

From Unstructured Text to TextCube: Automated Construction and Multidimensional Exploration

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ABSTRACT

The real-world big data are largely unstructured, interconnected, and dynamic, in the form of natural language text. It is highly desirable to transform such massive unstructured data into structured knowledge. Many researchers rely on labor-intensive labeling and curation to extract knowledge from such data, which may not be scalable, especially considering that a lot of text corpora are highly dynamic and domain specific. We believe that massive text data itself may disclose a large body of hidden patterns, structures, and knowledge. With domain-independent and domain-dependent knowledge bases, we propose to explore the power of massive data itself for turning unstructured data into structured knowledge. By organizing massive text documents into multidimensional text cubes, we show structured knowledge can be extracted and used effectively. In this talk, we introduce a set of methods developed recently in our group for such an exploration, including mining quality phrases, entity recognition and typing, multi-faceted taxonomy construction, and construction and exploration of multi-dimensional text cubes. We show that data-driven approach could be a promising direction at transforming massive text data into structured knowledge.

CCS CONCEPTS

• **Information systems** → *Data mining*; • **Applied computing** → **Enterprise ontologies, taxonomies and vocabularies.**

KEYWORDS

Data mining, text mining, text embedding, textcube construction

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INTRODUCTION

Motivated by developing automated methods for transforming massive unstructured text data into structured knowledge, we have proposed a multidimensional text cube model and developed a set

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of methods for automatically allocating unstructured text documents in multidimensional text cube structures, which may strike a key step for turning unstructured text into structured knowledge. Besides presenting our vision, we will introduce a set of concrete methods developed recently in our group towards such an exploration, including mining quality phrases [3], spherical text embedding [1], entity recognition and typing [6], multi-faceted taxonomy construction [4, 8], and construction and exploration of multi-dimensional text cubes [2, 5, 7]. We show that data-driven approach could be a promising direction at transforming massive text data into structured knowledge.

SHORT BIOGRAPHY

Jiawei Han is Michael Aiken Chair Professor in the Department of Computer Science, University of Illinois at Urbana-Champaign. He has been researching into data mining, information network analysis, database systems, and data warehousing, with over 900 journal and conference publications. He has chaired or served on many program committees of international conferences in most data mining and database conferences. He also served as the founding Editor-In-Chief of ACM Transactions on Knowledge Discovery from Data, the Director of Information Network Academic Research Center supported by U.S. Army Research Lab (2009-2016), and the co-Director of KnowEnG, an NIH funded Center of Excellence in Big Data Computing (2014-2019) He is Fellow of ACM, Fellow of IEEE, and received 2004 ACM SIGKDD Innovations Award, 2005 IEEE Computer Society Technical Achievement Award, 2009 M. Wallace McDowell Award from IEEE Computer Society, and 2018 Japan's Funai Achievement Award. His co-authored book "Data Mining: Concepts and Techniques" has been adopted as a textbook popularly worldwide.

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