Identifying technology evolution pathways based on patent citation network and tech Mining

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Technology evolution pathways have caught researchers’ interest as a powerful method to trace the historical route and forecast the future trends of New and Emerging Science & Technologies (NESTs).

Patent citation analysis provides a representation of the innovation process and offers another means to track technological change and evolving pathways.

- Adequately explain the nature of different developmental stages or capture the complex structure of technological change in detail.
- Take related technology information and the overall background trends into consideration to understand the whole technological development at a macro level.
Methodological approach

Collect patent data
- Set up a multi-step Boolean search algorithm
- Collect patent data from DII database

Profile R&D activities
- Identify technology life circle by patent indicators
- Make R&D activities profile by ‘Tech mining’

Search technological trajectory
- Construct the patent citation network
- Find main paths of the patent citation network

Assess evolution pathways
- Construct final technology evolution pathways
- Evaluate technology evolution pathways
Illustrative example: DSSCs

Device & Component
- Photoelectric conversion device
- Response-type light-receiving device
- Conversion element including n-type semiconductor

Material
- Said electrolyte composition
- Liquid crystal compound
- Co-sensitizers
- Metal oxide layer containing metal oxide nanoparticles
- Metal oxide semiconductor electrode

Research Field
- Photovoltaic devices, coatings, processes
- Basic electric elements

Applicant
- SHARP (C)
- FUJI (C)
- NIPPON (C)
- KOREA INST (NC)
- More companies; More Cooperation

Country
- Japan
- USA
- China
- Korea
- India
- Korea
- China

Technology Timeline
- 1992
- 1994
- 1996
- 1998
- 2000
- 2002
- 2004
- 2006
- 2008
- 2010
- 2012

European Commission
Q & A

Comments and questions are warm welcome!

Thank you for your attention!