



ROMÂNIA
UNIVERSITATEA BABEŞ-BOLYAI CLUJ-NAPOCA
Str. Mihail Kogălniceanu, nr. 1, 400084 Cluj-Napoca
Tel. (00) 40 - 264 - 40.53.00*; 40.53.01; 40.53.02 ; 40.53.22
Fax: 40 - 264 - 59.19.06
E-mail: staff@staff.ubbcluj.ro

RECTORATUL

Universitatea Babeş-Bolyai
Competiția Excelenței 2010

Dosar individual

Notă: Toate datele se referă la perioada 2005-2009

Nume, prenume, grad did.	DUMITRESCU DUMITRU
Facultatea, Catedra	Facultatea de Matematica si Informatica, Catedra de limbaje si metode de programare
Domeniul științific	Inteligență computațională și sisteme complexe
Adresa paginii web personale	www.cs.ubbcluj.ro/~ddumitr
Adresa e-mail	ddumitr@cs.ubbcluj.ro

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

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

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

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

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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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72. Organizational Survival and the Emergence of Collaboration Networks:a Multi-Agent Approach - Pedro José Ramos Moreira de Campos, 2007
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曲杰, 金泉林, 徐秉业 - 机械工程学报, 2009 - cqvip.com

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Citat în:

1. Financial Diagnosis Expert System, I Claudia - economyinformatics.ase.ro 2007
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
4. Integrated system, decisional support based on multisensorial information fusion for behavior surveillance and prediction of dams and hydropower plants, A Calarasu, I Stoian, O Dancea, M Gordan, T Popescu, ... - ... Conference on Automation ..., 2008

5. A Computational Methodology as an Artificial Language About Natural Language Rules K Fouskakis - 8th International Conference on DEVELOPMENT AND APPLICATION SYSTEM 2006
6. Soluții portabile de instrumentație virtuală aplicate în monitorizarea mediului DN Daniel, DN Adrian, MI Virgil - labsmn.pub.ro 2005

Dumitrescu, D., Costin, H., *Rețele Neuronale (Neural Networks)*, Teora, București.

Citat în:

1. Considerations on an Intelligent Buildings Management System for an ... A Gligor, H Grif, S Oltean - 2006 IEEE International Conference on Automation, ..., 2006
2. The Use of the Pattern Recognition and Classification Techniques within an Assisted Research System for the Vegetal Genetics N Morariu, S Vlad - STUDIES IN INFORMATICS AND CONTROL, 2006 – Citeseer
3. About Conxinist Paradigma LC COCULESCU - economyinformatics.ase.ro 2005
4. INTELIGENT MODELING RELIED ON NEURONAL NETWORKS FOR CORRECTION PROCESS MODELLING LDC COCULESCU, EC COCULESCU - imtuoradea.ro 2007
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 atrați (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 *metaraționalitate* 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,