Designing an Artificial Intelligence (AI)-Assisted App to Improve the Efficiency of Online Shopping for Aged Users

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ABSTRACT

Although we live in a time where technologies are progressing at an astonishing rate, there are still several technological issues, especially concerning the elderly. Even though the internet has made it easier for people to purchase goods, it is still difficult for the elderly to use such a tool. To ameliorate this phenomenon, a specialized app that gives solutions to the difficulties the elderly often encounter would be essential. Supported by AI, this specially designed AI program for elderly users will be able to help users find the goods they need through voice recognition, provide personalized services and constantly update and improve safety and security measures. This application will provide seniors with a more friendly and caring online shopping experience and a higher quality of life in today's fast-paced world through these features and functions.

Introduction

Nowadays, artificial intelligence is leveraged more and more frequently in the design of smartphone apps to help promote the efficiency of human's daily lives. For example, it is difficult to understand patients' cognition on the Medication Guides consisting of extensive and complex crucial interactions and side effects. Misunderstanding of managing complex medication information can result in hospitalizations and medication non-adherence. An app is designed based on AI technology to allow us to understand patient cognitive processes to better provide easy-understood important medication information to patients (Roosan et al. 6). AI-assisted apps can also track food consumption or compute the nutritional value. This app can help us identify foods for dietary assessment to prevent chronic diseases and overcome health issues (Samad et al. 12). During the COVID-19 pandemic, it is inconvenient for people to have in-person visits with doctors in hospitals. An app with AI assistance automatically classifies and analyses the data (ketonuria, diet transgressions, and blood glucose values) from women with gestational diabetes mellitus. Then, this app helps recommend the diet or insulin treatment.

The apps and smartphone are designed based on ability of cognizance of the young generation. Aging people's ability of adapting new things is limited, and they usually cannot smoothly and efficiently find the specific functions from the apps in smartphones. For example, when aging people intend to use the function of payment assembled in the app 'Wechat', they cannot easily find the hidden positions and cannot recognize the icon to use this function. It is also challenging for aging people to use online shopping apps, such as 'Amazon', and 'T-mall'. The concept of online shopping is so new that it is difficult for aging people to accept these apps and understand the logistics of online shopping. It is very valuable to spend efforts to help aged people use the current advanced smartphone and apps, leading to the improvement of their life quality. However, currently, no attention is paid to this problem.

As aforementioned, AI has been demonstrated as a powerful strategy to design various apps for solving complex problems. Here, we will design an AI-assisted APP to guide aged people when they use smartphones. This AI-assisted APP aims to predict the needs of aged people. Based on the prediction, the APP can automatically list the

specific options to navigate aged people. Thus, the aged people quickly find their needs from the smartphone and efficiently proceed to next steps, avoiding troubles and saving time. Moreover, this technology can be more essential when applied to the uses of aged people since they are struggling to use the functions of smartphones.

In this case, it is prominent to take action to aid them. The best way to accomplish this goal is to have AI-based software that can identify automatically what the problem is and provide corresponding assistance.

As a result, it can make their life much easier. It can save them time and allow them to follow up the epoch. For example, it is sometimes hard for them to operate functions in certain software, during the period they are still struggling, the AI will identify possible issues they are currently facing, and give solutions for each potential possibility. Since cutting-edge technologies like smartphones are new for them, also due to their limited ability to adapt new things, this technology can provide great assistance.

Methods and Expected Results
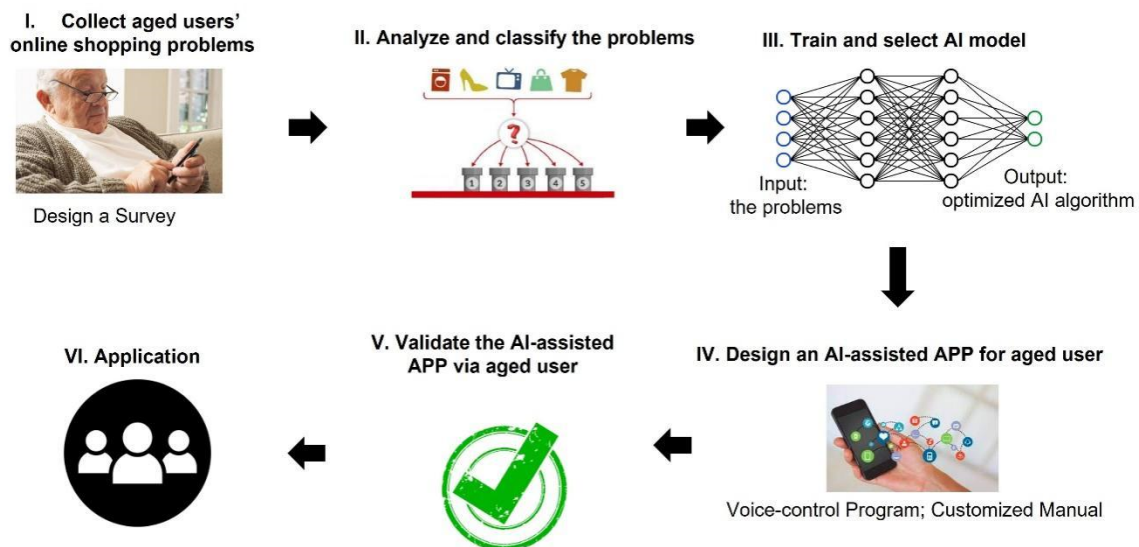
Figure 1. Illustration of our workflow to design an AI-assisted app that can solve the aged users' problems using online shopping apps, such as T-Mall and Amazon.

We aim to improve the efficiency for aged users (above 50 years old) using smartphones via this app. Our workflow includes six steps (Fig. 1). First, a comprehensive survey for aged people is designed to collect the problems the aged users encounter when using online shopping apps. The survey includes the questions as shown in Fig. 2.

After finishing the survey for aged users, we can better understand the current situation and problems when aged people use on-line shopping apps. Step II of our workflow (Fig. 1) is to analyze the data collected from the survey and classify these problems which aged users frequently meet. Based on Questions 1 – 4 in the Survey, we can obtain

1. the percentage of aged people who use on-line shopping app,
2. the average time that the aged users need,
3. the frequency that aged people use on-line shopping app.

Based on Questions 5 – 7; we can understand which process that aged people usually encounter problems, such as, Account registration, Login in, Product searching, Payment, and Web layout design. Considering the problems from their answers, we will classify these problems into different categories to help design the AI algorithm in the next step III.

Survey for aged user with online shopping experience

1.How frequently do you use on-line shopping app?
a)Daily b)A few times per week c)A few times per Month d)Never

2.What on-line shopping app do you use?
a)Amazon b)Taobao c)Tmall d)Others_____;

3.How long do you need to place an order for the expected products?
a)Less than 10 Minutes b)Half hour c)One hour
d)More than one hour;

4.Do you need to ask other's help?
YES / NO

5.Which part do you usually need help?
a)Account registration b)Login in c) Product searching
d)Payment e)Web layout design
(e.g., font size, color, unclear symbols, etc,···);
f) Others_____

6.Explain more details about the problems you mentioned that you need help in Question 5.

7.What are the most important things that you think can make the on-line shopping apps more friendly for aged user?

8.What do you think would help you the most when shopping online?
a) Guides b)Clearer titles c)Better search engine
d)All of the above
e)Others_____;

9.What is the most difficult step during the online shopping? What are your suggestions?

Figure.2 Survey for designing the app.

To train a machine learning algorithm, we can leverage the categorized problems from the former step and the corresponding solutions given by other older users as inputs. Since machine learning demands a considerable amount of information to optimize the solution, numerous attempts are required to find the optimized solutions. After increasing the number of trials, the solutions provided by the machine learning algorithm can be improved and become more efficient and accurate. Moreover, the aging users' problems can be solved even without sufficient details provided to the system. For instance, aging users are unfamiliar with the search processes by which they can find the ideal products. With the trained AI model, the aging one could just talk to an online shopping app with the demands, and the AI can suggest possible products by analyzing the similar demands from other users with similar profiles at

his age. Thus, it can make the software more considerate to the aged users by training the AI algorithm with the successful experience of other aging users. Furthermore, after training an efficient AI algorithm, the users' visual and auditory experience with the online shopping apps also play significant roles. We can provide solutions optimized by the AI algorithm to the aging users using voice-control functions and visually highlighted icons (as described in step IV), making the online shopping apps more friendly to aging users.

The fourth step overall (Fig. 1) is decorating the app, which is essential since this can improve aged users' user experience. Specifically, the software can be designed to have access control methods, such as voice control. This provides great help when aged users are struggling with viewing the texts. Moreover, a customized manual can be prepared to teach them basic knowledge of common functions on the phone and in the app.

After dealing with the algorithm, the user's experience is also essential. Due to the fact that this software is created for aged people, specialized design is required for the software's pages. Moreover, additional functions such as voice control and customized manuals should be added to the software to help users while using the app better. To be specific, when they are struggling with some buttons or pages, a customized manual will be helpful for them since it can simplify everything. For example, explicit words are presented to users instead of some ambiguous symbols. On the other hand, voice control can be applied when users have issues identifying words in the app. At this moment, what they need to do is just speak out about what they want to do with the app, and the app can use the same algorithm described above to answer the user's issue.

After the four steps, validation is required as the fifth step before the commercialized application in the market. In this step, we will test our AI-assisted app with recruited aged users to demonstrate to which degree our app improves the online shopping experience of aged users. The performance of this app will be quantified by designing an experiment. In these experiments, the recruited aged users are asked to purchase the same items online. We will assign two groups of aged users with or without the assistance of our app. The average time that the aged users in each group spend to finish the shopping will be recorded (Table. 1). The percentage of time saved via our app will be calculated by comparing the average time of these two groups. Then, the age users in the two groups will evaluate their online shopping process and experience to rank the online app via user satisfaction scores from one to ten (ten is the best, Table. 1). We will compare these scores from both groups to quantitatively show to which degree our app improves the aged users' online experience. For example, the average user's satisfaction score increased from four to nine after using our AI-assisted online shopping app. Moreover, we can use an accuracy percentage to evaluate how accurately the app can predict the goods the old users would like to purchase. The recruited users will report the accuracy percentage based on their experience (Table. 1). For example, the app predicts precisely nine times out of ten, which means 90% accuracy. Finally, based on the quantified validation from these experiments, we can demonstrate whether our AI-assisted app substantially improves the aged users' online shopping experience.

Table 1. The metrics used for quantifying the performance of the APP. The improvement ratio of the average time, statis faction score, and accuracy percentage can reflect to which degree the app benefits the aged users during the online shopping.

	Without the APP	With the assistance of the APP	Improvement ratio
Average time	T1	T2	(T1 -T2)/T1
Satisfaction score	S1	S2	(S2 -S1)/S1
Accuracy percentage	A1	A2	(A2 -A1)/A1

When the whole system passes the validation step, we will move to the last step, i.e., apply this APP to aged user's smartphones in the market (Fig. 1). During the steps of validation and application, we will keep collecting all the users' reports about their suggestions, critiques, comments, etc. Based on these reports, we will continue to improve the algorithm and design of our app to satisfy the users' needs at the utmost. Once the performance of this

app is optimized, it will become popular and quickly occupy the market, improving the online shopping experience of aged users.

Discussion

AI has been involved in many fields, including science, biomedicine, engineering, art, and people's daily life, which opens a new direction to promote the development of these fields.

Particularly, AI has been integrated into the design of smartphone apps to improve the quality and efficiency of daily human life. For example, patients can use an AI-based app to understand patient cognitive processes and important medication information (Roosan et al. 6). Also, AI-assisted apps can help us identify foods for dietary assessment, aiming to prevent chronic diseases and overcome health issues (Samad et al. 12). An app with AI assistance can automatically classify and analyze the data (ketonuria, diet transgressions, and blood glucose values) to recommend diet or insulin treatment for patients with gestational diabetes mellitus (Albert et al. 3).

In this communication, we aimed to develop an AI-assisted app to improve the online shopping experience for aged users. Aged users, including modern smartphones and apps, cannot easily adapt to new technologies. It is usually challenging for aged users to shop online, or their experience is unsatisfactory. Thus, the users of online shopping apps, such as 'Amazon,' and 'T-mall' are usually the young generation and not designed for aged users. But an online shopping app designed for aged users is valuable to improve their online shopping experience, helping them enjoy their life.

Compared with the common online-shopping apps, such as 'Amazon,' and 'T-mall,' our AI-assisted app has specialized designs for aged users. Additional functions, such as voice control and a customized manual, are added to the app to guide users to the next steps. To ensure the app is accessible and easy to navigate for seniors, it will show clear icons and explicit text language to elderly users instead of some vague symbols. In addition, senior users can perform the entire online shopping process through voice controls added to the app, as a certain segment of this group may have difficulty using a touch screen or typing. All these new features designed for older users can make online shopping easier and improve their experience.

According to Xu et al., the senior market is a huge and rapidly expanding segment (1). Furthermore, it has been noted that senior citizens are the fastest-growing segment in the United States and that seniors typically have more disposable income and purchasing power than the rest of the population. However, about 40% of seniors have a lower frequency of online purchases because they are less confident in their online abilities (Iyer and Eastman 59). In addition to the benefits mentioned above, the significance of this app will be to help older users have fewer problems or unsatisfactory experiences with shopping apps, enabling a significantly improved experience with cutting-edge technology for the older user group and, in turn, upgrading the online shopping experience.

On top of the current phenomenon, if this application continues to evolve as online shopping software advances, its benefits could be lasting. For example, as the shopping software is updated with more features, this application will also develop new corresponding algorithms to simplify the process based on the latest trends and technological advances in the market. Also, as users use this program for longer periods, the program can recommend items that better match their tastes based on their personal preferences and purchase history. In addition, this application can be developed to assist older users in using other features of their smartphones and to benefit their lives even more.

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