Field:
Social Sciences

Session Topic:
Collective Intelligence

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1. Introduction

Collective intelligence has become a challenging and indispensable issue in social science. This emerging issue can have an impact not only on a narrow research area in social science but covers a whole science and also society. This is partly because of exponential growth of knowledge accompanying segmentation and specialization. Currently, reflecting the increasing importance of knowledge in our economy and society, the accumulated and accessible knowledge has growth, however, at the same time, segmentation and specialization of our intellectual base proceeds and many problems became apparent [1]. This is because segmentation and specialization is an inevitable strategy for researchers to catch up with the pace of knowledge accumulation and to obtain deeper and newer scientific understanding. On the other hand, the problems that society expects science to tackle and solve like sustainability and aging society are so complex issues that one specialist cannot illustrate a comprehensive view and offer design principle and solution for those issues on those issues [2]. In this talk, I will offer some examples of our recent research to show what can be done by collective intelligence in order to discuss where we should go.

2. Approaches for Collective Intelligence

We begin our discussion with the definition of collective intelligence. Intelligence is a capability to consider, understand, analyze, communicate, learn, plan, and make a decision based on a past experience and knowledge. Collective intelligence is an intelligence which consists of collected information and knowledge of individuals and emerges from the integration and collaboration of diverse information and individuals' knowledge.

There are two ways for collective intelligence; collective computational intelligence and collective social intelligence. Collective computational intelligence is an approach to utilize a variety of computational methodologies like data mining, text mining and link mining. By collective social intelligence, I mean expert-based approach like collaborative workshop and scenario making. These two approaches can work complementary at a wide range of scale from concepts, documents, and actor levels.

3. Computational Intelligence to support Social Intelligence

An example of collective intelligence at concept level is Swanson's discovery. Don R. Swanson proposed that combining existing, though not connected, knowledge results in new knowledge [3]: one publication stated the relationship between the two phenomena A and B while another reported on the relationship between the phenomena B and C; if no

one has reported on the association between A and C, this association can be considered to be new knowledge. The Swanson type of discovery has great potential, and can be supported by computational intelligence [4].

The most developed and effective target of collective computational intelligence is analysis of documents including books, papers, web pages, and other items. Computational intelligence is utilized to illustrate an overview, to detect emerging issue, to describe the trend, and to predict a plausible future. These enable us not only to know overall map but also to detect digressional trait of information in an effective and efficient way. For example, interdisciplinary research, which is buried among a pile of publications and overlooked in most of cases, can be detected by link mining approach [5]. By analyzing the structure of citation network of academic publications, we can identify a paper tackling interdisciplinary issue. It is also shown that these boundary spanning researches will integrate disciplines and open a new research field [6].

Computational intelligence can be used at actorl level. A recommendation system to find plausible collaboration partners is developed and implemented [7]. These will be used to promote collaboration among researchers in different disciplines, different sectors, and different organizations, and to promote collective action including interdisciplinary research and transdisciplinary expertise.

Now, collective intelligence will become a key concept in this context, and fortunately development of information technology starts to enable us to utilize computational collective intelligence to enhance our own intelligence and social intelligence. In the presentation, I will show concrete examples for further discussions

References

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