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Enlarging Text for Individuals Suffering from Low Vision

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Abstract: ***The given input, either an image converted to a text document or a text document itself, chosen by the user will be displayed in the default font size, in which they are present in the selected input file. If the user is satisfied with the current font size and wishes to print the document in it's current font size, he/she may proceed to print the document, and the contents will be printed in the available font size. However, if the user wishes to enlarge the font size further, he/she may enlarge the text option which will alter the font size of the contents of the document, ensuring further readability. The text content of the selected input file is displayed to check if the resultant font size is sufficient. The text displayed is of the same font size as in the selected input file. The user may repeat the process until desired font size is obtained.***

Keywords : Enlarge Text; Artifical Intelligence; Vision People; Social Network

I. INTRODUCTION

The people with typical vision get the data dynamically reliant on vision in everyday living. Unfortunately, low vision people has a visual impairment that interferes with their ability to perform daily activities so that they obtain the information by reading standard print or enlarged print and through listening. In a survey conducted by World Health Organization (WHO) in 2010, approximately the statistical result showed that [1],

285 million people	Suffers visual impairment
39 million people	Blind
246 million people	Low vision

Because of low visual disability, the abilities for performing daily tasks like reading, walking, driving, or recognizing objects, finding and interacting with surrounding world are limited or unfair. They need assistance from their family members and friends. If the assistive technologies can support low visually impaired people in at least one of daily tasks, it is going to make a very relevant social impact [2].

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Large print type should be used, mostly "18" point, but at a minimum "16" point for low visually impaired people. The expandable fonts on the computer make this simple to do. To treat myopia, hyperopia, astigmatism and presbyopia, the corrective lensesare used to correct the blur and improve the focus [3]. Low vision is defined as visual impairment that interferes with a person's ability to perform activities on a daily basis. Most low vision is caused by eye diseases and health conditions such as cataracts, glaucomasome low vision is from birth defects or injuries. So that they are unable to perform basic everyday tasks such as reading, writing, driving and sitting in front of the television or a computer screen.

A number of devices have been developed to support the visually impaired to access public places and locations. For example, audible indicators are used to alert when doors open and cross the pedestrian[4]. Recently, several aid systems have been developed to help low vision impaired people read text from natural sceneries or product labels [5-11]. The digital audio books for people with print disabilities is provided by Digital Accessible Information System (DAISY) [12]. At present, extensible Markup Language (XML) and MP3 are recommended as DAISY standard to represent text content and audio content. An XML format can be easily converted into another format, such as Braille, enlarge text and audio format. A screen reader is an interface which bridges the computer operation system and the user's command [13-14].

To access the information, the visually impaired people utilizes: (1) Enlarging the text and Pictures. (2) Hearing the audio. To translate into Braille or speech a printed book needs to be scanned and recognized. [15].To recognize objects such as packaged goods, bank notes and CD covers, The LookTel software is developed [16]. Almost all of the schools for the low visually impaired need enlarged books for teaching and studying. However, in 80% of the blind schools, there is no department for producing tactile graphic and enlarged books for teaching and learning materials [17].

Our aim is to

(1) Develop a technology that supports the translation of text into enlarged format.

(2) Develop a technology that reads text from natural scenery.

(3) Improve the textbooks accessibility for low visually impaired students.

A. Objective

The objective of this chapter is to enlarge the given input text to a more suitable font size making it convenient for the user to read the displayed text. The user may wish to enlarge the font size further, or may stop to extract the text with the current size in which it is displayed.

B. Scope

Generally, the contents of a document contains several attributes which can be altered, such as, color, size, styles, formatting and so on. But the scope of this chapter is to alter the font size alone, to ensure readability of the contents.

II. PROPOSED SYSTEM

A. Project Structure

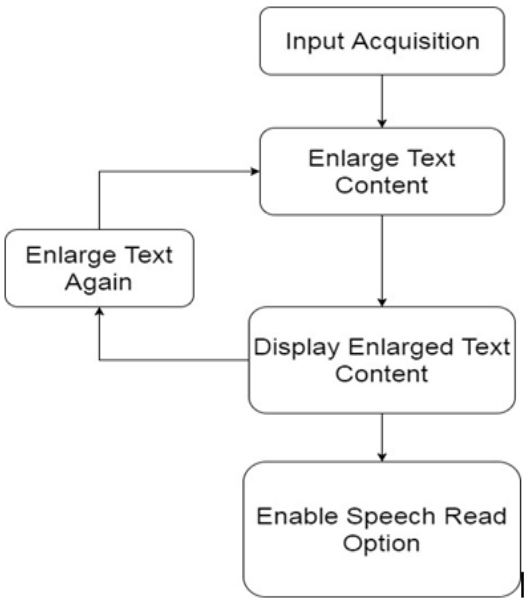

Fig. 1. System Architecture

The given diagram (Fig1) gives the overview of the flow of the project. The project structure diagram helps to better understand the flow of the project. The following sub-sections provide a more detailed description of the given components of the paper.

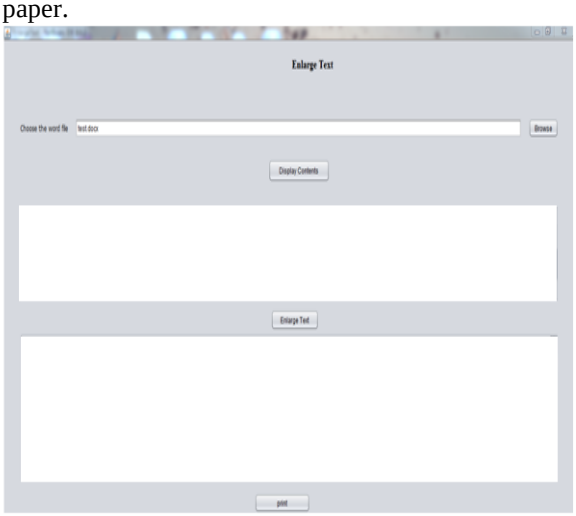

Fig. 2. Interface Design

The diagram given above (Fig 2) shows the interface produced when the project is run. The user can operate via this interface to alter the font size of the contents of the selected input file.

B. Input Acquisition

The input to the project can be one of several forms, which include an image, scanned by a scanner such as HP DeskJet 2132 or a text document. In the case of an input in the image format, the input is converted into a text document, which will be used to alter the font size, for the project. In the case of a text document as the input, no changes need to be made, as it already in the preferred format for alteration purposes.

C. Enlarge Text Content

The selected input, either an image converted to a text document or a text document itself, chosen by the user will be displayed in the interface in such a way that the contents are displayed in the default font size, in which they are present in the selected input file. If the user is satisfied with the current font size and wishes to print the document in its current font size, he/she may proceed to select the "Print" option, and the contents will be printed in the desired font size. However, if the user wishes to enlarge the font size further, he/she may select the "Enlarge Text" option which will alter the font size of the contents of the document.

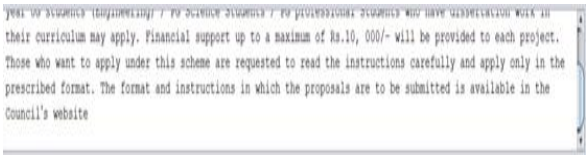
their curriculum may apply. Financial support up to a maximum of Rs.10, 000/- will be provided to each project. Those who want to apply under this scheme are requested to read the instructions carefully and apply only in the prescribed format. The format and instructions in which the proposals are to be submitted is available in the Council's website

Fig. 3. Content Text Before Alteration

The text content of the selected input file, is displayed in one area of the interface, when the "Display Contents" option is selected. The text displayed is initially in the same font size as in the selected input file as shown in Fig .3, which may later be altered via the interface.

D. Display enlarged Text Content

The displayed text is altered using the "Enlarge Text" option, which will result in the same text content, but in a much larger font size. This ensures readability for the user, which otherwise would have been difficult with the default font size. A simple example of the enlarged text displayed is given in Fig 4.

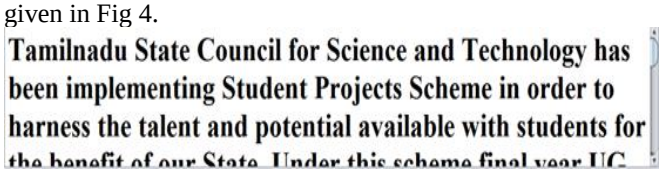
Tamilnadu State Council for Science and Technology has been implementing Student Projects Scheme in order to harness the talent and potential available with students for the benefit of our State. Under this scheme final year UG

Fig. 4. *Enlarged Text*

As seen in the given figure (Fig 4), the selected input file's text content is displayed with a modified font size. The user selecting the "Enlarge Text" option has resulted in the alteration of the font size of the content to achieve convenient readability. However, it is noticeable that the font size alone has been altered, and no other characteristics of the content have been modified in any manner.

E. Enlarge Text Content Again

As seen in the previous sub-section, the text content in the given input file is enlarged as per the user's desire. However, if the resulting text content is still not satisfactory for the user, or does not ensure convenient readability, the user may alter the font size again, by selecting the "Enlarge Text" option in the interface. This would result in the text content being displayed in a much greater font size as shown in Fig 5. This process may be repeated any number of times, until the user is satisfied with the resulting font size. Once the text approaches an easily readable form, the user can print the text, using the "print" option.

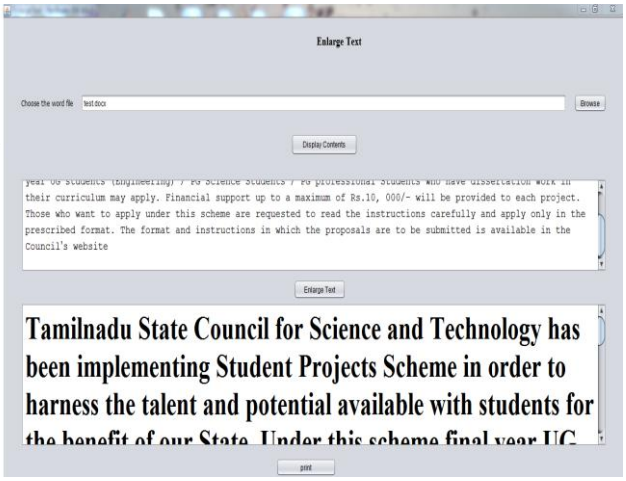

Fig. 5. ***Enlarging Text Repetitively***

F. Enlarge Speech Read Option

The text content, modified to the user's desired font size is made available for printing. But, as an additional option, if the user wishes to avail the speech feature, he/she may be able to do so, using the "Convert to Speech" option.

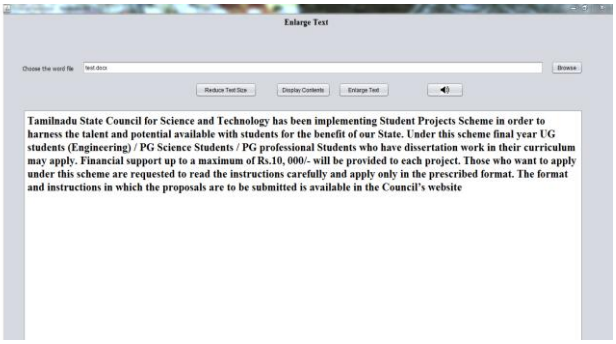

Fig. 6. ***Enable Speech Read Option***

G. Algorithm for Text Enlargement

```
Input:  List of image text
Output: Enlarged Text
BEGIN
IT ← {IT1,IT2,.....ITn}  //input images
WTi ← ITi        //image text to text
WTi← {WT1,.....WTn} //word text
X ← concatenate{WT1,.....WTn} //concatenate the list of
word text into single array
display X
ifenlargetext=true then
   foreachpara in X do
      increaseFontSize(paraeach,newpara);
   endfor
endif

ifshrinktext=true then
   foreachpara in X do
      decreaseFontSize(paraeach,newpara);
   endfor
endif

iftexttospeech=true then
   convert into speech(X)
endif
else
   display X

funincreaseFontSize(Paragraph paraeach, newpara) then
   for each run in paraeach do
      textInRun ← getText(run);
      fontSize ← getFontSize(run);
      newRun ← createRun(paraeach);
      newRun.setText(textInRun);
         newRun.setFontSize(run.getFontSize() + 2);
   endfor
endfun
fundecreaseFontSize(Paragraph paraeach, newpara) then
   for each run in paraeach do
      textInRun ← getText(run);
      fontSize ← getFontSize(run);
      newRun ← createRun(paraeach);
      newRun.setText(textInRun);
   newRun.setFontSize(run.getFontSize()- 2);
   endfor
endfun
end
```

The above algorithm describes the process of converting a list of image Text files to a single enlarged text file. The list of images is passed as input to the algorithm, which will then convert each image file to text. The list of text files are combined and stored in a single text file named X (word document).

Now, according to the user's desire, the text can be modified to either be enlarged or be shrunk. In any case, modifying the content of a word document directly is not possible, which is why the content is modified paragraph by paragraph. For each paragraph, an increaseFontSize() or a decreaseFontSize() function is passed to alter the font size. After each alteration, the modified content is displayed to confirm user satisfaction for readability.

III. PERFORMANCE VARIANCE

TABLE 1 PRECISION OF THE PROPOSED METHOD WITH DIFFERENT SCALES

SCALES	RECOGNITION ACCURACY (%)	COMPUTATION TIME IN ms (RECOGNITION)
TEXT IN IMAGE (.JPEG)	89.08%	0.0934
TEXT IN NPOTEPAT (.TXT)	95.6%	0.0676
TEXT IN WORD (.DOC/.DOCX)	98.9%	0.0451

The given table (Table 1) shows the variations with different input file formats. The parameters chosen for comparison are computing time and recognition accuracy. The details in the table are a summary of the results achieved after close examination of the different runtime scenarios.

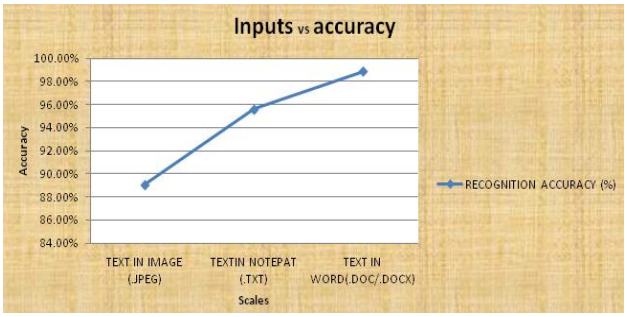

Fig. 7. ***Input vs. accuracy Graph***

The given Figure (Fig.7) represents a graph drawn between the different types of inputs and the performance accuracy achieved when each of the input file is passed. It is evident from the graph that the input files of the Word Document format (.doc or .docx), provide more accurate results when compared to the other file formats. This may be because when the input file is an image file (.jpg, .jpeg, or .png), it is much harder to convert into text, because of character recognition. The input files of the format of text files (.txt) also may not be as accurate as the word document files, as the content in a text document are present in a single line, unless the newline key is pressed, making it quite hard to read and analyze the text content.

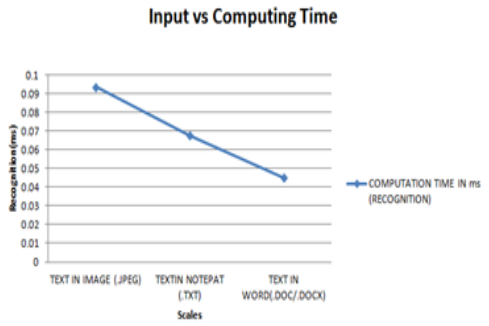

Fig 8. ***Input vs. computing time Graph***

The above Figure (Fig 8), is a graph drawn between the various input file formats and the computing time for each input type. It can be observed from the graph that the computing time for the input files of the format of word document is lesser. The reason for this could probably be because of the additional time needed to scan an input file of image type and recognize the characters accurately.

IV. CONCLUSIONS

The purpose of this paper is to explain the impact of developing a technology that supports the translation of text into an enlarged format. This has been achieved to the maximum possible extent. Experimentation has also shown that the font size of the content of the document is enlarged when the low vision people wishes to increase the size further for better readability. The Work scope of this paper is to develop a technology that reads text from natural scenery and for low visually impaired students the textbooks accessibility is improved. To check the sufficiency of the font size, the input text content is displayed. Performance of the system is more achievable.

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