Introduction

Automatically managing document collections is desirable for a number of reasons, such as to:

• Make information easier to discover and manage
• Reduce storage and computation requirements
• Comply with organizational policy and legal requirements for document management.

However, for large document collections, manual management is impractical since it is too time consuming. Thus, this research investigates the use of automatic methods for document collection management, focusing on duplicate detection and removal as a special case of automatic collection management.

The Case of Duplicates in the CiteSeer Digital Library

CiteSeer is a digital library of over 2 million academic papers that were automatically crawled from the Web and added to the digital library via automatic methods. The automatic detection and removal of duplicate documents, which make up approximately 2% of the documents in CiteSeer, could be considered a special case of automatic collection management.

Duplicate documents are undesirable in CiteSeer since:

• They clutter search results with the same documents [1]
• They require additional store and computation [1]
• The skew automatically generated collection statistics [2]
• They contribute to a document contributing to a document signature and duplicate documents are identified by the similarity of their signatures [5]
• When ensuring that no errors are made in duplicate classification, 98% of known duplicates could be found using these techniques [3]

Methodology and Findings

An experiment was conducted to determine the extent to which duplicate documents exist in CiteSeer by applying two state of the art duplicate detection algorithms to a random sample of 100 000 documents from the CiteSeer collection[3]

• The first algorithm is based on “shingles”, which are sequences of words that appear in documents and duplicates documents are identified by the overlap of their shingles [4]
• The second algorithm is based on a technique where each word in a document contributes to a document signature and duplicate documents are identified by the similarity of their signatures [5]

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Future Directions

Future work related to duplicate detection involves:

• Ranking of duplicate documents
• Removal and merging of duplicates

Duplicate detection is only one process in automatic collection management. Future research to generalize automatic collection management techniques involves:

• Systems for interpreting and enforcing collection management policies
• Classification and ranking of documents according to policies so that actions can be taken on the documents
• Scaling to large collections and big data

References