

**MULTI-DOCUMENT TEXT SUMMARIZATION USING TEXT
CLUSTERING FOR ARABIC LANGUAGE**

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Abstract (English)

The process of multi-document summarization is producing a single summary of a collection of related documents. In this work we focus on generic extractive Arabic multi-document summarizers. We also describe the cluster approach for multi-document summarization. The problem with multi-document text summarization is redundancy of sentences, and thus, redundancy must be eliminated to ensure coherence, and improve readability. Hence, we set out the main objective as to examine multi-document summarization salient information for text Arabic summarization task with noisy and redundancy information. In this research we used Essex Arabic Summaries Corpus (EASC) as data to test and achieve our main objective and of course its subsequent sub-objectives. We used the token process to split the original text into words, and then removed all the stop words, and then we extract the root of each word, and then represented the text as bag of words by TFIDF without the noisy information. In the second step we applied the K-means algorithm with cosine similarity in our experimental to select the best cluster based on cluster ordering by distance performance. We applied SVM to order the sentences after selected the best cluster, then we selected the highest weight sentences for the final summary to reduce redundancy information. Finally, the final summary results for the ten categories of related documents are evaluated using Recall and Precision with the best Recall achieved is 0.6 and Precision is 0.6.

Keywords: Multi-document text summarization, Arabic text summarization, Automatic text summarization, Text clustering.

Abstrak (Bahasa Malaysia)

Proses ringkasan multi-dokumen adalah menghasilkan ringkasan tunggal daripada beberapa dokumen yang berkaitan. Dalam disertasi ini kami memberi tumpuan kepada ringkasan multi-dokumen generik ekstraktif dalam Bahasa Arab. Kami juga menghuraikan pendekatan kluster bagi ringkasan berbilang dokumen. Permasalahan yang berkaitan dengan ringkasan multi-dokumen ialah lebih ayat yang berulang, dan dengan itu, ianya mesti dikeluarkan daripada ringkasan bagi memastikan kepaduan dan meningkatkan kebolehbacaan ringkasan yang dihasilkan. Oleh itu, objektif utama disertasi ini ialah untuk memeriksa maklumat penting ringkasan pelbagai dokumen untuk teks Bahasa Arab dengan mengambilkira maklumat asing dan lebih ayat. Dalam kajian ini kami menggunakan Essex Arabic Summaries Corpus (EASC) sebagai data bagi menguji dan mencapai matlamat utama kami dan seterusnya mencapai sub-objektif berikutnya. Kami menggunakan proses pertimbangan untuk mengasingkan teks asal ke dalam perkataan, dan kemudian mengeluarkan semua perkataan yang tidak signifikan, dan kemudian kata akar bagi setiap perkataan diekstrak, dan seterusnya mewakili teks dalam bentuk bag perkataan dengan TFIDF tanpa maklumat yang tidak diperlukan. Dalam langkah kedua kami menggunakan algoritma K-means dengan persamaan kosinus dalam percubaan untuk memilih kluster terbaik berdasarkan susunan kluster oleh prestasi jarak. Kami menggunakan SVM untuk menyusun ayat selepas memilih kluster yang terbaik, dan kemudian memilih ayat dengan pemberat paling tinggi bagi ringkasan akhir untuk mengurangkan maklumat lebih. Akhirnya, keputusan ringkasan akhir bagi sepuluh kategori dokumen berkaitan dinilai menggunakan *Recall* dan *Precision* dengan *Recall* yang terbaik dicapai adalah 0.6 dan *Precision* ialah 0.6.

Kata kunci: Ringkasan teks multi-dokumen, ringkasan teks Bahasa Arab, ringkasan teks automatik, pengklusteran teks.

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To the memory of my father ...

To my mother ...

To my family and brothers ...

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Glossary of Terms

Notation	Description
Natural Language Processing (NLP)	The science information branch that deals with natural language information.
Information extraction (IE)	A kind of information retrieval whose goal is to automatically extract structured information from unstructured documents.
Automatic Summarization	The creation of a shortened version of a text by a program of computer.
Extractive Summarization	Using IE for generating a system summary.
Generic-based Summary	A summary that presents an overall sense of a documents' contents.
Query-based Summary	A summary that presents the contents of a document that are related to a user's query.
Cluster	A similar group of objects growing closely together.
Clustering	The task of assigning a set of objects into groups (so called clusters) so that the objects in the same cluster are more similar to each other than to those in other clusters.
Hidden Markov Model	A statistical Markov model in which the system being modeled is assumed to be a Markov process with unobserved state.
Machine Learning	a scientific discipline concerned with the design and development of algorithms that allow computers to evolve behaviors based on empirical data.

Unsupervised learning	A machine learning task of inferring a function from unlabeled data.
Supervised learning	A machine learning task of inferring a function from supervised (labeled) training data.

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter presents an overview of the whole study. The first section describes the background of the study that leads to the implementation of the whole research. This is followed by the statement of problem, research question, research objectives, the scope, and the significance of the study.

1.2 Background of the Study

The availability of electronic documents in Arabic language on the internet is increasing exponentially. So everyone should take advantage of this information revolution. The excellent way to gain access to these documents and get the basic thought is to be able to extract the main idea and take advantage of them. For this reason, automatic text summarization has rapidly grown into main research area as demonstrated by the Document Understanding Conference (DUC), which started in 2001 and the Text Analysis Conference (TAC) (McKeown, 2011).

Automatic Text Summarization (ATS) is a procedure of examining the maximum salient information of related documents and transporting them in less space from the original text. On the other hand, Text Summarization (TS), which goal is to take out a reductive source text transformation to summary text through content condensation by

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