Search engine for the elderly population - GenX-G

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Abstract

Today the access to internet is no longer a luxury but a necessity and search engines plays a vital role in a user's internet experience. Despite the vast amount of information available on the internet, not everyone has the same access to it which is an increasingly disadvantaged from a socio-ecological point of view. People aged 50 and more are unable to equally enjoy the benefits of internet than the other aged group due to variety of problems such as complexity, lack of hearing-visual aid support, language obstruction and so forth. So here I propose a search engine named GenX-G specially designed for the elderly population, keeping in mind these factors which could be effective in improving their user experience. This paper contains list of features, their explanation, and a brief analysis of the current scenario. The ultimate objective of the paper is to take the internet one step closer to being equally accessible by all.

1 Introduction

Internet usage has become unavoidable, irrespective of the age, class, or profession of a person with the whole world transitioning into an online methodology for almost all works. Despite the ever-growing trend of internet users, one particular group that is often left out that is the elderly population. A study showed that over 6% of the internet users in India belong to age groups 50 and above. This is a number that cannot be ignored and shows why it is necessary to focus on the Indian elderly population as a potential target group of users. For most users their interaction with the internet and the world wide web begins with a search engine and thus it makes sense to put special emphasis on designing search engines which can fit their needs. GenX-G has been designed keeping in mind the needs of an Indian senior citizen and aims to provide an experience that is not just convenient for the user but also increases their engagement and productivity on the internet since it has benefits such as enhancement of social connectivity, prevention or reduction of social isolation, increased information about offline leisure and recreational activities, and increased empowerment through access to information.

While there are already enough content on the internet targeting the middle-aged person and some popular search engines that are designed for the children like Kiddle, Wacky Safe and more but there is no search engine which aims specifically targeting elderly people simplifying their lives due to less users leading to less support and vice-versa, which make senior citizens of India deprived of the basic benefits of the internet. To address these shortcomings, I introduce GenX-G, which was developed by examining several design methods in order to develop techniques that can address the challenges that the elderly encounter when using the internet and, in particular, search engines. The paper goes on to detail the concept and aspects that can be integrated within the design, as well as how they work.

2 Related Work

There have been numerous studies regarding inclusive web design ideas which can be used to make the internet more accessible to the older elderly peoples. Darvishy and Good (Darvishy and Good, 2013) presents list of guidelines for designing web design that are suitable for elderly. The National Institute on Aging or NIA (Leung, 2014) has also complied a similar checklist. These lists set a basic standard

like simpler language, conservative color schemes, deigning readable text for older adults, incorporating other media, and increasing the ease of navigation and more.

Etsin by Aula and Kaki (Aula and Käki, 2005), a web search interface designed for the older adults evaluated against Google on various aspects such as ui for search bar, way of presenting the results, opening and downloading documents, editing text queries and more. Some of these ideas have been incorporated in GenX-G.

And how we can forgot the security aspect since online frauds rate are increasing drastically we definitely need to protect elderly people from it so "Qwant" (da Costa, 2016) is one of the search engines that claims to be inclusive and focuses on the privacy and experience of the user not specially for older age section we made security an important feature for out GenX-G.

Access to internet via mobile has been dominating (Broadband-Search, 2021) in this age group so we definitely need to focus on light weight and mobile system compatible search engine too. The patterns studied as a part of this research showed how the plain text answer for simple questions provided by the search engine are helpful in improving the ease of information access for senior citizens.

3 Problem description

We can agree that the world without the internet is unimaginable since its appropriate use of the internet makes life easy, fast, and simple. It helps us with facts and figures, information, and knowledge for personal, social, and economic development but elderly groups feel deprived from these due to the following factors.

- Lack of technological knowledge: They are generally not comfortable while interacting with the technology. Even after learning the basics of computer use, older adults face age related difficulties when using information on the Web. This may be overcome by using simpler designs with much less redundant features.

- Language barrier: Another important aspect which could be specific to this age group is the diversity in language across the country. Most people belonging to older generations are more comfortable in receiving information in their native language instead of English and its more difficult to adapt in a new language at that age.

- Fraud prevention: online fraud is likely to be a growing problem and seniors are often targeted for frauds since they usually have financial savings, own a home, and have good credit all of which make them attractive to scammers and possess low knowledge about them.

- Aging issues: visual and hearing loss are very common among the older adults across the world and these cognitive problems significantly hinders their user experience.

- Form filing: this problem is not for a specific age group but in general since almost every process on internet requires a form filing and encountering a new layout with for every website can be pretty annoying.

In addition to these limitations, excessive navigation across pages, going through complex form filings, understanding complex terminology and keeping track of different information read from different pages on the web are some common difficulties that older adults face while accessing the internet (Darvishy and Good, 2013) and since search engines being the first point of interaction between a user and the web thus have this additional responsibility of making sure that the complex interface does not lay off the users.

4 Major Insights

These following points summarises the insights that have been gathered from multiple sources and their evaluation closest to the existing solutions available. Other than the insights they also contain the ideas that GenX-G uses in order to make it a better variant of search engine for elderly people.

- User interface
  - Due to loss of visual abilities, it is important that user can modify text size
  - User can choose his language to continue browsing and can switch it anytime
  - Search engine also contains a special icon which when clicked would display an updated list of all local emergency numbers, directions to the user.
  - There will be an option to save the results in a dictionary format for future use and share the results too.
- Input methods
  - It can take inputs in form of speech just like current voice search
  - It also provides OCR reader for visual search just like google lens
  - It also allows multilingual text queries too.
- Output methods
  - Using cards and subsection for displaying information, instead of the currently used lists is a better way to organise the results due to more clarity.
  - We can use a in built summarizer to summarize all results in less than 100 words because large text can be tedious for elderly users.
  - We can also provide a text to speech options to listen the summary present in card and another option to save it for later.
- Page ranking
  - Introduce multiple page rankings one is ranking of a page is decided by the number of pages that link to it and other is GenX-G search engine specific.
  - Pages with more images or visual content are given higher preference over those with no images for users who face difficulty in reading in GenX-G specific ranking.
  - As most search queries by elderly people are financial, news and informational which has results in single line or small paragraphs hence article with same will ranked better but user can change back to general page rank system.
- Others helpful features
  - As a unverified link appeared in a webpage it will show a confirm popup to proceed with a that link for security reasons.
  - Re-skeletonize all the form into a fixed form structure for uniformity.
  - A tutorial is available at all times which can be invoked by the 'i' icon to provide the tour of search engine functions.

5 Solution

The final solution proposed is a search engine that is tailor made to fit the needs of older citizens of India, keeping in mind the various features that may improve the user experience of the targeted users. This section elaborates on the proposed solution and provides the technical details about some of the key features of GenX-G.

5.1 Visual Search

An important aspect of this is the ability to recognise Indian languages as well. The camera scans the document or the label with text and these pictures are used by an OCR reader at to extract text. (Pati and Ramakrishnan, 2005) presents a survey of various statistical and neural network-based approaches to extract text written in Indian scripts from images. There is sufficient work on OCR for Indian languages which can be used for this purpose (Kumar et al., 2006). For labels which may contain less than 5 words, all extracted words are directly used as a part of the query for documents, once the text is retrieved then keyword extraction can be applied onto the extracted text to obtain a set of keywords that form the query.

5.2 Voice Search

Majority of this age group face difficulty with qwerty keyboard so as currently there is speech to text is present which will help user to speak there query in any language and convert it roman language using transliteration and can later follow similar process in visual search.

5.3 Cross lingual Search

With the growing use of instant messages for almost all sort of conversations, people in India have started typing their native language in the roman script due to a higher popularity of the English keyboard. GenX-G has taken this point into consideration and thus automatically detects and transliterates the words which may belong to the native language of the user even though they are typed in the roman script. Recent works on automatic language detection from words written in the roman script are based on neural networks and Generative Adversarial Network and provide satisfactory results.(Sharma et al., 2018).

5.4 Query Extraction

In order to perform keyword extraction some pre-processing is also done on the then the top 5 keywords are used to query and the articles are then displayed. For the purpose of keyword extraction a support vector machine based approach is observed to perform better in terms of precision compared to a statistical approaches which is based on tf-idf (Hasan et al., 2017), and thus serve best for our purpose.

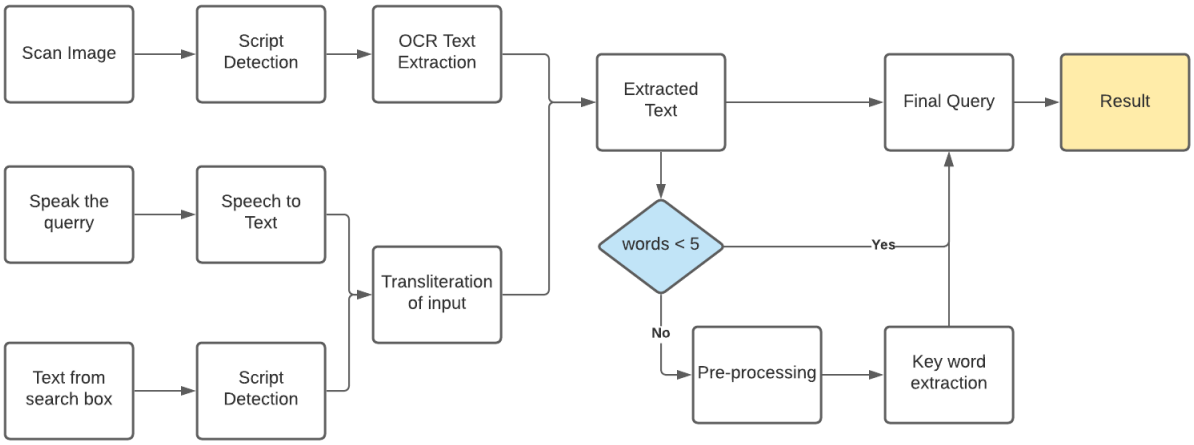

Figure 1: Flow chart explaining the pipeline of searching in GenX-G

5.5 Built-In Summarizer

This feature would allow users to keep a summary of their documents, not just in English but across languages as well. While most existing methods consider cross lingual summarisation as two separate tasks of summarising and then translating, Zhu et all (Zhu et al., 2019) approach it as a single end to end problem. For English to english translation existing neural approaches can be utilised. Common extractive approaches which rank and pick the most important sentences from a document provide decent

results when Latent Semantic analysis is used to identify semantically important sentences (Ozsoy et al., 2011). On the other hand is fully data-driven approaches like NAMAS can be used for abstractive sentence summarization where each word of the generated summary is conditioned on the input sentence. But this component can affect the output time since it add complexity of the entire interface so if user doesn't want this he can turn off this feature.

5.6 Page Ranking Algorithm

Despite all the added features and design the popularity of a search engine ultimately depends on the quality of its results. So here we will use two different ranks for listing the results. The one is famous Page rank algorithm (Brin and Page, 1998) where the rank of a page is decided by the number of pages that link to it and also by the quality/rank of the pages that link to it and the other algorithm which has few more parameters such as weighting the page on audio-visual content, bouncing rate of user, elder friendly and the article length along with tf-idf. It has also been observed older adults, due to lack of knowledge about the effective querying technique end up typing large sentences hoping for more accurate results where as that is not the case. To tackle this it is important to pre-process the queries properly and the same time extract more information out of them.

The algorithms for crawling through the web and indexing the documents remains same as the standard approach of starting by a few links and then crawling over all pages linked by the initial set and so on (Brin and Page, 1998). However additional minor details like the number of images in the page, there bouncing rates etc can also be stored.

5.7 User Interface

Its has adjustable font size for the page, user can choose the browsing language, disable all ads and popups, switch on reading mode and all the search results are shown in form of subsections along with summary for all result links and they can always save or listen the result clicking on unverified link or popup it will always ask for confirmation or fraud prevention, along with tutorial option at every step with a list of of all local emergency numbers and their directions to the user and a addition of assistant make it easier to use.

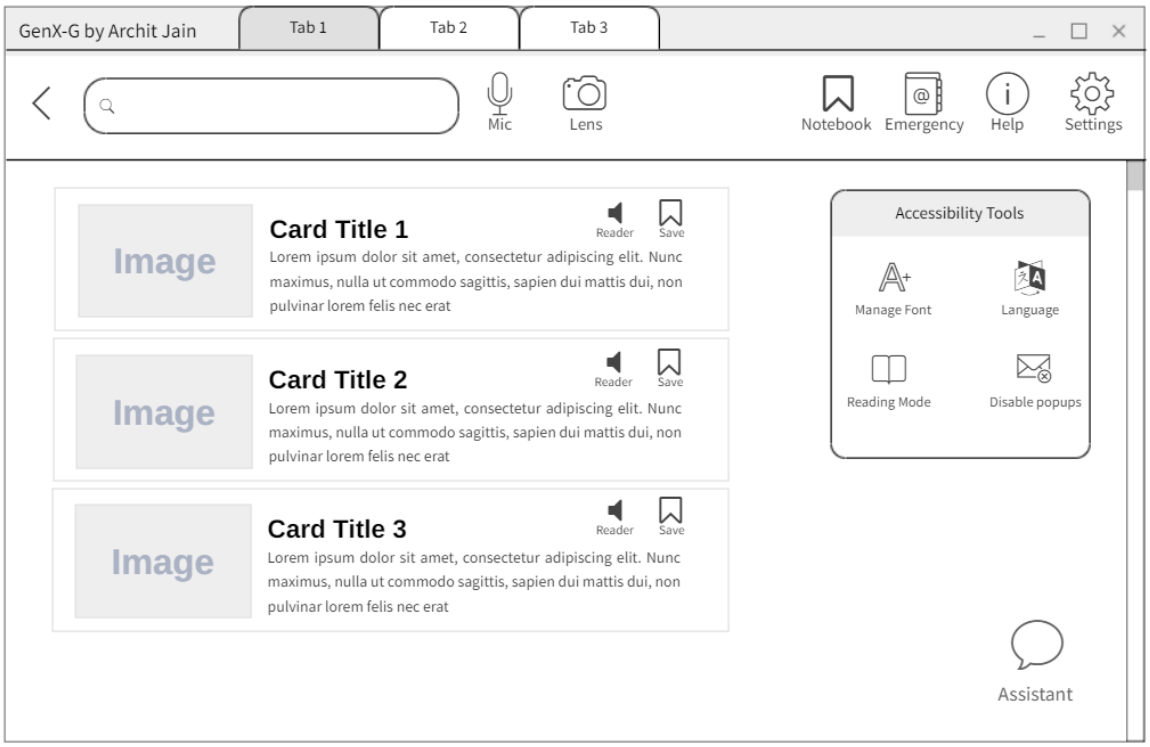

Figure 2: User interface prototype for GenX-G

5.8 Re-skeletonize Form

Form filing is a pretty tedious task for any age grouped user but also a essential part of any online process to make it less irritated this browser will scrapes out the all the different kind of form layouts across all the different websites and build a fixed kind of form which maintains a uniformity over all the websites for bettering the user experience.

6 Evaluation

While coming up with the design for Genx-G, many existing search engines were thoroughly observed keeping in mind the aspects and features which are considered to be important for our target audience as per various studies (Darvishy and Good, 2013) (Aula and Käki, 2005). Table 1 provides a summary of comparison of the existing search engines with GenX-G.

Feature	GenX-G	Estin	QUNTA	Google	Bing
Voice search	YES	NO	NO	YES	YES
Visual search	YES	NO	NO	YES	YES
Multilingual Queries	YES	NO	NO	YES	YES
Reader	YES	NO	NO	NO	YES
Built-In Summarizer	YES	YES	NO	NO	NO
Form Re-skeleton	YES	NO	NO	NO	NO
Reading Mode	YES	NO	NO	NO	YES

Table 1: Comparison between few search engine from GenX-G

Apart from the features mentioned, GenX-G comes with a lot of other functions like a built-in dictionary for saving result for easy recalling, direction and number for emergency contact on a click, dynamic font, multiple page raking algorithm and few others. The analysis shows that most of the recent search engine needs more facilities to help elderly people to connect to internet for smoothly and enhancing there overall user experience.

7 Future Scope

The future agenda for GenX-G would be to first create a prototype for the search engine and conduct a prototype testing and creating a proper case study or survey targeting the older adults and to evaluate a user experience and time taken to complete the specific tasks decide which features are more useful than others and add more features if required. We further start adding support for plugin/extension to add more features such as addition of cloud support since we cannot ignore it and maintaining it as per the increasing needs over the time. If this all ends up in a success, we can further use our search engine's features into other platform like creating a safer and enhanced version of social media apps for elderly people, but main focus will be maintaining and scaling the search engine but without over engineering it.

8 Conclusion

Form this paper we have studied what are some difficulties faced by elderly people in accessing the internet may be due to hearing/visual aid, may be due to language barrier or illiteracy towards technology but we cannot ignore this age group in term so there is a need of a search engine which can help them in overcoming those problems. GenX-G is designed keeping these problems in mind and created more senior-friendly web design among then currently present search engine along with incorporating the existing works that have made some progress in similar direction.

In this paper you can find a detailed list of ideas and analysis for same as comparison between current leading search engines. GenX-G is not only targeting the elderly people but also for any cognitive impaired person.

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