

CURRICULUM VITAE (DETAILED)

SEBASTIEN DESTERCCKE

General information

Institute of Radiological Protection and Nuclear Safety
CE Cadarache, IRSN, Bât 702
13115 St-Paul lez Durance
France

Born 30/08/1980

Live in Couple

Belgian

Phone: +33 4 42 19 97 02

Fax: +33 4 42 19 91 66

Email: sdestercke@gmail.com

Homepage: www.irit.fr/~Sebastien.Destercke

Driver Licence

Formation

Since 10/2005 PhD in computer science, Université Paul Sabatier, under a grant of the Institute of Radiological Protection and Nuclear Safety (IRSN).

Supervisor : Didier Dubois, research director CNRS/IRIT

Co-Supervisor : Eric Chojnacki, research engineer IRSN

Topic : *Synthesis methods in imprecise probabilities*

End of PhD 9-10/2008

09/1998–09/2004 Engineer (Ms.c.) degree in Faculté Polytechnique de Mons (FPMs)

Specializations : computer science, applied mathematics, economic science

4th year project (Sup. J-M. Godart et A. Fiordaliso): implementing in JAVA language a simulated annealing algorithm aimed at solving a multi-criteria decision problem to build a touristic trip fitted to user requirements (YourTour project).

09/2003–09/2004 Final year at Institut Supérieure d'Aéronautique et de l'Espace (Aeronautic and spatial engineering school), Toulouse

Specializations : computer science, information treatment, financial engineering/mathematics

Languages

French Mother tongue

English Fluent (TOEIC score: 970/990)

Spanish Basic notions

Dutch Basic notions

Professional experiences

03/2004–09/2004 Internship in System Analysis and Biometry Laboratory, French Institute of Agronomy (INRA), Montpellier.

Supervisors : Brigitte Charnomordic (INRA) et Serge Guillaume (Cemagref)

Topic : Adapting and implementing a (fuzzy rule base) learning algorithm to build linguistically interpretable results. Implementation in the FisPro Software (C++) under Linux environment.

Thesis (summary)

It often happens that the value of a model variable or parameter is known with uncertainty. This uncertainty can come either from the intrinsic variability of the modeled phenomenon (aleatory uncertainty) or from the imprecision, incompleteness or unreliability of available information (epistemic uncertainty). If uncertainty only arise from the first source, then it can be modeled faithfully by classical probabilities. In the second case (i.e., uncertainty stemming from imprecision or incompleteness), many arguments converge to the fact that probabilities cannot adequately account for this type of uncertainty. In order to faithfully account for this kind of uncertainty, other theories have to be used.

Due to their novelty, these theories face two major challenges: the need to unify them and to relate the different notions used in each theories, and the need to develop numerical and efficient algorithms to make them applicable to computationally demanding models (e.g., nuclear computer codes) or to huge amount of data (i.e. genomic data).

My research work contributed to partially solve these two problems, with the aim to make these theories more applicable in the fields of industrial risk analysis and of nuclear safety in particular. My main contributions are situated in the following areas:

- Information modeling: my researches lead me to relate various uncertainty models, often used in practice but seldom linked together. This lead us to introduce the so-called generalized p-box model as a bridge between these different practical models.
- Information fusion: often, information concerning a variable or parameter come from multiple sources (experts, sensors, ...). In this case, it is desirable to fusion and synthesize this information in a simpler message. During my researches, I studied and proposed solutions for two problems related to information fusion: treating inconsistencies in the information delivered by the multiple sources, and dealing with eventual dependencies existing between sources.
- Information propagation: once uncertainty on input variables is modeled, this uncertainty must often be propagated through some model, in order to quantify the resulting uncertainty on outputs. For example, to quantify the probability of getting over a safety threshold. During my research work, I've studied the various notion of independence and dependence existing between variables, and I've developed approximate numerical methods allowing for faster computations.

Some of these research results have been implemented in the uncertainty treatment software SUNSET (C++), developed at the IRSN. Some of the methodologies have been applied to results of uncertainty studies performed during the OECD project BEMUSE, a benchmark comparing the results of nuclear computer code simulating a loss of coolant accident.

Teaching

- 2007 Course - Industrial risks management (4H) Responsible : **Jean Baccou**
Ms.c. degree - Applied mathematics and economy *Ecole centrale de Marseille*
Content:
 - Introduction to imprecise probability theories (possibility theory, evidence theory and imprecise probability theory) and their use in the treatment of uncertainty in industrial risk management.Realizations:
 - Slides presented to the students
 - Simplified exercises adapted from case studies
- 2006 Course - Industrial risk management (3H) Responsible : **Eric Chojnacki**
Ms.c. degree - Mathematics and applications *Université de Provence*
Content:
 - Introduction to imprecise probability theories (possibility theory, evidence theory) and their use in the treatment of uncertainty in industrial risk management.Realizations:
 - Slides presented to the students
 - Simplified exercises adapted from case studies
- 2005 Practical course, computer science (42H) Responsible : **Anne-Marie Mondot**
Bs.c. degree - Economy and statistics *Université Paul Sabatier*
Content:
 - Learning the basics of computer programming, object oriented programming, and user interface implementation
 - Organization: 11 practical sessions of 3 hours, 3 sessions of 3 hours devoted to final project.
 - Tools and language: Borland integrated development environment, implementation under Delphi.Realizations:
 - Realization of practical sessions topics
 - Final project supervision (Simplified system simulating an ant colony)
- 2003-2003 Private courses - 1st and 2nd year of Bachelor degree - Economy, mathematics, computer science.

Publications

International journals with review committee

- Sébastien Destercke, Didier Dubois, Eric chojnacki. "Unifying practical uncertainty representations: I. Generalized p-boxes" Submitted to International Journal of Approximate Reasoning
- Sébastien Destercke, Didier Dubois, Eric chojnacki. "Unifying practical uncertainty representations: II. Clouds" Submitted to International Journal of Approximate Reasoning
- Eric Chojnacki, Jean Baccou, Sebastien Destercke. "Numerical sensitivity and efficiency in the treatment of epistemic and aleatory uncertainty" Submitted to Reliability Engineering and System Safety
- Sébastien Destercke, Didier Dubois, Eric Chojnacki. "Possibilistic information fusion using maximal coherent subsets" Submitted to IEEE Transactions on Fuzzy Systems
- Sébastien Destercke, Eric Chojnacki. "Methods for the evaluation and synthesis of multiple sources of information applied to nuclear computer codes". Nuclear Engineering and Design, in press.
- Sébastien Destercke, Serge Guillaume, Brigitte Charnomordic. "Building an interpretable fuzzy rule base from data using orthogonal least squares: application to a depollution problem". Fuzzy Sets and Systems, n° 158, pp 2078-2094, 2007.

International conferences with review committee

- Sébastien Destercke, Eric Chojnacki. "Extension of methods simulating dependencies to imprecise probabilistic models" European safety and reliability conference (ESREL), 2008
- Sébastien Destercke, Eric Chojnacki. "Evaluation, analysis and synthesis of multiple source information: an application to nuclear computer codes." European safety and reliability conference (ESREL), 2008
- Sébastien Destercke, Gert de Cooman. "Relating epistemic irrelevance to event trees" International Conference on Soft Methods in Probability and Statistics (SMPS), 2008
- Enrique Miranda, Matthias Troffaes, Sébastien Destercke. "Generalized p-boxes on totally ordered spaces" International Conference on Soft Methods in Probability and Statistics (SMPS), 2008
- Sébastien Destercke, Didier Dubois, Eric Chojnacki. "Computing with generalized p-boxes: preliminary results". Information Processing and Management of uncertainty in knowledge-based systems (IPMU), 2008
- Sébastien Destercke, Didier Dubois, Eric Chojnacki. "Cautious conjunctive merging of belief functions". European Conference on Symbolic and Quantitative Approaches to Reasoning with Uncertainty (ECSQARU 2007)
- Lev Utkin, Sébastien Destercke. "Computing expectations with p-boxes : two views of the same problem". Proceedings of the Fifth International Symposium on Imprecise Probabilities and Their Applications (ISIPTA'07).
- Sébastien Destercke, Didier Dubois, Eric Chojnacki. "Relating Practical Representations of imprecise Probabilities". Proceedings of the Fifth International Symposium on Imprecise Probabilities and Their Applications (ISIPTA'07).
- Sébastien Destercke, Didier Dubois, Eric Chojnacki. "Transforming probability intervals into other uncertainty models". European Society for Fuzzy Logic and Technology (EUSFLAT) Conference 2007
- Sébastien Destercke, Didier Dubois, Eric Chojnacki. "Possibilistic information fusion using maximal coherent subsets". FUZZ'IEEE 2007
- Sébastien Destercke, Serge Guillaume, Brigitte Charnomordic. "Using the OLS algorithm to build interpretable rule bases: an application to a depollution problem". FUZZ'IEEE 2007
- Sébastien Destercke, Didier Dubois. "A unified view of some representations of imprecise probabilities". International Conference on Soft Methods in Probability and Statistics (SMPS 2006)

National conferences with review committee

- Sébastien Destercke, Didier Dubois, Eric Chojnacki. "Une méthode de fusion possibiliste basée sur les sous-ensembles maximaux cohérents". French meetings on fuzzy logic and its applications (LFA), 2007
- Sébastien Destercke, Didier Dubois, Eric Chojnacki. "Fusion d'opinions d'experts et théories de l'incertain". French meetings on fuzzy logic and its applications (LFA), 2006
- Sébastien Destercke, Serge Guillaume, Brigitte Charnomordic. "Amélioration de l'interprétabilité d'un algorithme classique d'induction de règles floues". French meetings on fuzzy logic and its applications (LFA), 2004

International conferences without review committee

- Eric Chojnacki, Jean Baccou, Sébastien Destercke "Numerical sensitivity and efficiency in the treatment of epistemic and aleatory uncertainty" Fifth International Conference on Sensitivity Analysis of Model Output (SAMO), 2007
- Sébastien Destercke, Didier Dubois, Eric Chojnacki. "On the relationships between random sets, possibility distributions, p-boxes and clouds". 28th Linz Seminar on Fuzzy Set Theory. 2007

Others

- Sébastien Destercke. "Représentation et synthèse d'opinions d'experts". IRSN thesis days 2006
- Sébastien Destercke. "Méthodes de traitement de l'information illustrées par une application au Benchmark OCDE BEMUSE". IRSN thesis days 2007
- Sébastien Destercke. "Amélioration de l'interprétabilité d'un algorithme d'induction de règles floues et comparaison avec d'autres méthodes d'induction" Internship report, 2004

Other scientific activities

Formation - Collaboration

- 03/2007–04/2007 2 month stay at the SYSTeMS research group, Gent university, to collaborate with professor G. de Cooman.
Framework: PhD students mobility grants from université paul Sabatier (ATUPS)
Collaboration topics: generalizing results obtained previously, characterizing notions of independence between variables.
- 2006 Second summer school on imprecise probabilities (SIPTA), Madrid
Duration: one week, 8H/day

Reviewing activities

- Journals Journal Of Statistical Theory and Practice, Journal of the Franklin Institute, Artificial Intelligence
- Conferences Fourth International conference on Soft Methods in probability and statistics (SMPS 2008).

Autres

- Presentations
- *"Relating independence notions of imprecise probability theory to event trees"*, May 2008, Workshop on Principles and Methods of Statistical Inference with Interval Probability, Durham University
 - *"Relating practical representations of imprecise probabilities"*, December 2007, invited presentation to the Dpt. of applied mathematics and computer science, Gent University.
 - *"Imprecise probabilities in risk analysis: a short introduction illustrated by examples"*, December 2007, presentation to Ms.c. students in mathematics of computer science, Gent University.
 - *"Evaluation and Synthesis of Multiple Sources of Information"*, October 2007, Meeting of OCDE PRISME project.
 - *"Evaluation et synthèse de sources multiples d'information"*, October 2007, Workgroup on fire modeling IRSN/CNRS
 - *"Fusion d'opinions d'experts et théories de l'incertain"*, October 2006, Theme 4 seminars, IRIT.

Committees

- Member of the society for imprecise probabilities: theories and applications (SIPTA)
- Member of organizing committee of French meetings on fuzzy logic and its applications
 - 4 meetings: task repartition, event organization
 - Activities: welcoming, conference organization (badges, solving practical problems, . . .).
- Member of organizing committee of fourth international conference on soft methods in probability and statistics
 - 1 meeting : task repartition, event organization