

**ROMANIA**  
**MINISTRY OF NATIONAL EDUCATION**  
**AGORA UNIVERSITY OF ORADEA**  
**FACULTY OF LAW AND ECONOMICS**



# **Doctor Honoris Causa**

**PROFESSOR**

**Dr. YONG SHI**

**University of Chinese Academy of Sciences**  
**&**  
**Chinese Academy of Sciences**  
**Research Center on Fictitious Economy & Data Science**  
**BEIJING, CHINA**

**ORADEA**  
**MAY 7, 2014**

# AGORA UNIVERSITY OF ORADEA



## MANAGERIAL STAFF



***Prof. Adriana Manolescu, PhD***  
*President of The Senate  
of Agora University*  
adrianamanolescu@univagora.ro



***Prof. Mișu-Jan Manolescu, PhD***  
*President of The Administration  
Council of Agora University*  
mmj@univagora.ro



***Prof. Ioan Dzitac, PhD***  
*Rector of Agora University*  
rector@univagora.ro



***A. Prof. Gabriela Bologa, PhD***  
*Dean of Law & Economics Faculty  
of Agora University*  
decan@univagora.ro

# DOCTOR HONORIS CAUSA

## OF AGORA UNIVERSITY



**PROFESSOR**  
**Dr. YONG SHI**

**ORADEA, MAY 7, 2014**

## **LAUDATIO**

**addressed to Prof. YONG SHI, PhD,  
when awarding the title of Doctor Honoris Causa  
of the Agora University of Oradea**



**Prof. Dr. YONG SHI  
(b. 1956, Chengdu, China)**

*“Starting with his paper published in 1992, where the theoretical relationship between linear programming (LP), multiple criteria or objective linear programming (MC), and multiple criteria and multiple constraint level linear programming (MC2) was proved, Dr. Yong Shi initiated the extensive research efforts in the theory and applications of MC2 problems....His contributions in the filed of MC2 problems has added significant knowledge to Multiple Criteria Decision Making (MCDM)... Dr. Yong Shi is one of leading scholars in the field.” [...]*

*I rank Dr. Yong Shi as one of leading scholars in the fields of Multiple Criteria Decision Making”.*

*(Tom Saaty, the father of Analytical Hierarchy Process (AHP), the member of the National Academy of Engineering and University of Pittsburgh, USA).*

*“Prof. Yong Shi’s optimization based data mining methods ... have significantly enriched the literature and will unquestionably become influential as sources of knowledge in the community.” [...] Yong Shi’s application of optimization and multiple criteria mathematical programming in building National Personal Credit Scoring System at People’s Bank of China is the best evidence of showing his significance contribution to the daily economic life of the people in China.” [...]*

*The findings of Professor Shi and his colleagues are not only innovative, but represent significant contributions to the interdisciplinary field of optimization and data mining.”*

*(Fred Glover, Member of National Academy of Engineering, University of Colorado, USA)*

*“China Score developed by Yong Shi is the best evidence of showing the significance of the project and potential contribution to the daily economic life of the people in China”.*

*(Daniel Berg, Member of National Academy of Engineering, University of Miami, USA)*

**Yong Shi**, born in Chengdu, China on August 24, 1956, is a Senior Member of IEEE, serves as the Executive Deputy Director, Chinese Academy of Sciences Research Center on “Fictitious Economy & Data Science”. He was the Charles W. and Margre H. Durham Distinguished Professor of Information Technology, College of Information Science and Technology, Peter Kiewit Institute, University of Nebraska, USA 1999-2004.

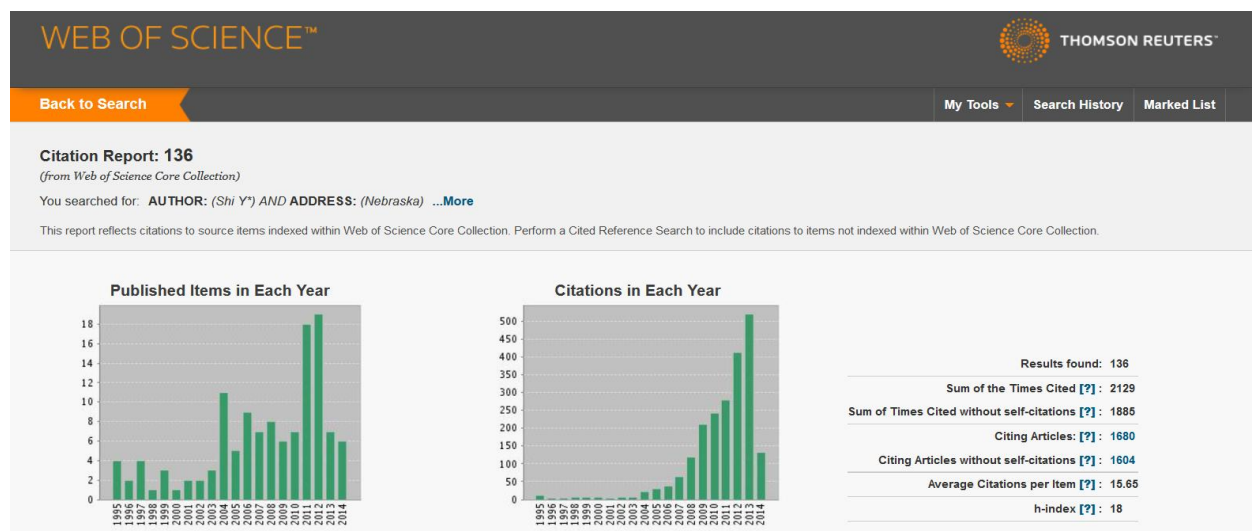
Dr. Shi's *Research Areas* include *a) Methodological Areas*: Multiple Criteria Decision Making; Multiple Criteria Multiple Constraint-level (MC2) Linear Programming; Optimal Linear Designs and Contingency Plans; Nonlinear Forecasting; Satisfying Models and Goal Setting; Fuzzy Sets and Systems; and *b) Functional Areas*: Bioinformatics; Data Mining and Data Warehousing; Information Intrusion; Detection and Prediction; Information Management; Information Overload; Intelligent Knowledge Management; Telecommunications Management; Decision Support Systems; Aggregate Production Planning and Scheduling; Capital Budgeting; Transfer Pricing; Petroleum Engineering Management; Social Welfare and Capital Taxation; Agricultural Policy Making.

He published 21 books (19 in English: 9 by Springer, 3 by World Scientific, 2 by Elsevier, 1 McGraw-Hill/Irwin). Among them, 8 books have been cited 60 times by others.

He published 158 research papers in 86 different journals and numerous papers in international conferences ranging from economics, finance, social science, and computational sciences. There are more than 400 SCI/SSCI citations by others. One of his papers has been cited 84 times by others, which has been ranked as the top 0.1% hot papers by ESI (Essential Science Indicators) of ISI Web of Science from 2009-2010 and the top 1% highly cited articles from 2001-2011.



**Impact in Google Scholar: more than 300 published works and 4,000 citations**  
(accessed on April 03, 2014)



**Impact in ISI Web of Science : more than 130 published articles and 2,100 citations**  
(retrieved on April 03, 2014)

The US top journal of Management Information Systems Quarterly has ranked Yong Shi as the third place of the Top Academic Authors in BI&A (Business Intelligence & Analytics) in its Vol. 36, NO.4, 2012, page 1181.



From 2006-2009, he has led a research and technical group at the People's Bank of China (China's Central Bank) to use the National Personal Credit Database (Petabyte Big Data), which is the world largest database of this kind and contains 800 million individual's banking records, and developed China's National Credit Scoring System (China Score) which differs from the FICO Credit Scoring that is widely used by Credit Bureaus in USA, Australia and some European countries. China Score was designed by applying Yong Shi's unique theory and methods in optimization based data mining and intelligent knowledge.


Dr. Yong Shi's key theoretical contributions to economics and social sciences can be summarized as follows:

*First*, he founded the theory and methods of multiple criteria and multiple constraint-level mathematical programming. Instead of identifying a fixed point as an "optimal solution", he proposed the design of "optimal solution structure" to cope with the changes of decision making environment. He proved the relation theorem between Multiple Criteria and Multiple Constraint Levels Linear Programming, Multiple Criteria Linear Programming and Linear Programming. This became a basis of building the theory of multiple criteria and multiple constraint-level mathematical programming. His related works were published in 40 plus international journals, including the well-known Management Science, Operations Research, European Journal of Operational Research and Decision Support Systems.

*Second*, he is the pioneer and promoter to innovatively use optimization in large-scale data (Big Data) mining. His optimization based data mining theory, using a hyperplane to separate data, is different from known statistics, decision tree induction, and neural networks in terms of the techniques of separating data. It uses two criteria: minimizing the overlapping degree (e.g., norms of all overlapping) with respect to the separating hyperplane and maximizing the distance from a point to the separating hyperplane. The satisfaction solution of this method is regarded as the classifier of data mining. Comparing with other data mining methods, his approaches show the advantages of simple modelling, flexibility of changing parameters, high computing efficiency and strong prediction. Based on this theory, he and his colleagues developed a series of optimization-based data mining algorithms that have been widely used to handle various management, economy and social problems, such as commercial banking, insurance, social welfare, public security, etc. He has published more 60 papers in international journals, including the top journals such as Pattern Recognition, IEEE Trans. on Knowledge & Data Engineering, and IEEE Trans. on System, Man & Cybernetics.

*Third*, he initiated a new concept of "Intelligent Knowledge". Although data mining can discover the hidden patterns from unknown data, these results of data mining may not be regarded as "knowledge". To create knowledge, which is useful to the end-users, from databases, the theory of human knowledge management should be applied. Given large-scale databases (or Big Data), he proposed the theory and mechanisms of how to combine human knowledge with the hidden patterns of data mining to generate a "special" knowledge, called intelligent knowledge, for the practitioners or decision makers as useful decision support. The theory of intelligent knowledge management opens a door for the people to adopt "data-driven" decision making replacing the traditional "hypothesis-driven" or "model-driven" decision making. His intelligent knowledge theory has quickly been accepted by international academic community. As the principle investigator, he has organized an innovative research group consisting of 25 domestic and international scholars (from Japan, USA, UK and Korea) on intelligent knowledge and related topics. Their activities have been funded by National Natural Science Foundation of China, Chinese Academy of Sciences, and Ministry of Science and Technology of China. Due to his outstanding contributions in both theory and applications in management science, he won a number of domestic and international awards and honours. Especially, the International Society of Multiple Criteria Decision Making (which contains the members from 58 Developing Countries), presented him the highest destination: Georg Cantor Award in June 2009, and the Fudan Management Prize Fund of China gave him the Highest Prize for Management Scientists in China: Fudan Distinguished Management Prize in November 2009. Many international scholars have highly evaluated his academic performance.

In 2012, he and 50 scholars from China, United States, Australia, South Korea, Japan, The Netherlands, Poland, Romania, Singapore, Spain, Lithuania, and Turkey formed a newly academic society, called the International Academy of Information Technology and Quantitative Management (IAITQM, [www.iaitqm.org](http://www.iaitqm.org)).

		<h2>The International Academy of Information Technology and Quantitative Management</h2>					
About IITQM	Membership	Societies & Communities	Publications	Conference & Meetings	Education & Careers	Industrial Partners	Contacts
<p>The inauguration meeting of IAITQM successfully took place in Omaha of United States on Sunday, June 3, 2012. More than 50 participants, coming from China, United States, Australia, South Korea, Japan, The Netherlands, Poland, Romania, Singapore, Spain, Lithuania, Turkey and other countries, attended the meeting.</p> <p>IAITQM is glad to have Prof. Siwei Cheng (Director of CAS FEDS), Mr. Walter Scott (Chairman of Level 3 Communications Inc., board member of Berkshire Hathaway Inc) and Prof. James Tien (University of Miami) to serve as the Honorary Chairmen. IAITQM attendees discussed and passed the IAITQM bylaws, and held the first election. Attendees elected Prof. Yong Shi as the President, Prof. Peter Wolcott as the Vice President for Conferences, Prof. Wikil Kwak as the Vice President for Finance, and Prof. Jianping Li as the Secretary. According to the bylaws, the attendees also elected five committees and their chairpersons, namely, the advisory committee, the awards committee, the executive committee, the conferences committee, and the publications committee.</p> <p>The First International Conference on Information Technology and Quantitative Management (ITQM 2013) was held in Suzhou (known as "the Venice of China"), May 16-18, 2013. It had attracted nearly 300 renowned scholars and business participants from China, USA, Russia, Japan, Spain, Brazil, Chile, Taiwan and other 21 countries and regions. The theme of the conference was "Innovation and Development of Information Technology and Quantitative Management." It is the first successful conference organized by IAITQM.</p>							



At its inauguration meeting in USA on June 3, 2012, he was elected as the first president of IAITQM. This is the first time in the world to combine the scholars and professionals from the two well-recognized fields: Management and Information Technology into one unique identity.

His leadership influences the international bodies, including the Developing World from now into the future. Dr. Shi has consulted or worked on projects in data mining and knowledge management for several international companies.

Professor Shi chaired the First International Conference on Information Technology and Quantitative Management (ITQM 2013), May 16-18, 2013. It had attracted nearly 300 renowned scholars and business participants from 21 countries and regions, including developing ones Brazil, Chile, China, Malaysia, Nigeria, Pakistan and Taiwan. As an educator, he taught thousands of students around the world in both USA and China. He also supervised 29 doctoral students and 40 master students. Many of undergraduate and graduate students whom he educated were from the Developing Countries, such as Afghanistan, Jordan, India, Iran (TWAS scholarship), Pakistan, Saudi Arabia, Thailand, Turkey, United Arab Emirates, and Yemen.

Professor Yong Shi is the Editor-in-Chief of *International Journal of Information Technology and Decision Making* (covered in Science Citation Index), and a member of Editorial Board of numerous academic journals.

Dr. Shi has received many distinguished awards including the Georg Cantor Award of the International Society on Multiple Criteria Decision Making (MCDM), 2009; Fudan Prize of Distinguished Contribution in Management, Fudan Premium Fund of Management, China, 2009; Outstanding Young Scientist Award, National Natural Science Foundation of China, 2001; and Speaker of Distinguished Visitors Program (DVP) for 1997-2000, IEEE Computer Society.

Dr. Shi contributed to the prestige of Agora University by taking part to the *International Conference on Computers Communications and Control* (ICCCC, periodical conference organized by Agora University) in 2012 as chair of a special session “Decision Support System” and delivering a plenary talk entitled “Structural Regular Multiple Criteria Linear Programming for Classification Problem”. He also accepted to be the honorary chair and a keynote speaker of ICCCC 2014 and is an active member of the Editorial Board of *International Journal of Computers Communications & Control* (IJCCC, edited by Agora University and covered in Science Citation Index Expanded). He is also honorary external member of Agora University Senate (since 2012).



His scientific results and papers are published and/or cited in scientific journals published IJCCC, Proceedings of Romanian Academy, Studies in Informatics and Control (SIC), Informatica economica and in books published by Romanian authors in well known companies such Hermes Paris and J. Wiley.

*Analysis Commission for Laudatio\**  
on the occasion of awarding the title  
*Doctor Honoris Causa*  
To Professor Yong Shi

*President:*

***Acad. Florin Gheorghe Filip,***  
*Romanian Academy, Romania.*

*Members:*

***1. Prof. Dr. Daniel Berg,***  
*University of Miami, United States.*

***2. Prof. Dr. Fuad Aleskerov,***  
*National Research University Higher School of Economics, Moscow, Russia.*

***3. Prof. Dr. Gang Kou,***  
*Southwestern University of Finance and Economics, Chengdu, China.*

***4. Prof. Dr. Luiz Flavio Autran Monteiro Gomes,***  
*Ibmec, Rio de Janeiro, Brazil.*

**\*Note.** The Commission has been nominated by Agora University’s Rector Decision No. 20/29.05.2013 based on approval of Agora University Senate.



# RESPONSE TO THE LAUDATIO

## Big Data, Big Data Mining and Data Science

**Yong SHI**

University of Chinese Academy of Sciences, Beijing, China

Executive Deputy Director, CAS Research Center on Fictitious Economy & Data Science

Associate Dean, School of Management, University of Chinese Academy of Sciences

E-mail: yshi@ucas.ac.cn

**Abstract.** At present, Big Data becomes reality that no one can ignore. Big Data is our environment whenever we need to make a decision. Big Data is a buzz word that makes everyone understands how important it is. Big Data shows a big opportunity for academia, industry and government. Big Data then is a big challenge for all parties. This talk will discuss some fundamental issues of Big Data problems, such as data heterogeneity vs. decision heterogeneity, data stream research and data-driven decision management. Furthermore, this talk will provide a number of real-life Big Data Applications. In the conclusion, the talk suggests a number of open research problems in Data Science, which is a growing field beyond Big Data.

**Keywords:** Big Data, Data Mining, Knowledge, Applications.

**Note.** Full text will be published in International Journal of Computers Communications & Control.



**AGREEMENT OF CO-OPERATION  
BETWEEN  
THE AGORA UNIVERSITY OF ORADEA, ROMANIA  
AND  
THE CHINESE SOCIETY FOR MANAGEMENT MODERNIZATION**

As a gesture of goodwill and for the purpose of establishing ties between their two institutions, the undersigned hereby affirm their intent to promote such academic collaboration and exchanges, as will be of mutual benefit to their respective institutions.

The Agreement covers, but is not limited to:

*Article 1 – Object and scope of co-operation*

The purpose of this Agreement is to define the main fields of the co-operation and the procedure for its implementation.

Specific agreements will be drawn up within the Agreement of co-operation and they will contain precise technical and economic terms for activities agreed upon by both parties.

Particular attention shall be given to the following items:

- 1.1. Participation in research programs.
- 1.2. Participation in specific training courses.
- 1.3. Development of special programs for the students and academic staff.
- 1.4. Other subjects of mutual interest, as will be agreed upon.

*Article 2 – Forms of co-operation*

The co-operation between parties will be carried out according to one or more of the following forms:

- 2.1. Exchange of verbal or written information and documentation.
- 2.2. Visits and training periods for the students and academic personnel.
- 2.3. Exchange of journal, books and reviews.

*Article 3 – Terms of co-operation*

3.1. Information and/or documentation, as per item 2.1., shall be dispatched upon request of either party at no cost if the information is already available or can be easily obtained. If the documentation itself or its preparation, translation or dispatch requires considerable expenses, the party requesting it shall be informed of the relevant price and the dispatch of this documentation shall be subject to that party's agreement to reimburse the expenses.

3.2. Travel and lodging expenses related to the study trips and/or training periods, as per item 2.2., shall be established on a reciprocity principle and a specific agreement shall set forth the economic terms for overhead expenses and for the assistance to be rendered by one party to another. Possible requests for study trips and/or training periods should be sent at least six months in advance.

3.3. The performance of services and the participation in research programs and specific training courses shall be covered by *ad hoc* supplementary agreements.

Article 4 – Duration

This Agreement shall be valid for three years and shall be automatically extended every three years, unless termination is requested by one of the parties at least six months before the expire date.

Article 5 – Taxes

All taxes related to this Agreement shall be paid directly by the Agora University of Oradea due in Romania and by the Chinese Society for Management Modernization if due in China.

Article 6 – Amendments

Any amendments to this Agreement shall be subject to the approval of both parties and given in writing in a new agreement.

Article 7 – Language

All correspondence related to this Agreement shall be in English.

Article 8 – Entry into force

This Agreement, drawn up in two original in English, both valid, shall take effect as of the date of signing by the contracting parties.

For Agora University of Oradea  
Mişu Jan Manolescu, Ph.D. Professor and  
President



May 12, 2012, Oradea, Romania

For The Chinese Society for Management  
Modernization  
Yong Shi, Ph.D. Professor, Vice President  
and Secretary in General







*„Quod bonum, felix, faustum fortunatumque sit”*

*Summis auspiciis rei publicae dacoromaniae, nos, praesidens membraque Senatus  
Agorae Varadiniensis Accademiae, sagacissimi magistri, morem nostrum  
accademicum sequentes, omnibus eius operibus investigatis, qui praecipuus  
scientia informaticae et economicae in doctrinam eiusdem rei excolendam et  
promovendam omni laude dignus est summis omnium plausibus decrevimus ut*

*Illustrisimo Magistro*  
*Yong Shi*

*Hoc diploma  
Doctoris Honoris Causa Agorae Varadiensis Accademiae  
Conferretur*

Datum Varadinum: A.D. MMXII, Nonae Maiae.

**IN HOC SIGNO VINCES**

Mișu-Jan Manolescu Praesidens Accademiae	Adriana Manolescu Praesidens Senatus	Ioan Dzițac Rector Magnificus
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