

Visualizing Dispersed Risk Signals for a Specific Emerging Technology: A Novel Approach of Keywords Aggregation across Topics (KAaT)

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During the past decades, the rapid growth of emerging technologies (e.g. nanotechnology, biomass energy, synthetic biology, genetic engineering and so forth) had brought huge impact on environment, economic and social systems; and some industrial symbiosis also encountered dramatic or revolutionary changes and new opportunities. Meanwhile, timely visualizing the potential or possible risk to social-economic systems and ecosystems increasingly becomes critical issue for public policy, strategic management and other relevant areas on governance. However, the studies on risk analysis or signal risk for a specific emerging technology are very trivial, and dispersed into many different categories and multidisciplinary areas. For example, the risk analyses on nanotechnology involve social communication, environment science, toxicology, occupational health and so on. Obviously, too much domain knowledge is required to identify and collect the relevant risk signals for a specific emerging technology.

Based on the background mentioned above, such research questions are raised in this article:

Q1: For a specific emerging technology, can we timely and efficiently visualize the risk signal / relevant works, especially in early period?

Q2: How can we evaluate the visualization or analysis results, which are outputted in Q1?

In terms of these two research questions mentioned above, a novel approach of keywords aggregation across topics (KAaT) is proposed; and a subsequent evaluation method also is argued. To verify the validity and completeness of KAaT, an empirical study on synthetic biology is conducted; and the algorithm of KAaT is shown in Figure 1.

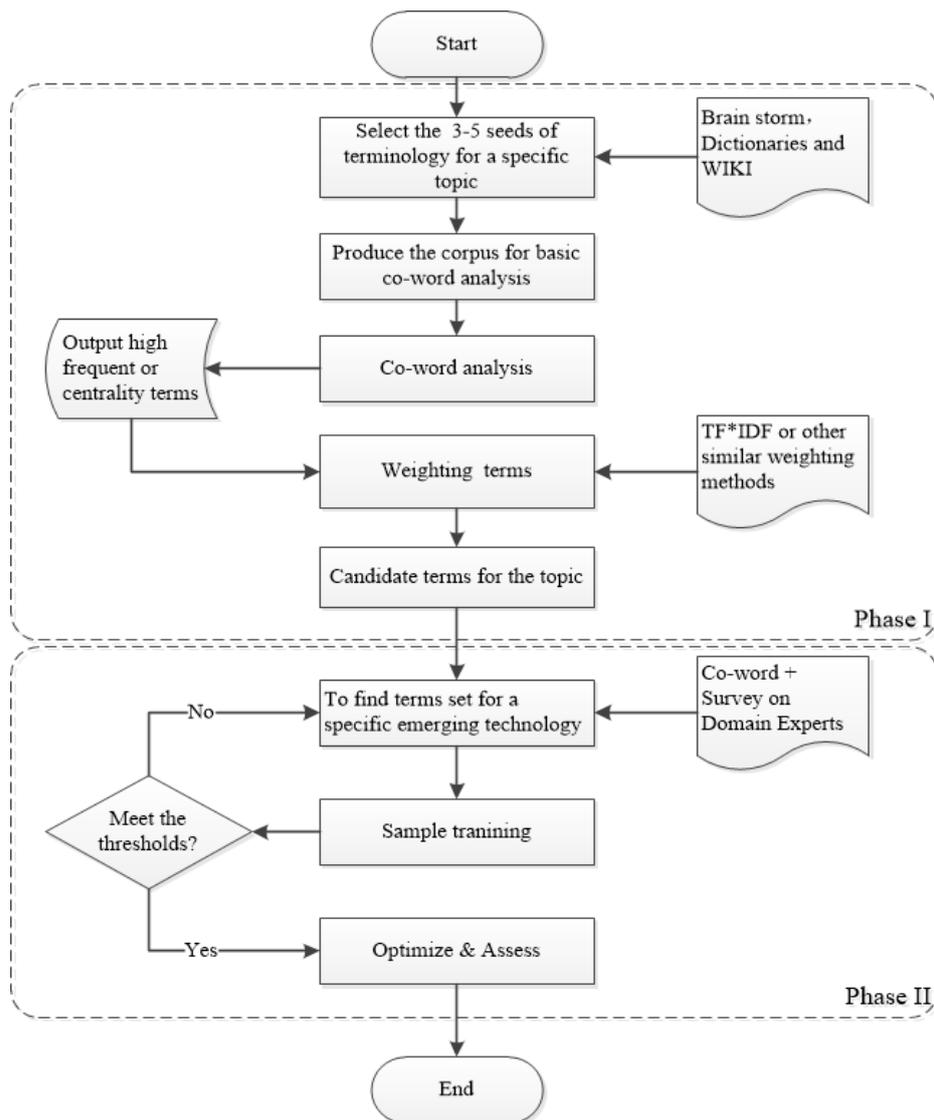


Fig.1 The algorithm flow of KAaT

Through theoretical and empirical analyses, the proposed KAaT algorithm could present some promising application on capturing the dispersed risk-signal for a specific emerging technology, or an ordinary technology, especially at the early stage.

Also, KAaT has some limitations. For example, in the text mining and analysis, the relevant patent data on the specific technology is not involved, and then some information will lose. In addition, the companioning noise data seems still too much, and then has moderate room for the following improvement.

Key words: risk analysis; emerging technology; text mining; keywords aggregation; synthetic biology