2005 "Herbert Simon 系列講座 " 之七

Introduction into Complex Networks

主講人：Sergey Dorogovtsev
A.F. Ioffe Physico--Technical Institute of Academy of Sciences of Russia
Departamento of Fisica
Universidade of Aveiro

Agent-based Economic Modeling and Experimental Economics

主講人：Jasmina Arifovic
Department of Economics
University of Simon Fraser

主辦單位：政治大學研究發展處(教學卓越計劃之延攬頂尖及傑出教師計劃)
政治大學社會科學學院、經濟系、暨人工智慧經濟學研究中心
中央研究院物理研究所、國家理論科學研究中心
中興大學物理系
協辦單位：中華民國人工智慧學會

各位先進：

2005 "Herbert Simon 系列講座 " 之七 - **Introduction into Complex Networks 與 Agent-based Economic Modeling and Experimental Economics (HSSS 2005, Series #7)** 即將於 **12 月 4 日至 12 月 10 日** 正式舉行，分別由國際知名學者蘇俄科學院理論系的 Dorogovtsev 教授以及加拿大西蒙佛斯大學經濟系的 Arifovic 教授主講！以下爲本次活動簡介，**更詳細的資訊請參考附檔所提供的投影片資料**，期待您撥冗參加！

"Herbert Simon 系列講座 " 乃爲紀念 Herbert Simon 而設，Herbert Simon 爲 1975 年電腦科學界中之殊榮 -- 杜林獎 (A. M. Turing Award) – 之得獎人暨 1978 年諾貝爾經濟學獎得主，並於 1993 年因對心理學的終生傑出貢獻而榮獲美國心理學會獎 (American Psychological Association's Award) ，他率先於經濟學中建立「有限理性」的概念，並利用電腦演算來了解及測試「有限理性」的行爲及決策模式，不但開啓了「行爲經濟學」的大門，並爲日後跨科際、跨學界的「計算智慧」奠定了先機。

計算智慧（Computational Intelligence ）爲一系列專門技術之統稱，包含了類神經網路、模糊邏輯、演化計算等，且爲計算經濟學與計算財務學中最重要的工具之一。在過去的十年間，計算智慧已被廣泛地應用在各類經濟與財務之模型、預測、與分析上。其中最顯著的應用便是在財務資料探勘（ Financial Data Mining ）與代理人基計算經濟（ Agent-Based Computational Economics）的研究域領中。

講座學者簡介 1：

Dr. Sergey Dorogovtsev 爲 2003 年由牛津大學所出版膾炙人口之一書「網路之演化」(Evolution of Networks) 之作者，他是蘇俄的物理學家，目前任職於聖彼得堡的蘇俄科學院的理論系及葡萄牙 Aveiro 大學的物理系。他是目前國際知名的研究「複雜網路」(complex networks) 的學者。複雜網路是目前聯繫社會科學、物理學與計算機科學最熱門的跨領域的學術研究平臺。因此不論是正在學習相關領域的學子或已學有專精的學者，對「複雜社會網路」(complex social networks)的研究，都不應該忽視，因爲它貫穿了經濟、管理、政治、社會等學門的核心，而在基礎上，它又依賴厚實的數學，在技術操作上，又需要大量計算。所以，很適合作爲發展跨領域研究的項目，而 Dr. Dorogovtsev 的演講正好爲營造這樣的環境做一個適當的準備。

講座學者簡介 2：

Arifovic教授是首位將遺傳演算法(Genetic Algorithm, GA)運用至總體經濟學並進而與實驗經濟學結合的一線專家學者，她目前任教於加拿大Simon Fraser University, B.C., Canada，曾多次受邀至國外擔任客座教授或從事研究工作，如California Institute of Technology (2002年迄今)、Federal Reserve Bank of St. Louis (2003年)等。同時，Arifovic教授也是將代理人基模型應用在蛛網模型(Cobweb Model)與疊代模型(Overlapping Generations Model, OLG Model)的創始者，其多樣且具突破性與革命性的思考，在本次演講中必能爲對學界之跨領域學門，特別是經濟、心理與資科、資管的橫向聯繫帶來很大幫助。

講座議程 1：

主題: Introduction into Complex Networks

Prof. Dorogovtsev			
場次	時間	地點	講題
1	12/5 (一) 14:00 – 17:00	政治大學 綜合院館 271034 室	Classical Random Networks: The History, the Main Notions, and Ideas
2	12/6 (二) 14:00 – 16:00	中興大學 理學大樓 601 室	Discovery of Complex Networks
3	12/8 (四) 19:00 – 22:00	政治大學 綜合院館 271034 室	Cooperative Effects in Complex Networks
4	12/9 (五) 9:30 – 11:30	台灣大學 物理系 312 室	The Architectures of the Internet and WWW
5	12/9 (五) 14:00 – 16:00	台灣大學 物理系 312 室	Cellular, Social, Economic, and Other Networks; Perspectives

講座議程 2：

主題: Agent-based Economic Modeling and Experimental Economics

Prof. Arifovic			
場次	時間	地點	講題
1	12/4 (日) 14:00 – 17:00	政治大學 綜合院館 271034 室	Models of Competitive Firms
2	12/5 (一) 19:00 – 22:00	政治大學 綜合院館 271034 室	Models of Fiat Money
3	12/7 (三) 19:00 – 22:00	政治大學 綜合院館 271034 室	Behavior of the Exchange Rates and speculative attack
4	12/10 (六) 14:00 – 17:00	政治大學 綜合院館 271338 室	Mechanism Design: Computer Testbeds and Experimental Evidence
5	12/11 (日) 14:00 – 17:00	政治大學 綜合院館 271034 室	One-shot and Repeated Games

課程大綱 1：**Introduction into Complex Networks**

Lecture 1:Classical random networks: The history, the main notions, and ideas

(1)The origin of graph theory.
(2)The notion of a random graph.
(3)Erdos-Renyi random graphs.
(4)Why are sparse networks important?
(5)The birth of the giant connected component.
(6)Physics approach to random systems.
(7)Degree and degree distribution.
(8)Clustering. What are trees?
(9)The organization of classical random graphs.
(10) The shortest-path distance.
(11) The small-world phenomenon.

Lecture 2: Discovery of complex networks

(1)What are complex networks?
(2)First empirical observations.
(3)The small-world networks.
(4)The configuration model and its generalizations.
(5)The problem of high clustering. Tree ansatz.

(6)Random networks from the point of view of a physicist.
(7)Equilibrium and non-equilibrium networks.
(8)How do complex architectures emerge?
(9)Heavy tailed distributions in nature.
(10) Preferential attachment and scale-free networks.
(11) Basic models of complex networks and their architectures.

Lecture 3: Cooperative effects in complex networks
(1)Networks as infinite dimensional objects.
(2)The idea and validity of the mean-field description.
(3)Percolation phenomena in physics.
(4)Random failures in networks.
(5)Ultra-resilience of scale-free networks.
(6)The weak point of scale-free networks; intentional attacks.
(7)General behavior of cooperative models on networks.
(8)The spread of deceases and the problem of the epidemic threshold.
(9)Finite size effects; real-world networks as mesoscopic systems.
(10) The role of correlations in networks.
(11) Synchronization in complex networks.

Lecture 4: The architectures of the Internet and WWW
(1)The Internet versus the WWW, the histories of the Internet and WWW
(2)Internet Protocols.
(3)Layers of the Internet.
(4)The Autonomous System net of the Internet.
(5)The router level of the Internet.
(6)The role of the geographic factor.
(7)Internet traffic and congestion.
(8)The jelly fish picture of the Internet, k-cores.
(9)Directed networks.
(10)Layers of the WWW.
(11)The architecture of the WWW.
(12)Reciprocal links in the WWW.
(13)Cliques and Web communities
(14)Search technologies.

Lecture 5: Cellular, social, economic, and other networks; perspectives
(1)Ecological networks -- food webs.
(2)Networks of chemical reactions.
(3)Metabolic reactions networks -- the problem of stability.

(4)Networks of protein interactions and genetic regulatory networks.
(5)How do software components connected?
(6)Power grids.
(7)Networks of ownerships.
(8)Friendships and e-mail networks, Milgram's small-world experiment.
(9)Social networks, extraction of communities, how to influencepublic opinion.
(10) Blogs, their interconnections, and role in politics.
(11) Open problems, recent results, and perspectives of the scienceof complex networks.

課程大綱 2：**Agent-based Economic Modeling and Experimental Economics**

This course will focus on agent-based modeling in a number of economic environments. Each economic model will first be briefly analyzed using the traditional economic analysis techniques. Then, it will proceed in describing and analyzing the properties of the models when an agent-based modeling approach is adopted. In our agent-based modeling, the emphasis will be on applications that incorporate evolutionary algorithms (genetic algorithms, genetic programming, and evolutionary programming). However, we will also compare the behavior of a number of other algorithms that have been frequently used in the literature on modeling economic agents adaptation. Analysis of the behavior of agent-based model will then be followed by presentation of the experimental evidence of the behavior of human subjects in the same environments. Subsequently, there will be discussion whether agent-based models can capture experimental behavior.

Topics
1. Agent-based Modeling and Experimental Economics
2. A Model of Competitive Firms
3. One-shot and Repeated Games
4. Behavior of the Exchange Rates
5. Models of Speculative Attacks
6. Mechanism Design: Computer Testbeds and Experimental Evidence

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