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## RECTORATUL

### Universitatea Babeş-Bolyai Competiția Excelenței 2010

#### Dosar individual

**Notă: Toate datele se referă la perioada 2005-2009**

<b>Nume, prenume, grad did.</b>	<b>DUMITRESCU DUMITRU</b>
<b>Facultatea, Catedra</b>	Facultatea de Matematica si Informatica, Catedra de limbaje si metode de programare
<b>Domeniul științific</b>	Inteligență computațională și sisteme complexe
<b>Adresa paginii web personale</b>	<a href="http://www.cs.ubbcluj.ro/~ddumitr">www.cs.ubbcluj.ro/~ddumitr</a>
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#### Criteriul I – Output

##### **1. Articole științifice publicate în reviste indexate ISI (cu menționare factorului de impact în cazul celor cotate)**

Catalin Stoean, Mike Preuss, Ruxandra Stoean, D. Dumitrescu, *Multimodal Optimization by means of a Topological Species Conservation Algorithm*, IEEE Transactions on Evolutionary Computation (2008 Impact Factor: 3.736), IEEE Intelligence Computational Society, accepted for publication, ISSN 1089-778X, 2009

R. Stoean, M. Preuss, C. Stoean, E. El-Darzi, D. Dumitrescu, An Evolutionary Resemblant to Support Vector Machines for Classification and Regression, Journal of the Operational Research Society, Palgrave Macmillan, Vol. 60, Issue 8 (August 2009), Special Issue: Data Mining and Operational Research: Techniques and Applications, Guest Editors: Kweku-Muata Osei-Bryson and Vic J Rayward-Smith, pp. 1116-1122, ISSN 0160-5682, 2009.

C. Chira, C-M. Pinteau, D. Dumitrescu, An Agent-Based Approach to Combinatorial Optimization, Int. J. of Computers, Communications & Control, ISSN 1841-9836, E-ISSN 1841-9844, Vol. III (2008), Suppl. Issue, pp. 212-217.

Diosan L., Dumitrescu D., Evolutionary coalition formation in full connected and scale free networks, INTERNATIONAL JOURNAL OF COMPUTERS COMMUNICATIONS & CONTROL, 3, 2008, 259-264.

Ruxandra Stoean, Catalin Stoean, Mike Preuss, D. Dumitrescu, Forecasting Soybean Diseases from Symptoms by Means of Evolutionary Support Vector Machines, Phytologia Balcanica, (indexed by ISI), Vol. 12, No. 3, pp. 345 - 350, Sofia, Bulgaria, ISSN 1310-7771, 2006.

Dumitrescu D., Roth A., Evolutionary optimization of Coercive Functionals Defined Euler-Monge Surfaces with Fixed Boundary Curves, Int.J.Comp., Comm.& Control, CCC, 1, ISSN 1841-9836, 31-40, 2006.

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## 2. Articole științifice publicate în ISI proceedings

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Lung Rodica Ioana , Dumitrescu, D., Guided hyperplane evolutionary algorithm, Genetic And Evolutionary Computation Conference, ACM Press, Editor: Hod Lipson, 978-1-59593-697-4, ACM Digital Library, DPLB, 2007, P. 884-891.

Lung Rodica Ioana , Dumitrescu, D., A Collaborative Model for Tracking Optima in, 2007 IEEE Congress on Evolutionary Computation, IEEE press, 1-4244-1340-0, IEEE , 2007, P. 564-567.

A. Gog, D. Dumitrescu, B. Hirsbrunner, New Selection Operators based on Genetical Relatedness for Evolutionary Algorithms. Proceedings of IEEE Congress on Evolutionary Computation (CEC 2007), Singapore, 2007, p. 4610-4614.

Ruxandra Stoean, Mike Preuss, Catalin Stoean, D. Dumitrescu, Concerning the Potential of Evolutionary Support Vector Machines, The IEEE Congress on Evolutionary Computation (CEC 2007), Singapore, 2007, pp. 1436 – 1443.

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C. Chira, C-M. Pinte, D. Dumitrescu, Sensitive Stigmergic Agent Systems – A Hybrid Approach to Combinatorial Optimization, Advances in Soft Computing, Innovations in Hybrid Intelligent Sytems, pp. 33 – 39, E. Corchado, J. M. Corchado, A. Abraham (Eds), Springer, 2007.

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C. Chira, D. Dumitrescu, Evolutionary Models for Protein Folding Simulations in the Simplified HP Model, International Conference on Computers, Communications & Control, ICCCC 2009

D. Dumitrescu, R. I. Lung, T. D. Mihoc, Generative Relations for Evolutionary Equilibria Detection, GECCO '09, Proceedings of the 11th Annual conference on Genetic and evolutionary computation, pages 1507-1512, New York, NY, USA, 8-12 July 2009. ACM. ISBN 978-1-60558-325-9.

D. Dumitrescu, R. I. Lung, T. D. Mihoc, Approximating and Combining Equilibria in Non cooperative Games, Proceedings of the 11th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing Timisoara, Romania, 2009.

R.I. Lung, D. Dumitrescu, Evolutionary swarm cooperative optimization in dynamic environments, Journal of Natural Computing, 10.1007/s11047-009-9129-9, 2009.

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C.M. Pinte, C. Chira, D. Dumitrescu, Results of Ant-Based Models for Solving the Linear Ordering Problem, Proceedings of the 11th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing Timisoara, Romania, 2009, IEEE Computer Society Press.

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A. Gog, D. Dumitrescu, A New Recombination Operator for Permutation Based Encoding. 2nd IEEE International Conference on Intelligent Computer Communication and Processing (ICCP), Proceedings of the 2nd IEEE International Conference on Intelligent Computer Communication and Processing (ICCP), UT Pres Publishing House, - ISBN (10) 973-662-233-9, 2006, p. 11-16.

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Pintea, C-M., Dumitrescu, D., Improving ant systems using a local updating rule, International Symposium on Symbolic and Numeric Algorithms for Scientific Computing, IEEE Proceedings of SYNASC, International Symposium on Symbolic and Numeric Algorithms for Scientific Computing, D. Zaharie et al., ISBN 0-7695-2453-2, 2005, 295-299.

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David, D., Diosan, L., Dumitrescu, D., A New Nature-Inspired Computational Model: Ising Model with Rays, The 7th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing, SYNASC05, IEEE Computer Society, 2005., IEEE Proceedings of SYNASC, International Symposium on Symbolic and Numeric Algorithms for Scientific Computing, D. Zaharie et al., ISBN 0-7695-2453-2, 2005, 315-320.

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David Iclanzan, D. Dumitrescu, Towards memoryless model building. In *GECCO '08: Proceedings of the 2008 GECCO conference companion on Genetic and evolutionary computation*, pages 2147–2152, Atlanta, GA, USA, 2008. ACM.

David Iclanzan, D. Dumitrescu, Large-scale optimization of non-separable building-block problems. In *PPSN 2008: 10th International Conference on Parallel Problem Solving From Nature*, pages 899–908, Dortmund, Germany, 13-17 September 2008.

David Iclanzan, D. Dumitrescu, Going for the big fish: Discovering and combining large neutral and massively multimodal building-blocks with model based macro-mutation. In *GECCO '08: Proceedings of*

*the 10th annual conference on Genetic and evolutionary computation*, pages 423–430, Atlanta, GA, USA, 2008. ACM.

C. Chira, D. Dumitrescu, C.-M. Pinte, *Heterogeneous Sensitive Ant Model for Combinatorial Optimization*, Genetic and Evolutionary Computation Conference *GECCO'08*, ACM, 163-164, July 12–16, 2008, Atlanta, Georgia, USA, 2008.

C. Chira, A. Gog, D. Dumitrescu, *Exploring Population Geometry and Multi-Agent Systems: A New Approach to Developing Evolutionary Techniques*, Genetic and Evolutionary Computation Conference *GECCO'08*, ACM, 1953-1959, July 12–16, 2008, Atlanta, Georgia, USA, 2008.

R. I. Lung, C. Chira, D. Dumitrescu, *An Agent-Based Collaborative Evolutionary Model for Multimodal Optimization*, Genetic and Evolutionary Computation Conference *GECCO'08*, ACM, 1969-1975, July 12–16, 2008, Atlanta, Georgia, USA, 2008.

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Ruxandra Stoean, Catalin Stoean, D. Dumitrescu, *Investigating Landscape Topology for Subpopulation Differentiation in Multimodal Evolutionary Algorithms. Study on Crowding Genetic Chromodynamics*, IEEE Postproceedings, 10th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing - SYNASC 2008, IEEE Press, pp. 551-554, 2008.

A. Gog, C. Chira, D. Dumitrescu, D. Zaharie, *Analysis of Some Mating and Collaboration Strategies in Evolutionary Algorithms*, Proc. of SYNASC 2008, IEEE Computer Science Publ.

Beata Reiz, Lehel Csató, D. Dumitrescu, Prufer Number Encoding for Genetic Bayesian Network Structure Learning Algorithm. Proc. Of SYNASC 2008, IEEE Computer Science Publ., 239-242.

László Szilágyi, David Iclanzan, Sándor M. Szilágyi, D. Dumitrescu, Béat Hirsbrunner, A generalized c-means clustering model using optimized via evolutionary computation, IEEE International Conference on Fuzzy Systems (FUZZ-IEEE'09, Jeju Island, Korea), pp 451–455, 2009.

C. Chira, C.-M. Pinte, D. Dumitrescu, Sensitive Stigmergic Agent Systems - A Hybrid Approach to Combinatorial Optimization, In *Innovations in Hybrid Intelligent Systems, Advances in Soft Computing*, Springer, vol 44, 33- 39, 2008.

David Iclanzan, Béat Hirsbrunner, Michèle Courant, D. Dumitrescu, Cooperation in the context of sustainable search. In *IEEE Congress on Evolutionary Computation (IEEE CEC 2009)*, 1904 – 1911, Trondheim, Norway, 18-21 May 2009.

C.-M. Pinte, G. C. Crisan, C. Chira, D. Dumitrescu, A Hybrid Ant-Based Approach to the Economic Triangulation Problem for Input-Output Tables, Real-world HAIS and Data Uncertainty, *Proceedings of the 4th International Workshop on Hybrid Artificial Intelligence Systems (HAIS 2009)*, Salamanca, Spain, *Lecture Notes in Computer Science*, Vol. 5572, 376-383, Springer, 2009.

C. Chira, A. Gog, D. Dumitrescu, Asynchronous Collaborative Search using Adaptive Coevolving Subpopulations, *ECOMASS Workshop, Genetic and Evolutionary Computation Conference GECCO'09*, July 8-12, 2009, Montreal, Canada, F. Rothlauf (Ed), *GECCO Companion*, ACM, 2575-2582, 2009.

C. Chira, C.-M. Pinte, G. C. Crisan, D. Dumitrescu, Solving the Linear Ordering Problem using Ant Models, Genetic and Evolutionary Computation Conference, July 8-12, 2009, Montreal, Canada, F. Rothlauf (Ed), ACM, 1803-1804, 2009.

C.-M. Pinte, G. C. Crisan, C. Chira, D. Dumitrescu, A Hybrid Ant-Based Approach to the Economic Triangulation Problem for Input-Output Tables, Real-world HAIS and Data Uncertainty, *Proceedings of the*

4th International Workshop on Hybrid Artificial Intelligence Systems (HAIS 2009), Salamanca, Spain, Lecture Notes in Computer Science, Vol. 5572, 376-383, Springer, 2009.

C. Chira, C.-M. Pinte, D. Dumitrescu, Multi-Population Agent Search: Stigmergy and Heterogeneity, SYNASC 08, IEEE Computer Society, 526-531, 2009.

Ruxandra Stoean, Catalin Stoean, D. Dumitrescu, Shifting from Radius-Centered Separation to Local Landscape Topology-Based Partition into Subpopulations within Crowding Genetic Chromodynamics, 10th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing, 2008.

C. Chira, A. Gog, D. Dumitrescu, *Distribution, collaboration and coevolution in asynchronous search*, Proceedings of the International Symposium on Distributed Computing and Artificial Intelligence (DCAI 2008), Salamanca, Spain, Advances in Soft Computing, Vol. 50, 2009, p.596-604.

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C.-M. Pinte, C. Chira, D. Dumitrescu, P.C. Pop *A Sensitive Metaheuristic for Solving a Large Optimization Problem*, SOFSEM 2008: Theory and Practice of Computer Science, Lecture Notes in Computer Science 4910, Springer, V. Geffert, J. Karhumaki, A. Bertoni, B. Preneel, P. Navrat, M. Bielikova (Eds), p. 551-559, 2008.

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A. Gog, D. Dumitrescu, B. Hirsbrunner, Community Detection in Complex Networks using Collaborative Evolutionary Algorithms. Proceedings of European Conference on Artificial Life (ECAL 2007), Lisbon, Lecture Notes in Computer Science 4648, 2007, p. 886-894.

### **3. Articole științifice indexate în BDI (din lista CNCSIS)**

D. Dumitrescu, R. I. Lung, T. D. Mihoc, Equilibria Detection In Electricity Market Games, Proceedings of the International Conference on Knowledge Engineering, Principles and Techniques, KEPT2009, Cluj-Napoca (Romania), July 2–4, 2009, pp. 111–114.

P.C.Pop, C-M.Pinte, D.Dumitrescu, An Ant Colony algorithm for solving the dynamic generalized Vehicle Routing Problem, An. St. Univ. Ovidius Constanta, 2009 (ISSN: 1224-1784).

A. Gog, C. Chira, D. Dumitrescu, Distributed Asynchronous Collaborative Search, Studia Universitatis Babes-Bolyai, Informatica Series, Special Issue, 99 – 102, 2009.

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C. Chira, A. Gog, D. Zaharie, D. Dumitrescu, Complex Dynamics in a Collaborative Evolutionary Search Model Creative Mathematics and Informatics, vol. 17, nr. 3, 2009.

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L. Diosan, D. Dumitrescu, *Evolutionary Coalition Formation in Complex Networks*, Studia Universitatis Babes-Bolyai, seria Informatica, vol. LII, no. 2, 115-128.

Dumitrescu, D., Simon, K., Vig, E., Genetic chromodynamics. Data mining and training applications. Studia Universitas Babes-Bolyai, Seria Informatica, Special Issue (2007) 145-152.

D. Dumitrescu, Catalin Stoean, Ruxandra Stoean, Genetic Chromodynamics for the Job Shop Scheduling Problem, Studia Univ. Babeş - Bolyai, Informatica, Special Issue, pp. 153-160, 2007.

David Iclanzan, D. Dumitrescu. Exact model building in Hierarchical Complex Systems. Studia Universitatis Babeş-Bolyai, Informatica Series, Special Issue, 161–168, 2007.

C-M.Pintea, D.Dumitrescu: Dynamically improving ant system, Automation Computers Applied Mathematics (ACAM), vol.15, no.1, pp.7–13, (ISSN: 1221-437X), 2007.

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Corina Rotar, D. Dumitrescu, Rodica Lung, Optimization using an Evolutionary Hyperplane Guided Approach – Acta Universitatis Apulensis No 11, 49-63, 2006.

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Catalin Stoean, D. Dumitrescu, Elitist Generational Genetic Chromodynamics as a Learning Classifier System, Annals of University of Craiova, Mathematics and Computer Science Series, Vol. 33, pp. 132- 140, ISSN 1223-6934, 2006.

Ruxandra Stoean, D. Dumitrescu, Catalin Stoean, Nonlinear Evolutionary Support Vector Machines. Application to Classification, Studia Babeş-Bolyai, Seria Informatica, Vol. LI, No. 1, pp. 3-12, 2006.

#### **4. Alte articole științifice/capitole publicate în reviste/volume cu referenți (peer-reviewed)**

Alexandra-Roxana Tanase, D. Dumitrescu, Solving routing in telecommunication problems using sensitive ants, Acta Univ. Sapientiae, Informatica, 1,2 (2009) 259-266.

#### **5. Cărți științifice publicate în edituri internaționale**

David Iclanzan, D. Dumitrescu, Béat Hirsbrunner, Pairwise Interactions Induced Probabilistic Model Building - Book chapter in Exploitation of Linkage Learning in Evolutionary Algorithms, Springer, 2009.

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#### **6. Cărți științifice publicate în edituri naționale acreditate**

Iantovics B., Chira C., Dumitrescu D., Principiile Agenților Inteligenți (Intelligent Agents Principles), Casa Cărții de Știință, Cluj-Napoca, ISBN: 978-973-133-035-8, 2007.

C. Chira, C.-M. Pinte, D. Dumitrescu, A Multi-Agent Stigmergic Model for Complex Optimization Problems, From Natural Language to Soft Computing: New Paradigms in Artificial Intelligence, Editing House of Romanian Academy, Zadeh L.A., Tufis D., Filip F.G., Dzitac I.(Eds.), 2008, pp. 51-62.

#### **7. Editor de volume publicate în edituri naționale și internaționale**

#### **8. Brevete internaționale**

#### **9. Brevete naționale**

#### **10. Impact tehnologic al brevetelor: resurse financiare extrabugetare atrase în relație cu economia**

#### **11. Realizări artistice naționale și internaționale (Domeniul Arte)**

(Expoziții, spectacole, concerte, publicații, filme, înregistrări)



## **Criteriul II – Prestigiu profesional**

### **1. Citări ale articolelor ISI listate la Criteriul I**

C. Chira, A. Gog, D. Dumitrescu, *Exploring Population Geometry and Multi-Agent Systems: A New Approach to Developing Evolutionary Techniques*, Genetic and Evolutionary Computation Conference *GECCO'08*, ACM, 1953-1959, July 12–16, 2008, Atlanta, Georgia, USA, 2008.

**Citat în:**

Ullah, A.S.S.M.B.; Sarker, R.; Lokan, C.; *An Agent-based, Evolutionary Computation*, 2009. CEC '09. IEEE

Chira C., Dumitrescu D., *Multi-Agent Systems and Ontologies for Distributed Collaboration*, Transactions on Information Science and Applications, Issue 8, Volume 3, pp 1452-1460, ISSN 1790-0832, 2006.

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C. Yu, Y. Luo, *Analysis of decision-making behavior*, TRANSACTIONS on SYSTEMS

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2. Expert Systems For Heating Systems Programming P Vizureanu, C Bejinariu, R Comăneci, C Predescu, R ... - 2007 - conferinta.amcsit.ro
3. Performance Assessment in Public Administration S Irimie, R Munteanu - UNIVERSITAS PUBLISHING HOUSE ..., 2005 - socionet.org
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1. Considerations on an Intelligent Buildings Management System for an ... A Gligor, H Grif, S Oltean - 2006 IEEE International Conference on Automation, ..., 2006
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5. Multilayer perceptron and neural networks MC Popescu, VE Balas, L Perescu-Popescu ... - ... on Circuits and ..., 2009

**4. Distincții, premii și alte recunoașteri naționale și internaționale**

Premiul Grigore Moisil al Academiei Române, premii de excelență științifică acordate de UBB

**5. Studenți naționali atrași (activități de coordonare științifică și didactică)**

- Îndrumare lucrări de licență (număr lucrări susținute) : 20
- Îndrumare lucrări de disertație (număr lucrări susținute) : 21
- Doctoranzi (lista nominală a doctoranzilor înmatriculați resp. lista nominală a tezelor susținute)

Teze susținute :

Mihai Oltean  
 Crina Groșan  
 Laura Dioșan  
 Rodica Ioana Lung  
 Anca Gog  
 Karoly Simon  
 Camelia Pinte  
 Barna Iantovics  
 Răzvan Florian  
 Ruxandra Gorunescu  
 Cătălin Stoean  
 Corina Rotar  
 Agoston Roth  
 David Iclănzan

Lista doctoranzilor înmatriculați:

Ioan Noje  
 Monica Chiș  
 Oana Muntean  
 Tudor Dan Mihoc

Attila Bartha  
Noemi Gasko  
Reka Nagy  
Andrei Sirghi

- Post-doctoranzi (lista nominală) :

Rodica Ioana Lung  
Camelia Chira

#### **6. Studenți internaționali atrași (activități de coordonare științifică și didactică)**

- Îndrumare lucrări de licență (număr lucrări susținute)
- Îndrumare lucrări de disertație (număr lucrări susținute)
- Doctoranzi (lista nominală a doctoranzilor înmatriculați resp. lista nominală a tezelor susținute)
- Post-doctoranzi (lista nominală)

#### **7. Membru în comitetul de redacție la reviste ISI**

#### **8. Membru în comitetul de redacție la reviste BDI**

STUDIA UNIVERSITATIS Babes Bolyai seria Informatica

#### **9. Participări la programe/granturi de cercetare finanțate din sursă internațională (se menționează și valoarea)**

#### **10. Participări la programe/granturi finanțate din sursă națională (se menționează și valoarea)**

#### **11. Coordonări de programe/granturi finanțate din sursă internațională (se menționează și valoarea)**

#### **12. Coordonări de programe/granturi finanțate din sursă națională (se menționează și valoarea)**

NOI MODELE DE CALCUL NATURAL ÎN STUDIUL COMPLEXITĂȚII ȘI REZOLVAREA PROBLEMELOR COMPLEXE, PN-II, 2007-2010, valoarea: 739,879

NOI PARADIGME COMPUTATIONALE ÎN ABORDAREA PROBLEMELOR COMPLEXE DINAMICE, PN-II, 2007-2010, valoarea: 583,637

CALCUL EVOLUTIV: NOI PARADIGME, TEHNICI ȘI CLASE DE ALGORITMI EVOLUTIVI. APLICATII ÎN OPTIMIZARE ȘI INTELIGENȚA ARTIFICIALĂ, CNCSIS, 2004-2007, valoarea: 12,000

CALCUL NATURAL – NOI PARADIGME ȘI APLICATII, CNCSIS, 2005-2007, valoarea: 280,000

MODELE COMPUTATIONALE ÎNȘPIRATE DIN NATURA. NOI PARADIGME ȘI METAEURISTICI. APLICATII REALE, CNCSIS, 2007-2009, valoarea: 199,870

#### **13. Profesor invitat la universități de prestigiu, cu titlu oficial**

#### **14. Membru în comisii profesionale relevante, cu titlu oficial**

**Consiliul Național de atestare a titlurilor, diplomelor și certificatelor universitare**

#### **15. Conferințe invitate internaționale**

BICTA 2006, HAIS 2008, ICCCE 2008, ICCCE 2006, Joint Symposium on Applied Computational Intelligence, Pecs, 2006, Development of Intelligent and Complex Systems, American Institute of Physics Proceedings, 2009, Advanced Bio-Inspired Computational Methods.

**16. Membru în comitete de organizare sau științifice ale unor conferințe internaționale**

KEPT 2009, SYNASC 2009, SYNASC 2009 Workshop on Natural Computing and Applications, HAIS 2009, BICTA 2006, NNCA 2008, WNCA 2007, HAIS 2008.

### **III. Realizare remarcabilă**

#### **Reconstruirea Teoriei Jocurilor strategice din perspectiva complexității și computabilității.**

Programul propus de reconstruire a Teoriei Jocurilor (TJ) a pornit de la limitările evidente legate de aplicarea Teoriei Jocurilor în sisteme economice și sociale complexe. Acest program este conceput ca o parte a paradigmei emergente care favorizează explicațiile sistemice bazate pe interacțiuni complexe multiple. S-a urmărit un echilibru între o abordare formală și aspectele computaționale.

Aplicarea teoriei jocurilor în probleme reale presupune considerarea unui număr mare de agenți și acesta este unul din punctele slabe ale abordării standard a TJ, bogată în rezultate matematice, dar inefectivă din punct de vedere computațional. Am construit un cadru conceptual care să permită interacțiuni strategice bazate pe acceptarea unor diferențe semnificative între agenți. Am propus conceptele de *meta-raționalitate* și de *metastrategie*, conform cărora agenți neuniformi, cu diferite comportament sau raționalitate, pot interacționa coerent. În cadrul programului am definit noi modele computaționale, care permit abordarea problemelor extrem de complexe cu număr foarte mare de jucători.

#### **A. Detectarea echilibrelor. Noi clase de echilibre**

Prima clasă de contribuții vizează extinderea noțiunii de soluție de joc (echilibru), o modalitate computațională eficientă pentru calculul echilibrelor și o metodă generală de definire și caracterizare a unor noi clase de echilibru. Principiile rezultate din această primă clasă de contribuții sunt:

- i. Noțiunea de relație generativă a unui echilibru.
- ii. Identificarea mai multor relații generative pentru echilibrele standard (Nash, Aumann, etc.)
- iii. Studiul algebric și computațional al relațiilor generative
- iv. O metodă generală de construire a relațiilor generative
- v. Definirea de noi clase de echilibre pornind de la studiul relațiilor generative și o metodologie generală pentru construirea de noi echilibre.
- vi. Un model computațional eficient pentru detectarea echilibrelor în jocuri necooperative bazat pe calcul natural (optimizarea multicriterială evolutivă).
- vii. Aplicarea modelelor și tehnicilor propuse în studiul unor probleme practice complexe (NP-dificile) cum ar fi probleme de programare a producției (job scheduling), analiza unei piețe de distribuție a energiei electrice, optimizarea alocării canalelor în telecomunicații.
- viii. Un nou model conceptual și computațional de calcul al echilibrelor care permite extinderea semnificativă cu două ordine de mărime a numărului de jucători.
- ix. Construirea unui model al dezvoltării durabile bazat pe conceptele și tehnicile introduse

#### **B. Studiul interacțiunilor strategice în sisteme reale (behavioral games, epistemic games)**

Societate umană este un sistem cu proprietăți emergente (inclusiv normele sociale) care nu poate fi derivat dintr-un model al agenților raționali. Numeroase experimente au demonstrat convingător că oamenii nu adoptă echilibrul Nash ca strategie spontană. Studiul acestui domeniu este de mare importanță dacă dorim să obținem modele consistente ale interacțiunilor strategice. Contribuțiile:

- i. Un nou model de echilibru (fuzzy Nash-Pareto) care descrie maniera în care subiecți umani interacționează în jocuri de tipul behavioral games (de tipul centipede sau guessing games).
- ii. Conceptul de învățare prin interacțiuni strategice limitate.
- iii. Un model al stabilirii consensului în grupuri sociale prin interacțiuni strategice locale.
- iv. O perspectivă computațională și simulări privind stabilirea echilibrului în behavioral games.

#### **C. Teoria deciziilor și interacțiunile strategice- o abordare unificatoare**

Teoria deciziilor este analiza comportamentului agenților în condiții de incertitudine nestrategică. Faptul că modele de bază sunt teoria probabilităților, teoria sistemelor nuanțate (fuzzy) și teoria optimizării este semnificativ. Am încercat să construim o abordare mai cuprinzătoare în care aspectele strategice devin o componentă esențială în procesul de luare a deciziilor, pornind de la observația simplă- și ignorată- că ființele umane nu sunt neapărat maximizatori și procesul de decizie este puternic contextualizat. În multe situații decizia este mai degrabă rezultatul unor interacțiuni strategice (negocieri, jocuri explicate sau implicite, etc.) decât al unei optimizări multicriteriale.

Am propus o abordare în care aspectele probabiliste, fuzzy, și de optimizare multicriterială (Pareto sau nu) sunt strâns împletite cu cele ale interacțiunilor strategice. În acest cadru concepte din teoria jocurilor strategice devin relevante în teoria deciziilor și reciproc. Noile clase de echilibre (Nash-Pareto, Aumann-Pareto, etc.) sunt pași importanți pe calea acestei unificări. În plus s-a propus un model al relațiilor generative probabiliste model relevant în domeniul optimizării după un număr mare de obiective.

Lucrările legate de acest program au fost prezentate, începând cu 2008, la importante conferințe internaționale. Ele au intrat în circuitul științific internațional, fiind citate și constituind punct de plecare pentru alte abordări.

Notă. Preocupările acestui program au evoluat din (și s-au dezvoltat în paralel cu) cercetările privind calculul natural (algoritmi evolutivi, swarm intelligence, Ant colony optimization, etc.) și studiul interacțiunilor în sisteme complexe (folosind în principal modele de automate celulare, rețele complexe, optimizare cu metaeuristici).

Data: 21.03.2010

Semnătura:

**Certific validitatea datelor prezentate**

Sef de catedră,