CROSS DOCUMENT RELATION IDENTIFICATION FOR
MULTI DOCUMENT SUMMARIZATION BASED ON
ENHANCED CASE BASED REASONING FRAMEWORK

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CROSS DOCUMENT RELATION IDENTIFICATION FOR MULTI DOCUMENT SUMMARIZATION BASED ON ENHANCED CASE BASED REASONING FRAMEWORK

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A thesis submitted in fulfilment of the requirements for the award of the degree of Doctor of Philosophy (Computer Science)

Faculty of Computing
Universiti Teknologi Malaysia

MARCH 2014
I hereby declare that this thesis entitled “Cross Document Relation Identification For Multi Document Summarization Based On Enhanced Case Based Reasoning Framework” is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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To my beloved father, mother, wife, sisters and brothers
Firstly, I would like to express my gratitude to my supervisor, Professor Dr. Naomie Salim, for her continuous support and availability on the development of my research study, especially because she has never been too busy to keep an eye on my progress in spite of her numerous obligations. She has greatly helped me in a lot of ways throughout this study. The most important lesson I learnt from her is that whatever you work, work with dedication and sincerity. Again, I owe her my deepest thanks.

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ABSTRACT

Documents which are available through online search often provide readers with large collection of texts. In the context of news documents, different news sources reporting on the same event usually contain common components that make up the main story of the news. This study aims to produce high quality multi-document summaries by taking into account the generic components of a news story within a specific domain. Since this study involves multiple documents, the research further investigates the automatic identification of cross-document relations from un-annotated text documents, where the case based reasoning (CBR) classification model is proposed. Cross-document relations are used to identify highly relevant sentences to be included in the summary. With the aim to improve the cross-document relation identification, genetic algorithm (GA) is integrated to enhance the CBR classifier. GA is used to scale the relevance of the data features used by the CBR classifier. Following that, this research proposes two new sentence scoring mechanism based on the identified cross-document relations. The first approach is based on a voting technique named votCombMAX which gives votes to sentences based on the relationship types between sentence pairs. The second approach investigates the benefits of fuzzy reasoning over the identified cross-document relations; since not all cross-document relation types have positive effect towards summary generation. In this study, the Document Understanding Conference (DUC) 2002 data sets are used; and as for the evaluation, the Recall-Oriented Understudy for Gisting Evaluation (ROUGE) evaluation metrics are used. The evidence from this study showed that the proposed methods yield significant improvement over the mainstream methods.
ABSTRAK

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LIST OF ABBREVIATIONS

AVG-F - Average F-measure
AVG-P - Average Precision
AVG-R - Average Recall
C1 - Method based on Clustering
CBR - Case Based Reasoning
Com - Component
CS - Cosine Similarity
CST - Cross-document Structure Theory
DUC - Document Understanding Conference
F1 - Method based on News Component Using Fuzzy based Scoring
F2 - Method based on Fuzzy Scoring Without News Component
G1 - Method based on News Component Using Graph based Scoring
G2 - Method based on Graph Based Scoring Without News Component
GA - Genetic Algorithm
GATE - General Architecture for Text Engineering
H1 - Human With Human Benchmark
IDF - Inverse Document Frequency
IE - Information Extraction
JAPE - Java Annotation Patterns Engine
LT - Length Type
NER - Named Entity Recognition
NLP - Natural Language Processing
NN - Neural Network
NP - Noun Phrase
ROUGE - Recall-Oriented Understudy for Gisting Evaluation
SVM - Support Vector Machine
TF - Term Frequency
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