Exploring potential patent portfolios: an integrated approach based on topic identification and correlation analysis

Xian Zhang[*1,2], Haiyun Xu[1], Shu Fang[1] and Zhengyin Hu[1,2]

[*] *zhangx@clas.ac.cn*
[1] Chengdu Library of Chinese Academy of Sciences (China)
[2] University of Chinese Academy of Sciences, Beijing (China)

Background

Studies have shown that patent portfolio is more valuable than single patent. For example, the Parchomovsky's theory of patent value argues, the true value of patents lies not in their individual worth, but in their aggregation into a collection of related patents-a Patent Portfolio, that is, the whole is greater than the sum of its parts. Accordingly, researcher have tried some approaches to explore the patent portfolios. The patent family priority, the forward and backward citations, and the International Patent Classification (IPC) clusters are the most used approaches in the existing studies. However, these methods are focusing on the external characteristics of patent documents instead of the technical solutions. The existing analysis approaches of patent portfolios are still ambiguous.

Methodology

We develop a framework to identify the potential patent portfolios, so as to identify potential patent pools or further collaborators for assignees. The proposed framework employs the topic identification and association analysis of patent documents, main steps are as follows:
(1) Extracting the technology topics of the patent solutions. These technology topics are represented in two dimensions. One is the patent classifications such as IPC and Derwent Manual Code. The other is the topic terms extracted by Thomson Data Analyst (TDA) from the patent text fields.
(2) Constructing the association networks, clustering in topics, computing the similarities and visualizing with NetDraw. Both an association network based on the technology topics, and a cross association network based on the assignees and technology topics are constructed. The former helps identifying the potential technology portfolios, while the latter helps investigating the potential partners.
(3) Interpreting the maps.

Empirical study

We conduct a case study, experimenting with the chemical engineering patents filed by the Chinese Academy of the Sciences (CAS) during 1992-2012. We employ the Derwent Innovation Index as the data source. According to WIPO's IPC - Technology Concordance Table, there are 27401 records hit. As the research results, we find:

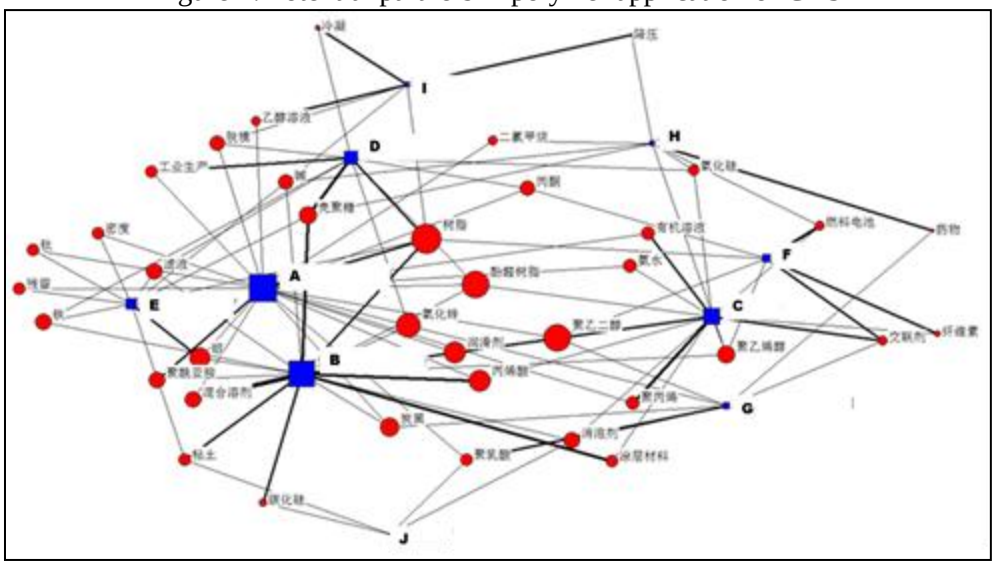
(1) The linkages between the chemical engineering, medicine (including traditional Chinese Medicine) and organic fine chemicals are closer and stronger, while the food chemistry, microstructure and nanotechnology, and surface processing and coating are linked weakly.

(2) The CAS's patents on Chemical Engineering can be clustered into 6 categories, which are (i) polymer, plastic; (ii) general chemistry; (iii) catalyst; (iv) drugs; (v) agriculture; (vi) semiconductor, circuit, fireproofing, ceramics, cement, electrochemical. Polymers, plastics is located in the center of the network, including: monomer, concentration, polymerization, natural polymer, addition polymer, condensation polymer, inorganic polymer, polymer blending, water dispersion system, additive, property, analysis, testing, control, polymerization, polymer modification, polymer processing, application of polymers. Wherein the application of polymers is the core node of the network.

(3) 409 patents on polymer application are identified in this study. Our findings indicate that the CAS's polymer-application patents can be roughly summed up into six areas: biological polymers, synthetic resin, conductive polymers, engineering plastics, fertilizers and polyamide system. To these 409 patents, we investigate the possible solutions to patent portfolios.

(4) Selecting the Top 10 assignees on polymer applications and the key topics to perform a cross co-occurrence network, we find the presence of multiple technique cross area between among these assignees (Figure 1). These common technical means there may be highly potential cooperation for these institutes. On this basis, we have discussed some of the most promising cooperation in detail.

Figure 1: Potential partners in polymer application of CAS



Discussion and Conclusion

Our proposed framework can also be applied by enterprise and other research institutes like universities. The findings may not only be valuable to scholars but also to policy makers and practitioners. It enables the industries and well-connected institutes to develop higher impact patent portfolios.

However, this research is still need to be improved. Firstly, when the topics and association networks combined as proxy measures for identifying the potential portfolios, more assessments of experts should be integrated. Secondly, in addition to using topic terms and DMCs as technical terms, more textual elements and semantic analysis should be considered in this approach, since the complexity of the patent documents. Thirdly, more case studies conducted in different technical fields are needed.

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