Hélène Fargier (IRIT)

Title: Egalitarian collective decision making under qualitative possibilistic uncertainty: Principles and Characterization

Abstract: This talk addresses the question of collective decision-making under possibilistic uncertainty. We will propose 4 egalitarian decision rules and show that, in the context of a possibilistic representation of uncertainty, the use of an egalitarian collective utility function allows to get rid of the Timing Effect. Furthermore, we will show that if both the agents' preferences and the collective ranking

of the decisions satisfy Dubois and Prade's axioms (1995), and particularly risk aversion, and Pareto Unanimity, then the egalitarian collective aggregation is compulsory. This result can be seen as an ordinal counterpart of Harsanyi's theorem (1955).

12h00-12h45: Michel Grabisch (CES, University of Paris I Panthéon-Sorbonne)

Title: Monotone Decomposition of 2-additive Generalized Additive Independence Models

Abstract: We consider discrete GAI (Generalized Additive Independence) models in decision making, begin monotone w.r.t. attributes, and study the problem of the decomposition. A canonical decomposition of a GAI is still an open problem in general, and here we propose a monotone (as a sum of nondecreasing terms) decomposition of a 2-additive discrete GAI model, which also the property to be minimal in number of terms. For this, we take advantage of the fact that discrete monotone (2-additive) GAI models are equivalent to k-ary (2-additive) capacities (monotone multichoice games), and the decomposition is nothing other than the expression of a k-ary capacity in terms of vertices of a simplex containing it. We identify the set of vertices of 2-additive k-ary capacities and give an explicit expression of the decomposition for k=2. This is a joint work with Christophe Labreuche and Mustapha Ridaoui.

13h00-14h30: Lunch

14h30-15h15: Sébastien Destercke (Heudiasyc)

Title: Ordinal regression with imprecise probabilities: from learning to inferences

Abstract: In this talk, we will first recall the basic principles of imprecise probabilistic approaches, as well as their motivation. We will then explore how those can be applied to the peculiar problem of ordinal regression, that we will also recall. We will focus on sets of models that present some computational advantages, both for the estimation and for the decision problems.

15h30-16h15: Alexis Tsoukiàs (LAMSADE)

Title: Comparing intervals of the real line

Abstract: The talk addresses the problem of comparing intervals of the real line under a preference modelling perspective. We suggest a general framework generalising the notion of interval order for a any finite number of points describing an

interval. We show that there exist finite comparison models establishing a lattice with interesting semantics.
This a joint work with Meltem Öztürk.

16h30-17h00: Jimmy Devillet (University of Luxembourg)

Title: Generalizations of single-peakedness

Abstract: We establish a surprising connection between a family of conservative semigroups, which includes the class of idempotent uninorms, and the concepts of single-peakedness and single-plateaudness, introduced in social choice theory by D. Black. We also introduce a generalization of single-peakedness to partial orders of join-semilattices and show how it is related to the class of idempotent and commutative semigroups. Finally, we enumerate those orders when the corresponding semigroups are finite.

17h00-17h30: Discussions
