

Identifying prominent converging technology based on patent analysis: two indices, the CDV-index and the CPV-index

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Introduction

Technological convergence & Innovation

- Technological convergence is commonly referred to as the spill-over and blending of technological knowledge across previously distinct disciplines.
- Technological Convergence as a form of innovation processes may yield outcomes which in their performance exceed the sum of their parts.

Hacklin (2008; 2013)

Technological convergence & Patent

- Patents co-classified by different fields implies a great degree of their convergence.
- Patents citation-based approach was used to forecast the future of technology convergence.

Kim et al. (2017)

Research Question

- How to identify prominent converging technologies by tech mining methods?

Step 1 Collect and Import Patent data to VantagePoint

Step 2 Create 4-digit IPC co-classification matrix

Step 3 Calculate CDV and Identify the IPCs with high CDV (Quartile 3)

Step 4 Calculate CPV of the identified IPCs and select the IPCs with high CPV (Quartile 3)

Step 5 Visualize the convergence network of the prominent converging technologies

Convergence Diversity Value (CDV): Diversity is one of the inherent attributes of the phenomenon.

$$CDV_j = \frac{1}{\sum_{ik} (1 - d_{ik})(p_i p_k)}$$

Zhang et al. (2016)

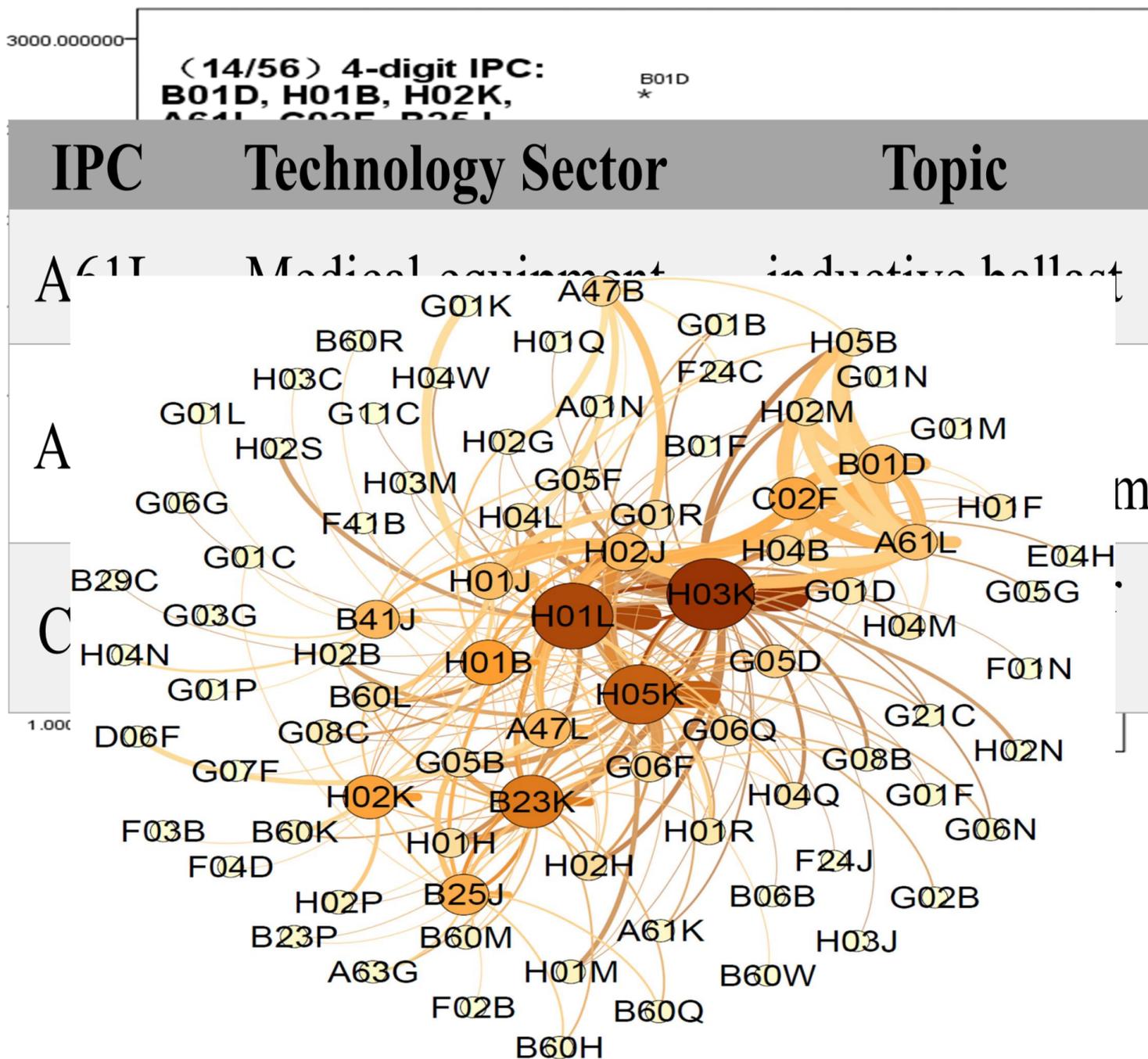
Convergence Productivity Value (CPV): Patent citations related to converging technologies may be indicative of the value of convergence on innovations.

$$CPV_j = \frac{1}{\text{number of } k} * \sum \begin{array}{l} \text{Total number of co-occurrence} \\ \text{between } (j, k) \\ * \text{Average Citation of } k \end{array}$$

Abbasi et al (2010)

Data Sources: Cooperative patent classification (CPC) Y04(Information or communication technologies having an impact on other technology areas) from 1976 to 2016 in US (5810 patents).

Results & Conclusions



Conclusions

- The two indices were combined to identify those prominent converging IPCs in ICT sector.
- ICT sector are converging prominent technologies from distinct disciplines such as medical equipment, furniture, basic chemical and so on.

Future Research

- More convergence phenomenon (evolutionary pathway and forecasting) of technological topics will be explored.