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Analyzing the Content of high School Arithmetic Books with a Text Summary Approach Based on Fuzzy Logic

Majid Riazi Maher¹, Ahmad Shahvarani Semnani^{2*}, Mojdeh Afshar Kermani³, Parvin Azhdari⁴

1. PhD student of applied Mathematics, Department of Mathematics, North Tehran Branch, Islamic Azad University, Tehran, Iran
2. Associate Professor, Department of Mathematics, Science and Research Branch, Islamic Azad University, Tehran, Iran
3. Assistant Professor, Department of Mathematics, North Tehran Branch, Islamic Azad University, Tehran, Iran
4. Assistant Professor, Department of Mathematics, North Tehran Branch, Islamic Azad University, Tehran, Iran.

❖ **Corresponding Author Email:** maths_ahmad@yahoo.com

Research Paper

Abstract

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Purpose: The most important purpose is to provide an intelligent machine based on fuzzy logic for the automatic summarization of various texts and documents, therefore, the purpose of the current research was to examine the content of high school accounting textbooks with the approach of fuzzy text summarization.

Methodology: The current research was applied in terms of purpose, which was designed and implemented based on fuzzy logic. The statistical population of the research was middle school accountants who were selected as a statistical sample by census method. In this research, a text summarizing system based on fuzzy logic was used, and in the first stage of the proposed strategy, the fuzzy system evaluated sentences based on the determined features, identified important sentences, and compiled them to produce the final summary. In the final stage, using the harmony search algorithm, an effort was made to produce a summary with the level of simplicity of reading and understanding the writings and appropriate continuity. Also, in order to evaluate the performance of the proposed method, summarization of high school arithmetic books was done using MATLAB software.

Findings: The results obtained from the implementation of the proposed text summarizing machine showed semantic continuity, high accuracy in extracting the main parts of the book, and the efficiency of the summary document in learning and teaching topics.

Conclusion: Based on the obtained results, it can be seen that among the most important achievements of the proposed strategy is the summarization of Persian texts and of a scientific-specialized type with very high accuracy, which can be used as a new approach in teaching.



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Detailed abstract

Purpose: Textbooks are one of the most important sources of learning in educational systems and form the main materials of the school curriculum. Research on the analysis of textbooks is also a worthwhile endeavor, because many teachers and students benefit from it, and these studies are effective in designing suitable opportunities for students to learn. Also, studying and reviewing textbooks can reveal the connection between some of the students' learning problems with the curriculum and help to include the curriculum concepts in the textbooks in an appropriate way. It is through content analysis that one can understand the characteristics of a textbook and identify and introduce weaknesses in the content of textbooks. On the other hand, considering that Iran's education system is centralized, most of the class time is devoted to the textbook and all the students' learning is measured based on the textbook. Therefore, in our country, in terms of the importance and position of textbooks, content analysis becomes more necessary. Textbooks should contain up-to-date scientific content. Usually, textbooks are revised and revised every few years and adjusted according to the latest scientific methods and new studies. The book of second-level math's is one of the textbooks studied in this study. Among the different methods of content analysis, we can mention the summarization of texts. In the last few decades, text summarization has become a useful and important tool for information analysis. At first, this work was done manually, which was a difficult and difficult task for humans. On the other hand, the texts available in the virtual space are abundant and wide, and therefore, searching for the desired information among a multitude of documents is an important issue. In such a situation, summarization can be described as a very appropriate method to display the main parts of a document or a way to provide quick information by covering all the information of the main text, the most important advantage of using it is reducing the time of reading the text. Also, summarizing tools can be used to identify the key topics and topics of a text and check its content. On the other hand, the massive volume of information sources on one hand and the time limit on the other hand have led researchers to the attractive topic of automatic text summarization. Summarizations have different divisions from different points of view, which are divided into single-document and multi-document summaries in a general classification. In machine or automatic document summarization, automatic summarization is done by computer, and for this reason, it has many differences with the summary produced by humans. Another challenge in automatic summarization is that a good summary, in addition to covering the content properly, should have high continuity and simplicity of reading and understanding, and have a proper grammatical structure, which in recent years, the research in the field of summarization has focused on This is the axis. In addition to the above challenges, another important challenge in summarizing the text is that after producing the summary, evaluating its quality is a very important issue. The most important goal is to present an intelligent machine based on fuzzy logic for the automatic summarization of various texts and documents, therefore, the aim of the current research was to examine the content of high school accounting books with the approach of fuzzy text summarization.

Methodology: The current research was of an applied type, which was designed and implemented using the field method and based on fuzzy logic. The statistical population of the study was accounting books (4 books) of high school level, which were investigated by census method as a statistical sample. Fuzzy inference system was used to investigate the modeling in the current research, which introduces a model that is sufficient for the qualitative analysis of the system by only using conditional rules without dealing with the qualitative and detailed analysis of a system. Accordingly, in this article, the most important goal that has been discussed is to provide an intelligent and computer-based method for summarizing the content of the book in Persian language. This summarization should be done in such a way that the main content of the book is preserved and unnecessary parts are removed, and as a result, by producing the desired summary, teachers, students, researchers and users in general understand the main concept of the book in the shortest possible time. Therefore, in the current research method, the target text was pre-processed, processed and analyzed by various text mining techniques and finally summarized using fuzzy logic. which included the following steps: text loading, pre-processing, text processing, sentence scoring based on fuzzy logic, extracting important sentences, and summarizing the text. Also, in order to evaluate the performance of the proposed method, summarization of high school arithmetic books was done using MATLAB software.

Findings: The results showed that by removing the worthless words and symbols, the sentences were completely cleared. And although the sentences are out of their meaningful form, they are fully prepared in order to extract the features hidden in the sentences. It was also found that the original diameter in the similarity matrix is considered to be zero. Because in the subject of summarization, the similarity of each sentence is not raised by itself and the similarity between the sentences is a problem. Also, based on the similarity matrix presented in the table, it can be seen that sentences (2) and (3) have no similarity, and therefore the data related to the similarity of these two sentences are zero. On the other hand, it was found that the property of a particular name was zero in many texts. Finally, based on the fuzzy machine designed, the sentences with the highest scores and the desired number are selected and presented as a summary of the text. For example, if in each text we want to extract about 1/3 of the text as a summary, in text number (1) only one sentence should be selected and that is sentence number (2), in text number (2) sentence number (1), In the text of number (3) will be the sentence of number (2), in the text of number (4) will be sentences with numbers (1) and (3) and in the text of number (5) will be sentences with numbers (2) and (7) .

Conclusion : Based on the obtained results, it can be seen that one of the most important achievements of the proposed strategy is the summary of Persian texts and scientific-specialized type with very high accuracy that can be used as a new approach in teaching.