

# Does Computer Help Democracy?

Yasuharu Ukai

RCSS

文部科学省私立大学学術フロンティア推進拠点  
関西大学ソシオネットワーク戦略研究センター

Research Center of Socionetwork Strategies,  
The Institute of Economic and Political Studies,  
Kansai University  
Suita, Osaka 564-8680 Japan  
URL : <http://www.rcss.kansai-u.ac.jp/>  
<http://www.socionetwork.jp/>  
e-mail : [rcss@jm.kansai-u.ac.jp](mailto:rcss@jm.kansai-u.ac.jp)  
tel. 06-6368-1228  
fax. 06-6330-3304

# Does Computer Help Democracy?

Yasuharu Ukai

*RCSS*

文部科学省私立大学学術フロンティア推進拠点  
関西大学ソシオネットワーク戦略研究センター

Research Center of Socionetwork Strategies,  
The Institute of Economic and Political Studies,  
Kansai University  
Suita, Osaka 564-8680 Japan  
URL : <http://www.rcss.kansai-u.ac.jp/>  
<http://www.socionetwork.jp/>  
e-mail : [rcss@jm.kansai-u.ac.jp](mailto:rcss@jm.kansai-u.ac.jp)  
tel. 06-6368-1228  
fax. 06-6330-3304

# Does Computer Help Democracy?

Yasuharu Ukai<sup>1</sup>

## Abstract<sup>2</sup>

Widely allocated data base and high speed information network are very difficult to be destroyed totally; therefore pluralistic democracy will easily protect itself. In addition to it, this kind of decentralization of data base and data processing will promote pluralistic democracy with computer grid. Democracy will prevail over the world with computer.

Keywords: computer, network, democracy.

## 1. Pluralistic Democracy

Ladies and gentlemen, distinguished guests from the United States and Europe. Welcome to the 4<sup>th</sup> International conference of Socionetwork Strategies. Professor Foster, our first keynote speaker told us one of the most advanced field of computer science. Professor Zysman, our second keynote speaker explained new expansion of our information age from the stand point of political economy. I would like to fuse this computer science with policy studies in the most advanced stage. In metaphorical image of chemical reaction, I wish to catalyze a synthesis of new academic discipline with computer science and policy studies. My wife is always worried about whether I blow up them, instead of catalyzing.

The starter of today's talk is a question whether computer helps democracy or not. You could expect your soup, fish, chicken and beef, and sweets. Democracy, which I mean here, is a pluralistic democracy uniting us with a strong tie of social infrastructure. I believe that the United States, European Union and Japan are

---

<sup>1</sup> Director and Professor, Research Center of Socionetwork Strategies, Kansai University <ukai@rcss.kansai-u.ac.jp>

<sup>2</sup> This paper was the author's speech draft for the 4<sup>th</sup> international conference of socionetwork strategies, on September 1st, 2006, at Tokyo.

managed by pluralistic democracy. This kind of democracy is threatened by two emerging powers. One power is Islamic fundamentalism. The other one is the red capitalism leading by communist party in China. These two powers dramatically succeeded in their own areas. Could Computer hardware, software, and middleware protect democracy against these two threats and help it for spreading among the people in the rest of the world? This is a question for us.

## 2. The Image of Socionetwork Strategies

The image of socionetwork strategies will be explained. The technical term of “socionetwork strategies” is invented by my school in 2001, therefore it sounds little strange to you. When we created these new words five years ago, no search engine on internet could find the phrase of socionetwork strategies. On the contrary, Google will show you more than fifty sites when you search these words. My society will create them and help their evolution. Simply speaking, we would like to combine computer science, statistics, mathematics and policy studies in all together. The right corner shows the most succeeded project which is our productivity analysis of information and communications industry. However the left corner also shows our most promising project which is multi-agent simulation for policy studies.

## 3. The Definition of “Socionetwork Strategies”

Our tentative definition is here. Socionetwork Strategies are the arts and sciences which optimally allocate the physical, human, monetary and information assets, and design institutions with large scale and high speed information networks for a particular political object.

This definition should not be permanent. It is under the evolution process during our five year research project. I am expecting its evolution even after the end of next five year project. The red under lined part insists that we use large scale and high speed information networks for a particular political object. This is the reason why we invite Professor Foster at Chicago, Illinois, far from Tokyo.

You will be curious for the phrase of arts and science in our definition. At first we did not include the word of art in our definition, because we are very proud of our scientific destiny. In our research process, however, some of our members insisted

that we should give a profound insight to our society if we are not able to analyze the information and communications technology by scientific positive method. That is why we take the word of art.

#### 4. Progressing Research Project

Five years ago, our research project started with the positive analyses of individual organizations and human beings in advanced information society. The word of positive means reproducible. All of our propositions are able to be tested and open to any other scholar's collection. Therefore, we have been concentrated on testing of statistical hypothesis. We have never send our first draft to a particular referred journal, otherwise published it as a discussion paper of RCSS, which is commonly known as a green paper. Then, we circulated it among the scholars all over the world.

Our final object is publishing a refereed journal with totally new concept. First positive study was Ukai 2002. It was published as a discussion paper No. 1 and was reported at several workshops, then finally being published in 2005 by Springer. Second study was a positive analysis of internet service providers. Its first draft was published in 2004 by Professor Ebara, Professor Nakaniwa, Professor Yokomi and Dr. Takemura. Third study was positive analysis of information and communications industries by Dr. Takemura and Mr. Murakami.

#### 5. Positive Contribution

What kind of social rules was founded by these studies on individual organizations in advanced information society? First, it was clarified that each individual bank had its own character of ICT investment, by the analysis of investment behavior of many banks in the long run. Tokyo-Mitsubishi-UFJ group has a quite different ICT investment style with Mizuho Financial Group. Second, one dollar ICT system investment in any Japanese bank creates market value between 11 and 14 dollar, with considering of these characteristics. This concept of investment is a marginal change of information and communication assets, which contain computer hardware and software, and knowledge and wisdom about computer.

These market values are extraordinarily high level. James Tobin, a Nobel

laureate in 1981, proved that this kind of asset value should come near to one dollar under the condition of perfect competition. It was clarified that ICT asset has much higher effectiveness than the other assets. Third, one dollar computer software investment per capita creates market value of 32 dollar, in any Japanese bank. This value is also remarkable high level. On the other hand, hardware effect is statistically insignificant.

## 6. Policy Implication

What kind of policy implication does it have? In short, public policies promoting software investment is the most important factor in the information age. Today's fifty guests will easily understand that software investment is the most important factor. However, an ordinal parliament member could not understand it as well as ordinal government officer could not. I tell you one episode. Some Japanese senator commented to my report at an international workshop in 2002. He was a member of banking committee in the house. He said to me. "All right I understand your proposition totally. But Japanese computer hardware investment is much lower than USA investment, especially in banking industry. Therefore Japanese banks need more hardware investment for the bright future.

Did he understand my report? Japanese parliament member always says us. "I understand it". They never understand it. Ladies and gentlemen, what is the destiny of social scientist? It is for him or for her to persuade the public to agree with his or her mathematical proof even though it conflicts with their intuition. That is why I published this book.

## 7. Another Facts Findings

These are our second and third studies. We founded some social rules by macroeconomic approach. Professor Sadahiro and Shimasawa founded a positive relationship between hardware and software computer investment and area products of Japanese 47 prefectures. Professor Shinozaki, today's coordinator, is also very famous for his labor productivity analysis after 1990s when information and communications technology has been prevailed on the macroeconomic approach. Finally we are doing institutional studies. Professor Yada, the second speaker of today's morning workshop was very famous developer of data mining tool, Musashi.

On the other hand, he did also nice field work about failure of data mining strategies in Japanese private sector. Professor Shiba, sitting here just like Darma, has been studying the disclosure of public and private institution. Professor Nagata is doing his legal study of electronic market.

## 8. ICT Productivity

Our first finding is that information and communications system investment has a positive effect to the market value, area labor productivities and macroeconomic productivity in Japan. Ladies and gentlemen, you would think that this proposition is self-evident. Honestly speaking, economists have thought that it is not self-evident. Every economists know Solow's productivity paradox in macroeconomics, crowned by the name of 1987 Nobel laureate Robert Solow. He wrote, "You can see the computer age everywhere but in the productivity statistics", in New York Times Book Review, July 12, 1987.

In addition to it, Sadahiro group insisted that Tokyo, Osaka and Nagoya metropolitan areas have been enjoying much higher information and communications effect to area productivities than the other are of Japan.

## 9. Legal System

Our second finding is here. Japanese legal system has been conflicting with advanced information and communications technology. It can not catch up with the progress of information and communications. Professor Nagata and Professor Shiba contributed to this finding. In addition to it, local and central governments has been compiling extremely large scale of data on information and communications technology since 1990s. However they never applied these data to data mining. It is very sad. Therefore they neither choose particular number of assumptions from the result of data mining, nor find particular social rules by testing those assumptions statistically.

## 10. Tools Needed

Ladies and Gentlemen, I would like to ask you one question through these positive and institutional studies and data mining. What kind of thinking tools do

we need?

I am very skeptical about macroeconomics in this society under the highly advanced information and communications technology, even though I stated my career as a professor of econometrics and macroeconomic theory. Professor Shinozaki will strongly oppose this skepticism.

In addition to it, I also suspect that traditional micro economic theory maybe losing the game, because analytical tools of microeconomics can not explain economic behaviors in the information age.

How about the game theory? I am not the specialist of this field. It could be useful. But I am not so sure. I expect that Dr. Takemura and his colleges will successfully establish ICT related behavior models of individuals and organizations in the information and communications age.

How about Data mining? I think this will be useful on the social infrastructures of highly advanced ICT technology. Extra ordinarily large scale of information is cascaded through communication channels. Moreover these data never stop I one site. Therefore you can compile these data from some node, and will be able to particular candidate of social rules by data mining. Data mining can not find a definitive social rule, but it offer the alternative group of assumptions for you. Needless to say, you need gigantic scale of data.

Finally, we reached multi-agent simulation which explicitly describes the interdependency between agents in your society. I think it might be useful to this kind of problem. I named our simulation project "1200 million citizens simulation". In order to put our project in execution, we need the help of Professor Foster, Professor Matsuoka, and Dr. Sekiguchi; the leading computer scientists in this planet.

## 11. Large Scale Data

What is the advantage of large scale of data? I fell I am a high school student in front of the teachers, Professor Foster, Professor Matsuoka, Professor Yada and Professor Date, if I explain this advantage. But you can do it in Chicago Illinois. The necessary condition for making data mining effective is large scale of data. Suppose you have the data of 10 thousand agents or 100 thousand agents with two or three attributes, it would not be useful for data mining. You need more than 100 attributes for each agent, in other word, citizen or organization. I am expecting that



this kind of social data mining offers you a new policy measurement. This kind of tools could be effective to promote the growth of democracy. In addition to it, from the reduced assumptions by data mining you can select particular reliable assumption statistically. Then you will be able to construct several mathematical functions of social simulation for plenty of application areas. Dr. Kadoka, sitting here, applied grid computing to explain air flow on the airships wing by hydrodynamics. Mr. Miyazawa, an executive director of Fujitsu Laboratories, will explain to you what their application to social phenomena is like.

## 12. Social Simulation

Our grid computing for social multi-agent simulation will be explained briefly. We connected personal computer clusters and servers among two research institute, the research center of siconetwork strategies, Osaka and Fujitsu Laboratories, Kawasaki, and built a private network. Then we executed a social simulation. We took a middleware, called cybergrip, which had been developed by Kadooka chime. The actual leader of line troops was Professor Akiko Nakaniwa, sitting there. She will have her own opinion to use cybergrip in the actual stage.

## 13. Labor Supply Behavior

I would like to show you the first example of our simple simulations. This simulation tells us what kind of policy is proper to promote married women's participation to labor market.  $U$  is a utility function of married women. Almost all economist love utility function, which is his or her object subjecting to particular constrained conditions.  $W$ , a suffix of  $U$ , means a married women's utility function if she is employed.  $H$ , the other suffix of  $U$ , means her utility function if she is in home. She will have her psychological order between working and staying home. This ordering could be transferred to some numerical functions under plausible mathematical assumptions. Then she will be able to calculate her utility difference between these two cases. Suppose, for instance, her utility difference is negative. Because her staying home utility is greater than working utility, she will stay home. In the opposite case when her utility difference is positive, she wishes to work in labor market because her staying home utility is smaller than working utility. We can estimate the numerical values of  $\beta_1$ ,  $\beta_2$ ,  $\beta_3$ ,  $\beta_4$ ,  $\beta_5$ , and  $\beta_6$  by putting real

married women's data onto the dependent variables in these functions. After then we moved one thousand agents of married women about 680 thousand times in torus space.

#### 14. Implication of Simulation

The first finding of our simulation is the first sentence on this slide. A nursery near to the working place will introduce more labor supply in the labor market than one near to the residence. The second finding is the second sentence. A nursery near to the leader agents will introduce more labor supply in the labor market than one near to the follower agents if you divide the member of society into the leaders and followers. Both of findings are valuable information for labor market and reduce quite opposite policies of today's local governments in Japan.

#### 15. Pension Plan Simulation

I would like to show you the second example of our simulations. This is an entity relationship model with utility functions in the long run, borrowing advanced experimental psychology model. In 1980s, some experimental psychologists insisted that utility function was decreasing along with hyperbolic curve. They observed human behavior in laboratory and found that they changed their mind today even though they decided it yesterday. For instance, even though you decided to subscribe national pension plan and to pay insurance premium annually in 1990, you will not pay it in 2010, because the discount factor of your utility function have decreased.

In addition to it, we insist that social feeling of distrust will shift this hyperbolic curve downward. This is today's report of Professor Tanida and Mr. Murakami.

#### 16. Propositions

This second simulation suggested us two propositions. In order to stop social distrust prevailed, policy makers should explain these national pension plan by visual and dynamic three dimensional images. Economist always depends on mathematical equations. On the centrally, you need some kind of three-dimensional image which is moving up and down. I vaguely remember the behavior of molecules

in chemistry. This kind of dynamic image could explain each citizen's behavior precisely and weaken social feeling of distrust. In other word, policy visualization could support welfare policy which is a basement of pluralistic democracy. Therefore we need the help of grid computing for policy visualization because it demands extremely large scale of computer resources.

## 17. Policy Visualization

For policy visualization, we are thinking of using Super SINET which is the highest speed information network of 10 Gigabit per second. Super SINET has twenty eight nodes in Japanese territory. Through these 28 nodes, several personal computer clusters and super computers is connected with each others.

The University of Tokyo has three nodes. Tokyo Institute of technology has one node. Professor Matsuoka belongs to it. Kyushu University has one node. Professor Shinozaki belongs to it. Osaka University has one node. Professor Date belongs to it. Kansai University also has one node. I belong to it. We are planning to execute the largest scale of policy visualization by connecting these four universities.

## 18. Operating Schedule of Socionetwork Strategies

Ladies and gentlemen, I would like to present an operating schedule of socionetwork strategies in Japan. In 2007 the first group of baby boomers will begin to retire and in 2013 the last group will finish his career completely. This should be the constraint to our schedule. We need specific items on the table.

In 2007, every public and private organization should nominate their chief information officer: CIO by law. Japanese Fire Defense Law, Article 8 enforces you to place fire prevention supervisor in particular size of building. This is a good example for CIO.

State CIO should have the first priority to use every computer all over Japan, in the case of emergency for the democracy by law. Nara institute of science and technology already has their CIO. I heard that Professor Yamaguchi greatly contributed to this new procedure.

In 2009, computer security committee should be established by law. This committee should cover all of Japanese territory including sea and air. The concept

of this committee was inspired by the air accidents investigation committee. In the case of investigation of air accidents, the committee members have the first priority to enter the accident location against a police agent. We think that computer specialists should access to the accident machine or line at first in order to protect our computer system against the challengers to our democracy. We should shift our state budget from computer hardware to software and data compiling for enriching individual attributes.

In 2011, every government office should install grid middleware in their computers. Almost all public policies should be visualized in three dimension image.

## 19. Computer and Democracy

After these seven years actions, we will have a totally decentralized society. For instance, wide variety of public data will be allocated just like this picture. Two years ago, Professor Nakaniwa gave me this picture. If some terrorist group attacked the computer center of the Bank of Japan, Japanese monetary system will stop absolutely. To avert this kind of risk, the Bank of Japan should distribute all of its data to several servers and control all of it by network. When it was attacked, the bank should recover network system by using another data base server and networks. It will be a tough democracy in short. High speed network, wire or wireless, and grid middleware could support tough democracy.

## 20. Conclusion

Ladies and gentlemen, please remember my first question.

Does computer help democracy? You will answer me, "Yes it does."

Widely allocated data base and high speed information network are very difficult to be destroyed totally; therefore pluralistic democracy will easily protect itself. In addition to it, this kind of decentralization of data base and data processing will promote your pluralistic democracy with computer grid. Democracy will prevail over the world with computer.