

Thematic change and technological progress – a mapping approach

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Technologies change and evolve over time. This change has various aspects such as the (worldwide) spread or the potentially growing involvement of different disciplines. But more interestingly, a text mining based approach enables to regard the contextual evolvments and orientation of a technology over time. So the objective of this work is to investigate to which extend and how these changes can be mapped and expressed in figures. This is examined on the basis of abstracts of bibliographic data (Web of Science). From these short thematic summaries, the substantive orientation and focus over predefined time slices are analyzed. Further, publication countries and subject categories are mapped to frame the noticed developments in an overall context.

To extract noun phrases from the abstracts (PoS-based approach), regular expressions are defined. The noun phrases are analyzed in their interrelation (network analysis) and clusters are built. Frequent item sets as well as association rules are built. The network of association rules especially illustrates changing (technological) dependencies. The conducted analysis is summarized in a set of visualizations to map change and progress over time.

This approach helps to map the thematic evolution by direct visual comparison of the results within each defined time slice. The results are most helpful to understand how changes perform and hint towards emerging and declining topics. This is for example helpful for policy evaluation to illustrate the “before and after” of research funding programs. Further, hypotheses about the evolution of a field can be tested..