

# Special issue on chance discovery

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## 1. Introduction: Chance discovery

More than five years have passed since Ohsawa proposed the concept of chance discovery [2]. When Ohsawa proposed the concept, data mining was already in boom and many researchers were starting, or absorbed in, studies on data mining.

This trend seemed to be reasonable. The real lives of human are complex, and the future is not predictable. In order to have better or the best benefits, it is necessary to predict the future trends. Actually, in the usual case, data mining techniques provide us with satisfactory results enough for doing good business.

For example, the phenomenon that subprime loans incited the market panic in August, 2007 was predictable and the risk has been pointed out by a large number of economists, due to their knowledge about many similar cases and about explicit signs of the market panic. Such a (not *very* but *sufficiently*) frequent pattern can be obtained by data mining, as far as economists have data on the events preceding the panic.

On the other hand, we encounter exceptional events where simple data mining techniques and statistical analysis can not deal with. For example, the economic “bubbles” were found to die out suddenly after several years of prosperity – as did in Japan in 1991. Such an event is hard to predict, or even to explain the causality after its occurrence, because its causal relations with other events are unknown.

In the latter case, i.e., if we cannot to predict the risk, the result may be the start of an even more serious scenario than the panic itself. For the Japanese case, since

we could not predict the end of the economic bubble phenomenon, we suffered from serious influences of the break of the bubble economy for more than ten years.

According to the posterior analysis, there are implicit (not noticed due to the rarity or the novelty) events which can be signs for the fatal, or sometimes for an extremely beneficial, scenario.

Because these signs are novel, and are hard to be related to the result, it has been hard to catch them for making a suitable decision at a suitable time. And, had we a suitable decision at the time of significant signs events, we might have escaped from the hard scenario after 1991. Thus for us, it is important to determine implicit symptoms to risks or benefits (opportunities). Accordingly, Ohsawa proposed chance discovery in 2000.

The definition of chance discovery is as below;

A chance in chance discovery means to understand an unnoticed event/situation which can be (uncertain, but) significant for making a decision. Associating the event with the appearance of a product or a service, customers seek a valuable event, i.e., the appearance of a product/service significant for his/her decision to improve daily life. Associating the event with a message from a customer, people in the side of business should look at a valuable event, i.e., a message significant for the decision to improve the service.

Thus, for realizing the methods of chance discovery, we have been exploring existing techniques and

developing new methods for determining rare or novel events that might cause serious risks or opportunities<sup>1</sup>.

We can summarize the method of chance discovery, as the process formed of two components (1) computers who make (logical or statistics-based) suggestions on data given by the user, (2) the user who interprets the suggestions by the computer, who talks to each other, and who works in the real world, and the interactions between (1) and (2).

In the first stage of chance discovery research, we focused on fundamental problems around chance discovery and various theories, techniques. Through these efforts, methodologies were proposed and were adopted to determine rare or novel events in real cases. And, psychological and sociological viewpoints or analyses are proposed as the basis of chance discovery. Contributions can be found in special issues from journals such as *Contingencies and Crisis Management* (Vol. 10, No. 1 and No. 3 (2002)), *New Generation Computing* (Vol. 21, No. 1 and No. 2 (2003)), and books collecting archival contributions [2].

The year of 2003 was a turning points in the short history of chance discovery. At first, for a chance we focused keenly on a single event. However, since 2003, not only a single event but also a series or a cluster of events was taken into account, in order to catch the really meaningful chance events. This new trend came out because several contributions to the workshops on chance discovery submitted ideas that a series or a cluster of events should be regarded as a scenario, and a chance should be positioned at the cross of scenarios. That is, a scenario, i.e., "a time series of events under a coherent context [3]," is something to be chosen in a decision. When a human stands at a cross of multiple scenarios, the situation affects his/her decision significantly.

In addition, since 2003, the new organization called Chance Discovery Consortium has been established where business persons join meetings for presenting their real-world problems and researchers present new methods for chance discovery. These people began to apply created concepts, theories, and techniques, to the actual applications such as risk management, marketing, product design and development.

And, the international workshops we have been organizing since 2000 enjoyed the synergy effects with

these new activities. From the first stage of the research, chance discovery had been aiming to contribute to the real life in the human society by generating opportunities and removing risks. Thus, our attitude to apply methods of thinking about scenarios, with new tools for chance discovery, to real problems came to be established since 2003.

Theories and techniques in chance discovery is not yet fully mature, so it is still necessary to conduct basic researches such as cognitive science, psychology, sociology, philosophy and logical frameworks on artificial intelligence. These bases are expected to found the required force of thoughts to accelerate the process of chance discovery. And, the models of causality in application domains such as consumers behaviors, product development, medicine, etc. are required.

Contributions from these essential domains can be found in the books we published after 2003 [1,2,4]. Because the purpose of edition is different for books. After the publications of these books, will chance discovery move to another new direction or go to the similar direction to our past? The special issue might have an answer.

## 2. Invited sessions in KES conferences

Since 2000, we organized invited sessions on chance discovery in KES conferences. We had many contributors in each year. Nationalities of them were different according to the conference venues, but all the time we collected many papers from all over the world, for instance, Japan, Taiwan, England, Italy, and Russia.<sup>2</sup>

We say, the studies on chance discovery attracted many researchers. In 2004, Ohsawa had a plenary lecture on chance discovery. Readers can refer to contents of each sessions by checking at the bottom of KES2007 invited session's home page (<http://ultimaVI.arc.net.my/ave/KES2007/>). CFPs before 2003 have already been lost, but they include the similar concept as that of the latest CFPs. The topics discussed have increased according to discussion in or out of sessions. For instance, for the session in KES2007, we suggested discussion list as below;

- Analysis of human behavior
- Analysis of complex systems (society, community etc.)

<sup>1</sup>A chance is often considered as a (good) opportunity in daily conversations, but we regard it as both good and bad opportunities, according to its original meaning in dictionaries. A chance, also according to the definition above by Ohsawa, can be both a good opportunity and a hard risk.

<sup>2</sup>In fact, in the other workshops and sessions, we have collected papers from USA, Korea and Australia.

- Applications of Chance Discovery
- Characterization of “Chance”
- Logical foundations for Chance Discovery
- Theories and methodologies to discover rare or novel events
- Theories and methodologies to foretell future trends
- Theories and methodologies to be aware of significant events
- Theories and methodologies for an evaluation and selection of chance
- Models and methodologies for effective suggestion of chance
- Relationship between computational and manual methods
- Integration of computational and manual methods

As shown above, we still call for basic researches in the CFP. Especially, we welcome to introduce new type of theories and methodologies to chance discovery.

### 3. Selected papers in this special issue

Authors in this special issue are not totally identical to contributors in KES’s invited sessions, but some of them appeared in chance discovery sessions in the other conferences or workshops. We also have new contributors. It is our pleasure to have these new submissions, and to select the best of them in the special issue.

In this volume, we selected (accepted according to reviews by two referees) 9 papers among 16 submissions as below;

- Hong: Discovering the rare opportunity by strategy based interactive value-focused thinking model.
- Magnani: Abduction and chance discovery in science.
- Abe, Ozaku, Sagara, Kuwahara, and Kogure: Nursing risk management by focusing on critical words of phrases in nurses conversations.
- Matsumura and Sasaki: Human influence network for understanding leadership behavior.
- Takizawa, Kawaguchi, Katoh, Mori, and Yoshida: Risk discovery of car-related crimes from urban attributes using emerging patterns.
- Kim, Jung, and Cho: KeyGraph based chance discovery for mobile contents management system.
- Ohsawa and Ishii: Gap between advertisers and designers: results of visualizing messages.
- Garcia-Almanza and Tsang: Detection of stock price movements using chance discovery.
- Tsumoto and Hirano: Detection of interesting rules using visualization of differences between rules syntactic and semantic similarities using multi-dimensional scaling.

Reader may guess the contents of the papers from the titles. However, as a whole, the underlying common keywords for the this special issue are found to be “interaction,” “visualization,” and “abduction” that are contributive to the basic methodologies of chance discovery.

And, for application, the management and discovery of risks, in which stock price movements are to be included, are appeared as core issues. This trend succeeds the initial aim of chance discovery which aimed to determine hidden or potential events for realizing a better future by removing possible risks and finding possible benefits.

### References

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