

Chapter 8

Artificial Intelligence Method for the Analysis of Marketing Scientific Literature

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ABSTRACT

A machine-based research reading methodology specific to the academic discipline of marketing science is introduced, focused on the text mining of scientific texts, analysis and predictive writing, by adopting artificial intelligence developments from other research fields in particular materials and chemical science. It is described how marketing research can be extracted from documents, classified and tokenised in individual words. This is conducted by applying text-mining with named entity recognition together with entity normalisation for large-scale information extraction of published scientific literature. Both a generic methodology for overall marketing science analysis as well as a narrowed-down contextualised method for delimited marketing topics are detailed. Automated literature review is discussed as well as potential automated formulation of hypotheses and how AI can assist in the transfer of marketing research knowledge to practice, in particular to startups, as they can benefit from AI powered science-based decision making. Recommendations for next steps are made.

INTRODUCTION

Given the challenges humanity is facing, the acceleration of scientifically tested discovery is essential for human flourishing. Scientific progress is disseminated in scientific publications. The number of journal articles has increased dramatically with millions of research articles already available yet growing exponentially with thousands of new papers annually in fields such as materials, education and marketing science. Researchers have become much better at the generation of information than at its integrative analysis, interpretation and use for tackling issues where knowledge is required.

A substantial human effort is required for the manual extraction of research literature. Keeping up with publications is untenable even within specialised disciplines. Such overload has an impact on making use of research discoveries, as they depend on the knowledge embedded in past publications. It is increasingly harder to assimilate, relate and connect research and new results with the previously established literature, and to elucidate the role of a piece of knowledge. Individual marketing scientists will only access a fraction of research information in their lifetime and only a sliver of the relevant science guides the formulation of new questions or hypotheses. As a consequence, a major bottleneck arises for attaining progress in the marketing discipline as well as for the application of knowledge to both science and practice.

The vast majority of marketing science knowledge is stored as unstructured text across published articles. Although current online search technologies typically find many relevant documents, they still do not extract and organise the information content of scientific documents, nor suggest new scientific hypotheses to be formulated based on organised content. There is a need for techniques that can simplify the use of marketing research knowledge. Here is where artificial intelligence (AI) can assist.

Fundamentals of AI for Marketing Science Analysis

Herewith a description of AI terms required for the development of this chapter.

Scientific research documents are commonly presented in the form of scientific articles and thesis documents available through published digital information. They are written in natural languages mixed with domain-exclusive terminologies added to numerical data, and are difficult to analyse by either traditional statistical analysis or modern machine learning (ML).

Text mining (TM) refers to using algorithms for the extraction of information from written text documents. It is also used with scientific literature automatically identifying direct and indirect references to specific knowledge (e.g., Srinivasan, 2004).

Natural language processing (NLP) is a subfield of linguistics, computer science, information engineering and artificial intelligence concerned with the interactions between computers and human natural languages, in particular how to program computers in order to process and analyse large amounts of natural language data.

Scientific literature text mining with natural language processing is enabled by combining text mining and NLP. It has been used in several studies focused on the supervised retrieval of information from scientific literature. Research knowledge can be efficiently encoded as information-dense word embeddings, which is a vector representation of words, with or without human labelling or supervision (Tshitoyan et al., 2019).

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