Artificial Intelligence Economic Research Center

www.aiecon.org

Introduction

AI-ECON Research Center, formerly the AI-ECON Research Group, was established in 1995 at the College of Social Sciences, National Chengchi University. While interdisciplinary innovation may have triggered the idea of its establishment, it is the growth of computer power that has given momentum to such efforts. Our goal of the center is to fully harness the computer power to facilitate the integration of economics into the multidisciplinary research stream and to benefit economists from the cross-fertilization of ideas with different disciplinary backgrounds.

Subgroups and Goals

AI-ECON Research Center is devoted to the study of economics from the bottom up with simulated evolution and learning and to the development of software for teaching computational economics. The Center covers two active research subgroups in AI, namely, the Agent-Based Computational Economics and Computational Intelligence in Economics and Finance. The purpose of the subgroups is to sustain the growing researches in their related fields and to study frontier issues synergistically with international academic society. Eash subgroup is described as follows:

Agent-Based Computational Economics and Finance

Agent-Based Computational Economics and Finance (ACE) is a growing research area in economics and indeed delivers an entirely new way of studying. Using the extended agent-based models, we are simulating the evolution of strategic behavior and investigating the characteristics of the long-run surviving population of agents. By introducing agent-based modeling

to economic and financial markets, issues such as market dynamics or policy appraisal are able to be addressed. This subgroup is currently researching on the following topics and is expected to expand in the future:

1. The Cobweb Model
2. Overlapping Generations Model
3. Artificial Stock Markets
4. Agent-Based Double Auction Markets
5. Evolutionary Model of R&D and Innovation
6. Agent-Based Lottery Markets
7. Small World Network Model

Computational Intelligence in Economics and Finance

Computational intelligence (CI) is a newly developed paradigm of intelligent systems resulted from a synergy among fuzzy logics, artificial neural networks, evolutionary computation, machine learning, etc., broadening the interdisciplinary researches in computer science, physics, engineering, mathematics, statistics, psychology, as well as social sciences.

AI-ECON Research Center has a long history in utilizing various CI tools, such as *Artificial Neural Networks*, *Genetic Algorithms*, *Genetic Programming*, *Self-Organizing Maps*, *Reinforcement Learning, Decision Trees*, etc. By keeping the pace with the development in CI techniques, we are able to utilize tools to best facilitate our researches.

Members

With Dr. Shu-Heng Chen as Director, the Center currently associates with 16 professors in both academic and industrial sectors across the world, It has 15 researchers, including 6 Ph. D. students. AI-ECON Research Center holds an open attitude toward research fellows all over the world. We strongly encourage collaborations across different fields and disciplines. Researchers in independent institutions as well as industrial organizations are also invited to join the research and development.

Academic Activities

AI-ECON Research Center is actively organizing and participating in the following academic activities to promote interdisciplinary AI researches and applications and to stimulate the potential of students interested in ACE:

1. Graduate Education
   (a) Tutorials
   (b) Short Courses, Workshops and Seminars
   (c) Joint Training Program with International Universities or Research Institutes
   (d) Innovative Curriculum Design
   (e) Developing Educational Software
   (f) Online and Distance Learning Facilities

2. Publications
   (a) International Journal
   New Mathematics and Natural Computing, World Scientific, 2005
   (b) Edited Books and Volumes
      i. Evolutionary Computation in Economics and Finance, Series on Studies in Fuzziness and Soft Computing, Vol. 100 (series editor: J. Kacprzyk), Physica-Verlag, A Springer-Verlag Company, 2002.
      ii. Genetic Algorithms and Genetic Programming in Computational Finance, Kluwer. 2002.
      iii. Computational Intelligence in Economics and Finance, Series on Advanced Information Processing (series editor: L. Jain), Springer-Verlag, 2003.
      iv. Multi-Agent for Mass User Support, Lecture Notes in Artificial Intelligence, Springer, 2004.
      v. Computational Economics: A Perspective from Computational Intelligence, IDEA Group INC. (will be published in 2005)
      vi. Applications of Artificial Intelligence in Finance and Economics, Elsevier Ltd. 2004.
      vii. Guest editor, Information Science: An International Journal, A Special Issue on Computational Intelligence in Economics and Finance, Elsevier. 2003.

3. International Conferences

(a) The Joint Conference on Information Sciences (JCIS) – The International Workshop on Computational Intelligence in Economics and Finance (CIEF Since 2000)
(c) The Congress on Evolutionary Computation (CEC 2004) – Special Session: Evolutionary Computation in Finance and Economics
(d) Annual Summer Workshop on the Economic, Financial and Managerial Applications of Computational Intelligence (since 2004)
(e) Herbert Simon Series Seminar (since 2005)

4. Collaboration Works
   (a) Agent-Based Computational Simulation
      - Center for Advanced Studies University of Buenos Aires, Argentina University of Buenos Aires, Argentina
      - Health Insurance Commission, Australia
      - Max Planck Institute for Research into Economic Systems, Evolutionary Economics Group, Germany
      - Centre for Mathematics and Computer Science (CWI), Holland
      - Department of Computer Science, National Defense Academy, Japan
      - Electrotechnical Laboratory, Information Science Division, Japan
      - Software & Pervasive Computing, Tokyo Research Laboratory, Japan
      - Department of Computers and Systems Engineering, Tokyo Denki University, Japan
      - Laboratory of Biometrics, Div. of Agriculture and Agricultural Life Sciences, The University of Tokyo, Japan
      - Graduate School of Economics Kyoto University, Japan
      - Center for Social Complexity, George Mason University, USA
      - Department of Economics, Iowa State University, USA
      - School of Business, University of Redlands, USA
      - Decision and Information Sciences, Argonne National Laboratory, USA
      - Department of International Trade, National Chengchi University, Taiwan
      - Department of Information Management, Yuan Ze University, Taiwan
   (b) Computational Intelligence
      - University of Buenos Aires, Argentina

- Operations Research Laboratory Department of Applied Mathematics Tsinghua University, China
- Department of Management Sciences City University of Hong Kong, Hong Kong
- Department of Computer Engineering and Institute of Cognitive Science, Seoul National University, Korea
- Department of Industrial Information, Kongju National University, Korea
- Centre for Computational Intelligence, Faculty of Computing Sciences and Engineering, De Montfort University, UK
- Applied Computational Intelligence Research Group, University of Paisley Scotland, UK
- Department of Finance & Business Information Systems, Nottingham Business School, UK
- Natural Computation Group School of Computer Science The University of Birmingham, UK
- School of Business, University of Redlands, USA
- Decision and Information Sciences, Argonne National Laboratory, USA
- Department of Computer Science and Information Systems, Texas A&M University-Commerce, USA
- College of Management, Shenzhen University, China
- Department of International Business, National Kaohsiung University of Applied Sciences, Taiwan
- Department of Management Information System, National Kaohsiung University of Applied Sciences, Taiwan
- Department of International Trade, Feng Chia University, Taiwan
- Department of Economics, Soochow University, Taiwan
- Department of Finance and Banking, Aletheia University, Taiwan
- Department of Business Administration, Chang Gung University, Taiwan
- Institute of Physics of Academia Sinica, Taiwan

Software and Other Resources

Software packages developed by AI-ECON Research Center are provided to the public for academic use. For more resources, please refer to the website of AI-ECON Research Center at http://www.aiecon.org