

Book recommendation and meaning systems for blind persons

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Abstract

There are many audio reading systems to help blind persons to read the texts. The reading system alone is not enough to help blind persons. This paper aims to design and implement a book recommendation and meaning system which appended to an audio reading system that was proposed previously. This book recommendation system is based on the book title that the blind person reads. In addition, the meaning system is used to get the meaning of the most frequent word in the text that is read. Since the proposed system is utilized by blind persons, it uses text-to-speech tools to convert the result into audio.

Keywords: Book recommendation, Machine learning, Meaning system, Blind persons

1. Introduction

There are many audio reading system to help the blind persons to read the text. These systems don't support the book recommendation or meaning system. Therefore, we aim to append recommendation and meaning systems to a system which was proposed in [3].

A Book Recommendation System is a system that have the ability to present a reader a suggestion for a book. This suggestion is based on his previous favorites books and the favorites books of a society with similar opinions [13, 1]. The meaning system is used to get the meaning of the most frequently words in the text that are read now.

The recommendation system has three types of the filtering techniques. First, content-based filtering system recommends a book to reader based on similar objects to those the reader has liked

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in the past. Second, collaborative filtering system which recommends the books that have been liked by readers with similar likings. Thirdly, Hybrid filtering system combines two or more techniques to improve recommendation system, leading to overcoming limitations of standalone techniques [14, 8].

The main characteristic of this paper is apply book recommendation and meaning system in the audio reading system for blind persons to help them to read a new book and understand to meaning of the most frequently words.

The paper is organized as follows: section 2 reviewed the related works for the recommendation systems. Section 3 presented our methodology of this System. While in section 4 we showed the experimental results. Finally, section 5 concludes this paper.

2. Related work

Parvatikar et al. [9] presented an approach to solve the data sparsity problem by combining association rule algorithm with collaborative-based technology to get better performance. They used the collaborative-based algorithm to detect similarity of objects. The benefit of this algorithm is a decision support system in recommended objects selection. For the vacant ratings the association rule was used to fill these places.

In [7], Mathew et al. proposed a technique to filter content-based features. Their system combines collaborative filtering and association rule for data mining which produced effective and efficient recommendation system. Their hybrid recommendation system was very helpful to buyer's interest recommendations detections.

In [2], Devika proposed Frequent Pattern Intersect algorithm (FPIntersect algorithm) that is a novel algorithm for pattern mining. It used to get rid of the disadvantage of Apriori algorithm. The proposed algorithm was tested and validated using simulation tools.

In [10], the authors proposed a book recommendation system for reader. Their system used designed training and testing models to new user's predictions ratings. It produced three recommendations type based on three various user attributes by using the predicted user ratings. This system has two steps of collaborative filter: first, using training model to training a book rating data. second, using testing model and trained data to predict user ratings for new users.

Tain et al. [12] designed a personalized recommendation system for college libraries depending on the hybrid filter technique. The paper shows the application of collaborative filtering and content-based filtering of college book recommendation system. This involves basic steps: first, reader classification is needed and then user-item scoring matrix is established and finally construction of vector space model and calculation of similarity among users is done. This system used characteristic of books and readers in college to improve the user-item matrix.

3. Proposed method

Two systems are proposed in this paper and appended to the audio reading system. These systems are used to help the blind persons to recommends a new book and understanding the meaning of the most word frequency in the text.

3.1. Meaning system

The blind persons can request a meaning feature, the output text of the audio reading system is input to the Term Frequency algorithm to select the words which have the most frequency in the text. Then, using English-Word-Meaning dataset to get the meaning of the selected word. Finally, the meaning result will be send to audio reading system (client side) to speak it using speaker device. The block diagram of the meaning system shown in figure 1.

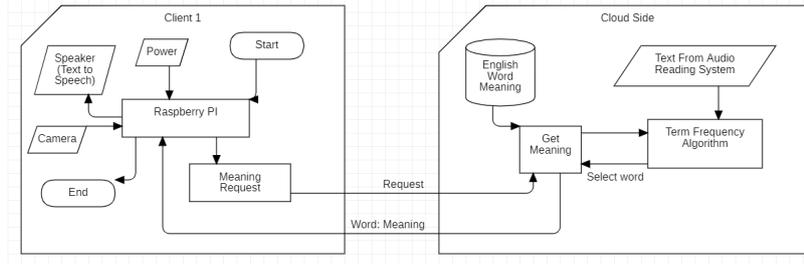


Figure 1: Block diagram of the meaning system

Term Frequency (TF) algorithm is common feature extraction approach based on the often-weighting which measures the frequency of a word that occurs in a text. Every text is different in length; it is possible that a word would appear much more times in long texts than shorter ones. Thus, the TF is often divided by the text length [4, 11]. TF using the following formula [6, 5]:

$$TF(i, j) = \frac{n(i, j)}{\sum_k n(i, j)}$$

where $n_{i,j}$ indicates the frequency of that word in the text. The denominator is the sum of the frequency of all the words in the text.

3.2. Recommendation system

The blind persons can request a recommendation feature, the audio reading system read the book title, this title is used to recommends a new book. This system recommends two books for two types of the recommendation.

3.3. Content-Based recommendation

From the book title, we get the category of this book using BookTitle-Category Dataset and then get the most book rating in this category using Book-User-Rating Dataset. This book is recommending to blind person as a content-based recommendation.

3.4. Collaborative recommendation

From Book-User-Rating Dataset, we get the most book rating for all category. This book is recommending to blind person as a collaborative recommendation.

The block diagram of the recommendation system shown in the figure 2.

3.5. User preference

To get which category is preference for specific user, the User-Book-Read dataset will be used. From dataset, we get all books that read by the specific users. Then, the category for each book is determined, count each category, finally get the category which has high frequency. By this category, we can recommend new book with the most book rating in this category.

4. Results

Python programming language is used to implement these systems. These systems are appending to audio reading system [3]. The output of these systems will be send to audio reading system as a text to convert it into audio.

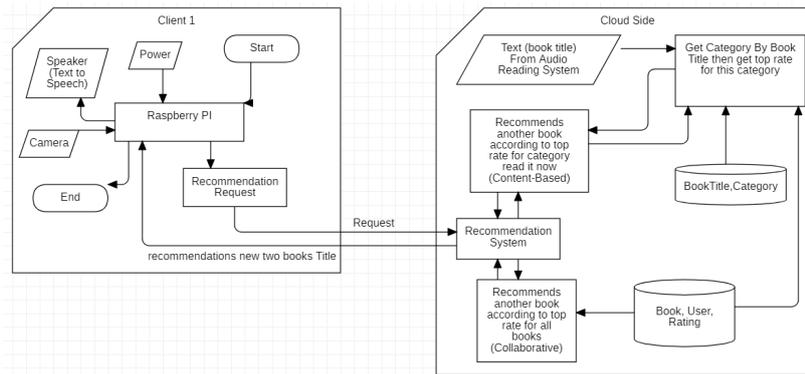


Figure 2: Block Diagram of recommendation system

Example 1: the output text of the audio reading system is “Big Brother”. The result of these systems are:

Term Frequency: Big

Meaning system: “Big is of considerable size or extent or intensity”.

Recommendation system: category of this book is “Romance” and the Recommendations are “Content-Based Recommendation is ‘Brother Odd’ and the Collaborative Recommendation is ‘Archer is Voice’”.

Table 1: Execution time for example 1

	Cloud Side (Second)	Total (Second)
Meaning System	0.1370	0.3316
Recommendation System	2.0459	2.4939

Example 2: the output text of the audio reading system is “Test Message This Text is used to Test the audio reading system for blind persons”. The result of these systems are:

Term Frequency: Test

Meaning system: “Test is to check the quality or performance of something”.

Recommendation system: Recommendations are “There is no recommendation, no matching with a dataset”.

Table 2: Execution time for example 1

	Cloud Side (Second)	Total (Second)
Meaning System	0.0137	0.7610
Recommendation System	0.0306	0.1864

5. Conclusions

The audio reading system is not enough to help the blind persons. The system can be useful once recommends a new book to read it after complete the current book. In addition, it should help the user to get the meaning of important words in the text. We proposed a modified meaning system to support the voice command recognition system to help the blind person to input the word that is wanted its meaning.

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