

Assignment P5:

Yasaman Vaghei
yvaghei3@gatech.edu

1 QUESTION 1- COMPUTER SCIENCE PROMPT

To answer this question, I decided to discuss about the computer science prompt.

1.1 Positive effect

The main positive effect that the Georgia Tech's OMSCS program has is that it gives students the flexibility to attend lectures and take exams at any time of the day during a specific period of time (e.g., one week or three days). I believe this can count as a great opportunity for people who are working full-time or are parents. These people might not be able to do class work during the daytime; however, being able to attend the lectures or take exams in the evening or nighttime is possible for them. Attending Georgia Tech's OMSCS program is a great substitution for on-campus program that mainly targets the aforementioned population. It provides an equal opportunity to learn for people having various time schedules.

This positive effect is closely tied with the asynchronous structure of the program. The lectures are all previously recorded. This enables the students to watch the lectures at any time that works best for them at any time zone. Also, the tests are set to be given in a certain time period (e.g., three days). This way, the students can choose to give the test at the time that they can best focus.

1.2 Negative effect

The Georgia Tech's OMSCS program targets people who continuously have access to internet. In order to get access to the course materials, tests, submitting assignments, class discussions and other elements of the course, the students require to have access to internet. It is of great importance for the students to closely follow Canvas and monitor their emails to stay up to date with the announcements and discussions. Missing any of the updates may negatively affect the students. Also, it is crucial to have access to internet in order to submit assignments every week and give tests. The tests even require proctoring that comes with specific internet requirements (e.g., speed).

I believe this negative effect also ties with the asynchronous structure of the program. This naturally comes with the need to have access to internet to transfer information between the server (i.e., Georgia Tech) and the user (i.e., student). Also, since the Georgia Tech's OMSCS program serves people residing at different locations on earth with different time zones, transferring information through internet is the fastest and most secure way that is currently being used instead of the other options.

1.3 Positive design

In order to re-design the program to limit the negative effect, Georgia Tech can make changes to the way that they deliver the material to the students. For example, for the students that have limited access to internet, they can send CDs to them on a weekly basis. This CDs may contain the course material required for the following week. This way, the students can watch the course videos offline or work on the assignments having the required information on the CDs.

Another option is to give students to submit their assignments via mail. Although this might take a few days longer than submitting the assignment online, it can be considered as a bypass for the students that have limited access to internet. These students might finalize their assignment and send it via mail a few days in advance to not miss the deadline.

1.4 Negative design

In order to re-design the program to limit the positive effect, Georgia Tech might enable the students to watch the lectures for instance at a certain time for all students, no matter what their time zone is. This way, the students are restricted to closely follow the solid schedule offered by the program in order to be successful.

2 QUESTION 2- CYBER SECURITY PROMPT

To answer this question, I decided to discuss about the cyber security prompt.

2.1 Unintentional side effect 1- losing access to your account

The two-factor authentication required a second device in order to add a second layer of security rather than using only username and password. This means that the users require to have the second device (usually their cell phone) in order to securely get access to their account.

However, in the event that one loses the second device, they might be locked out of their account forever. For example, if someone uses their phone for two-factor authentication, in the event that the phone is robbed or damaged, they lose access to their account unless they recover the phone. Also, if the phone is out of charge and the user does not have access to a charging unit, they might stay locked out of their account until they re-charge their phone.

2.2 Unintentional side effect 2- differential impacts

Using VPN and dual factor authentication services require people to have a basic knowledge about computer systems and setting up network connections (e.g., identifying the IPs of their system and the Georgia Tech's server IP). Although this might sound trivial for people who have good knowledge and experience in these areas, people coming from other backgrounds might experience difficulties even with setting up their VPN or dual factor authentication service. This negative side effect discriminates between people with more technical computer background and staff members or students with a different background.

2.3 Unintentional side effect 3- opening up more opportunities for attackers

The VPN and dual factor authentication services add a second security layer to get access to Georgia Tech's account. However, this makes the authentication more prone to risk. For instance, if one uses their USB for two-factor authentication, someone might be able to steal the USB and replace it with a similar one that enables the attacker to get access to the password. Assuming this scenario, the attacker might wait for the user to try to get access to their account on their computer using the replaced USB. In this situation, the attacker can easily install drivers on the user's computer and hack their password entered to their computer.

2.4 First way- using biological metrics instead of passwords

People now have access to webcams, either at their work office or on their laptop. In order to provide greater assurance of individuals' identities, Georgia Tech can use the user's webcam to identify the face of the user and then get access to the account. This has been previously implemented on iPhone and newer versions of laptops and is a convenient and cheap way for user authentications. Also, the face of the user is one of the biological metrics that is specific to the user and cannot be stolen or hacked by the attackers.

2.5 Second way- using software-defined perimeter (SDP) instead of VPN

An SDP is a framework that regulates access to the organizational resources based on the identity of the user. SDP can be used as a replacement of VPN to not only ensure that the access to system is permitted before allowing to connect to the network, but also grant user access to certain and specific services previously defined for the user and not all services.

SDP first identifies both the device and the user. After these steps are accomplished, SDP then determines if the device and the server are allowed to gain access to the network. If successful, it then opens a gateway to grant secure access between the user device and certain services that the user has access to. This procedure requires verification from the device, user, and the server and is more secure than VPN. Also, in the unfortunate event of attackers hacking their way through, they will only get access to certain services that were previously defined for that certain user. Therefore, not all services get exposed.

3 QUESTION 3

For this question, two papers from CHI conference are selected.

3.1 First paper

Title: Head-Worn Displays for Emergency Medical Services Staff

Authors: P. Schlosser, B. Matthews, I. Salisbury, P. Sanderson, S. Hayes

Providing emergency medical services on plane and air crafts is a challenging task. Currently, the devices that the medical support team use for decision support and patient information exchange include conventional handheld devices (e.g., smartphones and tablets). However, it is highly possible that using such devices in the busy and emergency environment interfere with the operations that are required to be performed. Head-worn displays (HWDs) were introduced in this study as a hardware replacement for handheld devices that can continuously present content in a hands-free manner.

First, the authors focused on the medical emergency staff. They studied the steps these people take for preparation, use of technology, and procedures required to be implemented in addition to the way the emergency staff members develop their skills. This was mainly done to identify the field and context.

Second, proposing the HDWs, the authors stated that such devices are beneficial for enriching information exchange between medical staff members including members of the prehospital care, support monitoring and clinical imaging. This was shown by an experimental design on 13 different medical staff members.

Third, the authors presented a novel set of considerations required to be used in the development of HWD. These considerations included the following: 1) environmental considerations: the HWDs require to be compatible with the weather conditions at high altitude levels. Also, they require to be dust and water resistant. 2) cognition and workload considerations: since the pre-hospital environment is stimulus rich and there is a change for increased workload in a short time period, the HWDs require to be designed in a way to be informative but not disruptive. 3) collaboration considerations: the HWDs require to be designed in a way that the information presented on the HWD can be communicated with other local staff members as well as the ones who are assisting remotely. 4) privacy considerations: patient privacy and data confidentiality must be maintained and not be violated by the design. 5) adaptability considerations: the HWDs require to be flexible with accommodation situation specific requirements at different timepoints when giving care.

The reason that I was interested in reviewing and summarizing this paper was the detailed assessments. I believe this paper not only did a good job to explore the field, but also did a thorough need finding process. Consequently, proposing using a novel device to the field, they evaluated their model by surveying the users and concluded the work by relying on the evaluation made by the users. Finally, as a by-product to the evaluation phase, they clearly stated five different considerations required to be taken into account in the design. This ultimately paves the path for future studies.

3.2 Second paper

Title: LightWrite: Teach Handwriting to The Visually Impaired with A Smartphone

Authors: Z. Wu, C. Yu, X. Xu, T. Wei, T. Zou, R. Wang, Y. Shi

Writing can be a challenging task for the blind and low vision (BLV) individuals. Despite the growing body of literature and development of several different devices, the current assistive devices and program developed are expensive and

require guidance from the sighted teachers. This study first explored the previously developed devices for the problem stated above. Both conventional and modern devices were explored. The authors stated that these devices required an external additional device that are not readily available in daily life such as thermos pens and 3-D printers. This imposes a great burden of costs and energy to learn writing for BLV users.

In this work, a low-cost voice-guided smartphone app was developed in order to assist BLV individuals with writing. The voice guidelines indicated the handwriting process to write the letters. The proposed application was evaluated by 15 BLV individuals. The participants were then asked to explain how satisfied they were with the new design. Analyses were performed in order to assess the efficiency of the application proposed in real-life application.

This study was done at two different stages: 1) learning to write: participants explored the app by trying it for 10-15 minutes, writing 26 different letters and numbers. They were then required to evaluate their experience by a survey and a follow-up interview. 2) memorizing and training: participants were asked to use the application for 20 minutes per day in five consecutive days. They were asked to send over their daily writings to the experimenter. In order to encourage the users, a 15\$ reward was considered for the individual who completes the task with the most written letters. After 7 days, the participants participated in a survey and an interview to evaluate their learning experience.

The results revealed that the participants not only were able to write an average of 19.9 letters out of 26 letters (recognizable by sighted raters), but also expressed interest in continuing to use the application and recommending it to their community.

The main element of this study that grabbed my attention was the emphasis of the authors on the users. Through out the study, it is clear that the researchers made efforts to continuously evaluate their designed application by getting the BLV users' feedback through surveys and interviews. Also, I like the fact that they broke down their study into two sections in order to study the effect of practice on the outcome.

4 QUESTION 4

For this question, two papers are selected from two different conferences.

4.1 First paper

Title: Strategies for the Inclusion of Human Members within Human-Robot Teams

Authors: S. S. Sebo, L. L. Dong, N. Chang, B. Scassellati

Conference name: ACM/IEEE Conference on Human Robot Interaction

Inclusion is one of the most important aspects that leads the group to become more productive and successful. The members of the group are required to be included equally in the group regardless of their background and expertise. Today, robots are becoming an essential part of the work teams. Previous work showed that the robots can affect the group dynamics such as related behavior and participation. This study explores two different strategies in order to study the effect of a robot being included in a team of human members.

In the first strategy, a single specific person is instructed to interact with the robot only. This person can be considered as a technical person who has expertise in working with the robot. Other members are allowed to interact with the human members and not the robot. The goal was to assess the level of participation that single person perceives in the human-robot group in this situation.

In the second scenario, the robot was programmed in a way to support all team members verbally, at least for 6 times during the session. The goal here was to assess the effect of participation level in the group for all human members in a collaborative task with humans and the robot involved.

The results revealed that in the first strategy, the single person interacting with the robot feels to be not included as the other human participants. In the second scenario, the confirmation received by the robot showed a significant increase in the participation of the human participants.

The main reason that I chose this paper was an idea that I had about using robots in order to collect information from the participants in the need finding stage in group brainstorming sessions. I believe that this paper provides good insight on those robots can be used in future studies for the aforementioned purpose. Also,

I like the visualization included in this paper that makes it more understandable. The number of participants in this study are also noticeable and makes the results more reliable.

4.2 Second paper

Title: Increasing the Speed and Accuracy of Data Labeling

Through an AI Assisted Interface

Authors: M. Desmond, Z. Ashktorab, M. Brachman, K. Brimijoin, E. Duesterwald, C. Dugan, C. Finegan-Dollak, M. Muller, N. N. Joshi, Q. Pan, A. Sharma

Conference name: International Conference on Intelligent User Interfaces

Machine learning is one of the most popular areas of research today. In order to develop machine learning models, there is need for training data to be fed to the algorithm. The training data includes information on the input and the relevant target variable (also known as label). In order to better train the machine learning model, there is need for a large number of training data. However, labelling input variables is not a trivial task and requires experienced and expert users in the field. However, humans are prone to mistakes and human time is costly.

In order to minimize the risk for mistakes and make the data labeling more time effective, an AI-assisted data labelling interface was proposed in this work. The two main goals were to 1) identify and visualize the labels that have a higher probability to match with the un-labelled sample, 2) limiting the labelling decision space. The designed interface was tested by 54 participants to evaluate the accuracy and the speed of labelling. The results revealed that the newly designed interface increase the accuracy and speed of labelling significantly.

This paper was super interesting to me since it was aiming a very common problem that everyone faces when it comes to developing machine learning algorithm. I experienced a similar problem when developing a predictive model for a large number of data in my Master's thesis. I believe that this AI-base interface can have a huge impact on the field. I specifically liked that they paid attention to minimizing clutter in the interface while emphasizing the material with highest importance. The assistive nature of this paradigm enables one to avoid mistakes and better focus on the task.