COST Action IC0602:
Algorithmic Decision Theory

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Final Meeting, 15/04/2011

Outline

1. What is ALGODEC?

2. Achievements

3. Challenges

4. The Future

What is Algorithmic Decision Theory?

The Action aims to put together researchers coming from different fields such as Decision Theory, Discrete Mathematics, Theoretical Computer Science and Artificial Intelligence in order to improve decision support in the presence of massive data bases, combinatorial structures, partial and/or uncertain information and distributed, possibly interoperating decision makers. Such problems arise in several real-world decision making problems such as humanitarian logistics, epidemiology, risk assessment and management, e-government, electronic commerce, and the implementation of recommender systems.

Background

- Ongoing research activities.
- 2 EURO Working Groups (MCDA and Preference Handling).
- Several Bilateral Cooperation Agreements.
- Several Workshops organised in the past (Dagstuhl, DIMACS, ECAI, EURO, IJCAI, VLDB etc.).

How is ALGODEC organised?

- 4 Working Groups:
    - Uncertainty and Robustness in Planning and Decision Making.
    - Decision Theoretic Artificial Intelligence.
    - Preference in Reasoning and Decision.
    - Knowledge Extraction and Learning.
- A Chair, a Vice-Chair, a Steering Committee and a Management Committee.
- A grant holder: Université Paris Dauphine.
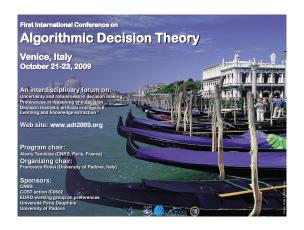- See www.algodec.org.

Ultimate objectives

- Establish a community of researchers interested in Algorithmic Decision Theory.
- Create a community of "early stage researchers attracted by this research area.
- Increase awareness about the challenges and opportunities for Decision Sciences and Technologies.
- Show that **"we can do it"** in theory and in practice.

ALGODEC Meetings-1

- Kick-off meeting, Brussels, May 2007
- 1st Regular meeting, Madrid, November 2007 (David Rios Insua)
- 2nd Regular meeting, Catania, April 2008 (Salvatore Greco)
- 3rd Regular meeting, Paris, October 2008, together with the DIMACS-LAMSADE Workshop
- 4th Regular meeting, Cork, April 2009, (Barry O'Sullivan)
- 5th Regular meeting, Venice, October 2009 (Francesca Rossi), together with the 1st International Conference on Algorithmic Decision Theory

ALGODEC Meetings-2

- 6th Regular meeting, Coimbra, April 2010 (Carlos Antunes), together with the 2nd International Conference on Uncertainty Management
- 7th Regular meeting, Düsseldorf, September 2010 (Felix Brandt), together with the 3rd International Workshop on Computational Social Choice, COMSOC
- 8th Regular meeting, Manchester, April 2011 (Simon French)
- plus special meetings in Amsterdam (Ulle Endriss), Bruxelles (Yves de Smet), Mons (Marc Pirlot), Brest (Patrick Meyer), Luxembourg (Raymond Bisdorff), Paris (Nicolas Maudet and Patrice Perny)

ALGODEC Meetings-3

ALGODEC Meetings-3

- More than 80 participants from almost 20 countries
- 2 tutorials (Fred Roberts and Toby Walsh) and 4 plenary lectures (Craig Boutilier, Jean Christophe Culioli, Mike Trick, Peter Wakker)
- Proceedings published by Springer (LNAI series)
- 30 presentations and 10 posters

ALGODEC Training Schools

1. Han-sur-Lesse (BE), Marc Pirlot
2. Troina (IT), Salvatore Greco
3. Cork (IE), Barry O'Sullivan
4. Lisbon (PT), José Figueira
5. Manchester (UK), Simon French
6. ICAPS2009 (Thessaloniki, Carmel Domshlak)
7. MCDM 2010 (Paris, Vincent Mousseau)

ALGODEC Meetings-3

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ALGODEC Training Schools

- 2008/2008 11 (2 ESR)
- 2008/2009 18 (13 ESR)
- 2009/2010 21 (14 ESR)
- 2010/2011 21 (18 ESR)
- COST Office budget for Australia 3 (2 ESR)

ALGODEC achievements

- More than 40 labs and research centres involved from almost 30 countries including the USA (DIMACS), Australia (NICTA) and South Africa (CSIR), mobilising more than 300 researchers.
- More than 12 Workshops organised.
- 7 Doctoral Training Schools already organised with an average of 35 participants.
- 74 STSMs (66% ESR)
- The Decision Deck project: www.decision-deck.org.
- 2 books, 4 special issues (Annals of OR, Mathematical Social Sciences, Group Decision and Negotiation, JMCDA)

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What do we do?

How to decide better?

What do we do?

How to decide better?
How to help deciding better?

What do we do?

How to decide better?
How to help deciding better?

Issues of interest

- What is a decision problem?
- How to formulate a problem?
- What is a solution and how to find it?

Why is not straightforward?

- multiple stakeholders
- multiple criteria
- multiple uncertainties
+ algorithmic aspects

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SO WHAT?

- efficiency
- accountability
- legitimation

Scientific Challenges-1

- learn preferences, desires, constraints, similarities;
- extract meaningful information and knowledge;
- manage very large amounts of data;
- construct synthetic representations of such information;
- take into account uncertainties, inconsistencies and ambiguous information;
- take into account opinions, criteria, potentially conflicting.

Scientific Challenges-2

- Update and revision information and values;
- Represent heterogeneous information;
- Optimisation and constraint satisfaction;
- Robustness;
- Algorithmic Efficiency;
- Understandable, explicable, accountable, legitimate recommendations.

Technology Challenges-1

Engineering, Manufacturing, Environmental Management,
Transportation, Energy, Telecommunications, Health Care,
Natural Resources, Airlines Industry, Logistics, e-commerce,
e-government, Business and Policy Analytics, etc. ...

- Recommender Systems
- Smart Cities
- Extreme Risks management
- Water management

Technology Challenges-2

- Computing;
- Software Engineering;
- Decision Support Systems Infrasctructure;
- Visual Interactive Modelling;
- Distributed, real-time, any-time decision support.

ALGODEC future

Second International Conference on
Algorithmic Decision Theory

DIMACS, Rutgers University
New Brunswick, New Jersey, USA

October 26-28, 2011

An interdisciplinary forum on:
Algorithmic Challenges to Modern Decision Support and Automation
Decision Theoretic Artificial Intelligence
Learning and Knowledge Extraction for Decision Support
Uncertainty and Robustness in Decision Making

Website: http://adt2011.org/

Meeting Co-Chairs:
Ronen Brafman (Ben-Gurion University)
Fred Roberts (Rutgers University)
Alexis Tsoukiàs (University of Paris-Dauphine and CNRS)

Enjoy the nearby attractions of
New York City and the beautiful
Fall colors of New Jersey

Sponsors

Photo courtesy of Dipanjan Nag

Future

Further ALGODEC

- DIMACS 4 years special focus on Algorithmic Decision Theory, funded by NSF.
- GDRI ALGODEC (NSF, CNRS, FNRS, FNR, ...)
- Computational Social Choice.
- Policy Analytics and Smart Cities.
- The Internet of Decisions.

Training

- Life-long training (VIRTUOSI project).
- European Master on Decision Sciences and Technologies.

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