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Emerging technologies and methods for research synthesis

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Abstract:
Introduction There are many challenges facing the emerging science of research synthesis. They include the rapidly expanding volume of research evidence and difficulties in synthesising qualitative research. New developments in information science can assist with some of these challenges. Two recent developments are described here. 1. Text mining Currently, systematic reviewing is performed mostly manually and, consequently, it is time consuming. This is problematic because policy-makers and practitioners often need to know the state of research evidence over a much shorter timescale than current methods allow. Text mining enables researchers to collect, maintain, interpret, curate, and discover hidden knowledge in text and has been used successfully in many biomedical applications. We propose to use text mining techniques to improve the efficiency of research synthesis and describe and demonstrate two applications of it here. a) Term extraction, query expansion and document classification: to locate relevant documents in poorly indexed electronic sources. Term extraction allows us to capture the semantic content of documents, as we go beyond words using concepts for our searches, and to improve the effectiveness of retrieving and classifying literature. b) Summarisation: to select significant information from the selected documents and 'map' research activity quickly and efficiently. 2. Synthesising qualitative research Despite a vigorous debate on the subject, there is a growing recognition of the value of synthesising qualitative research. Some criticisms of the synthesis of qualitative research argue that the process is too interpretative to meet the standards of rigour and transparency that systematic reviews for policy and practice demand. Others argue that the strength of a qualitative synthesis lies in its interpretative nature. We demonstrate how software can support the synthesis of qualitative research in a way that upholds expected standards of rigour and transparency. This need not restrict the ability of a researcher to interpret their findings and develop new theories and innovate conceptually, but it does support principles of transparency and being explicit about which parts of the synthesis can be traced to statements in the included studies. Issues covered include: ensuring context is not lost, sensitivity analysis and exploring the impact of study quality on the findings of the synthesis. Conclusions The combination of technological and methodological developments described here should make reviewing more efficient and timely, and enable us to synthesise diverse types of research in systematic and rigorous ways.
