Research Contribution In Human Computer Interaction

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Abstract- *Human computer interaction (HCI) is an interaction in which users can easily interact with computer. The machinery inside the computer might be harder but at the end the output of the computer must be understandable to the users this include desktop system as well as embedded system in different devices. If the interface is poor or difficult then the user will simply ignore the product or technology. One of the most important concept of HCI is functionality and usability. Services provided usually by a system are called functionality. Usability is when a user utilizes the system's function properly. There must be a balance between both functionality and usability then only the system is said to be successful. Functionality and usability may be different from one system to another system. In this paper we will look at existing HCI and the recent advances in the field.*

I. INTRODUCTION

Human-computer interaction (HCI) is a multidisciplinary field of study focusing on the design of computer technology and, in particular, the interaction between humans (the users) and computers. While initially concerned with computers, HCI has since expanded to cover almost all forms of information technology design.

HCI surfaced in the 1980s with the advent of personal computing, just as machines such as the Apple Macintosh, IBM PC 5150 and Commodore 64 started turning up in homes and offices in society-changing numbers. For the first time, sophisticated electronic systems were available to general consumers for uses such as word processors, games units and accounting aids. Consequently, as computers were no longer room-sized, expensive tools exclusively built for experts in specialized environments, the need to create human-computer interaction that was also easy and efficient for less experienced users became increasingly vital. From its origins, HCI would expand to incorporate multiple disciplines, such as computer science, cognitive science and human-factors engineering.

HCI soon became the subject of intense academic investigation. Those who studied and worked in HCI saw it as a crucial instrument to popularize the idea that the interaction between a computer and the user should resemble a human-to-human, open-ended dialogue. Initially, HCI researchers focused on improving the usability of desktop computers (i.e., practitioners concentrated on how easy computers are to learn and use). However, with the rise of technologies such as the Internet and the smartphone, computer use would increasingly move away from the desktop to embrace the mobile world. Also, HCI has steadily encompassed more fields:

"…it no longer makes sense to regard HCI as a specialty of computer science; HCI has grown to be broader, larger and much more diverse than computer science itself. HCI expanded from its initial focus on individual and generic user behavior to include social and organizational computing, accessibility for the elderly, the cognitively and physically impaired, and for all people, and for the widest possible spectrum of human experiences and activities. It expanded from desktop office applications to include games, learning and education, commerce, health and medical applications, emergency planning and response, and systems to support collaboration and community. It expanded from early graphical user interfaces to include myriad interaction techniques and devices, multi-modal interactions, tool support for model-based user interface specification, and a host of emerging ubiquitous, handheld and context-aware interactions."

Where HCI came from

Until the late 1970s, the only humans who interacted with computers were information technology professionals and dedicated hobbyists. This changed disruptively with the emergence of personal computing in the later 1970s. Personal computing, including both personal software (productivity applications, such as text editors and spreadsheets, and interactive computer games) and personal computer platforms (operating systems, programming languages, and hardware), made everyone in the world a potential computer user, and vividly highlighted the deficiencies of computers with respect to *usability* for those who wanted to use computers as tools.

The challenge of personal computing became manifest at an opportune time. The broad project of cognitive science, which incorporated cognitive psychology, artificial intelligence, linguistics, cognitive anthropology, and the philosophy of mind, had formed at the end of the 1970s. Part of the program of cognitive science was to articulate systematic and scientifically informed applications to be known as "cognitive engineering". Thus, at just the point when personal computing presented the practical need for HCI, cognitive science presented people, concepts, skills, and a vision for addressing such needs through an ambitious synthesis of science and engineering. HCI was one of the first examples of cognitive engineering.

Goals for computers

Human–computer interaction studies the ways in which humans make—or do not make—use of computational artifacts, systems and infrastructures. Much of the research in the field seeks to *improve* human–computer interaction by improving the *usability* of computer interfaces. How usability is to be precisely understood, how it relates to other social and cultural values and when it is, and when it may not be a desirable property of computer interfaces is increasingly debated.

Much of the research in the field of human–computer interaction takes an interest in:

- Methods for designing new computer interfaces, thereby optimizing a design for a desired property such as learnability, findability, efficiency of use.
- Methods for implementing interfaces, e.g., by methods of software incorporation.
- Methods for evaluating and comparing interfaces with respect to their usability and other desirable properties.
- Methods for studying human computer use and its sociocultural implications more broadly.
- Methods for determining whether or not the user is human or computer.
- Models and theories of human computer use as well as conceptual frameworks for the design of computer interfaces, such a cognitivist user models, activity theory or ethnomethodologically accounts of human computer use.
- Perspectives that critically reflect upon the values that underlie computational design, computer use and HCI research practice.

Visions of what researchers in the field seek to achieve vary. When pursuing a cognitivist perspective, researchers of HCI may seek to align computer interfaces with the mental model that humans have of their activities. When pursuing a post-cognitivist perspective, researchers of HCI may seek to align computer interfaces with existing social practices or existing sociocultural values.

Researchers in HCI are interested in developing design methodologies, experimenting with devices, prototyping software and hardware systems, exploring interaction paradigms, and developing models and theories of interaction.

II. PRINCIPLES

The user interacts directly with hardware for the human *input* and *output* such as displays, e.g. through a graphical user interface. The user interacts with the computer over this software interface using the given input and output (*I/O*) hardware. Software and hardware are matched, so that the processing of the user input is fast enough, and the latency of the computer output is not disruptive to the workflow.

The following experimental design principles are considered, when evaluating a current user interface, or designing a new user interface:

- Early focus is placed on user(s) and task(s): How many users are needed to perform the task(s) is established and who the appropriate users should be is determined (someone who has never used the interface, and will not use the interface in the future, is most likely not a valid user). In addition, the task(s) the users will be performing and how often the task(s) need to be performed is defined.
- Empirical measurement: the interface is tested with real users who come in contact with the interface on a daily basis. The results can vary with the performance level of the user and the typical human–computer interaction may not always be represented. Quantitative usability specifics, such as the number of users performing the task(s), the time to complete the task(s), and the number of errors made during the task(s) are determined.
- Iterative design: After determining what users, tasks, and empirical measurements to include, the following iterative design steps are performed:

    1. Design the user interface
    2. Test
    3. Analyze results
    4. Repeat

The iterative design process is repeated until a sensible, user-friendly interface is created.

III. METHODOLOGIES

Various different strategies delineating methods for human–PC interaction design have developed since the ascent of the field during the 1980s. Most plan philosophies come from a model for how clients, originators, and specialized frameworks interface. Early techniques treated clients' psychological procedures as unsurprising and quantifiable and urged plan specialists to look at subjective science to establish zones, (for example, memory and consideration) when structuring UIs. Present day models, in general, center around a steady input and discussion between clients, creators, and specialists and push for specialized frameworks to be folded with the sorts of encounters clients need to have, as opposed to wrapping user experience around a finished framework.

- Activity theory: utilized in HCI to characterize and consider the setting where human cooperation with PCs occur. Action hypothesis gives a structure for reasoning about activities in these specific circumstances, and illuminates design of interactions from an action driven perspective.
- User-focused design: client focused structure (UCD) is a cutting edge, broadly rehearsed plan theory established on the possibility that clients must become the overwhelming focus in the plan of any PC framework. Clients, architects and specialized experts cooperate to determine the requirements and restrictions of the client and make a framework to support these components. Frequently, client focused plans are informed by ethnographic investigations of situations in which clients will associate with the framework. This training is like participatory design, which underscores the likelihood for end-clients to contribute effectively through shared plan sessions and workshops.
- Principles of UI design: these standards may be considered during the design of a client interface: resistance, effortlessness, perceivability, affordance, consistency, structure and feedback.
- Value delicate design (VSD): a technique for building innovation that accounts for the individuals who utilize the design straightforwardly, and just as well for those who the design influences, either directly or indirectly. VSD utilizes an iterative plan process that includes three kinds of examinations: theoretical, exact and specialized. Applied examinations target the understanding and articulation of the different parts of the design, and its qualities or any clashes that may emerge for the users of the design. Exact examinations are subjective or quantitative plan explore thinks about used to advise the creators' understanding regarding the clients' qualities, needs, and practices. Specialized examinations can include either investigation of how individuals use related advances, or the framework plans

Human computer interface

The human–computer interface can be described as the point of communication between the human user and the computer. The flow of information between the human and computer is defined as the *loop of interaction*. The loop of interaction has several aspects to it, including:

- Visual Based: The visual based human computer interaction is probably the most widespread area in Human Computer Interaction (HCI) research.
- Audio Based: The audio based interaction between a computer and a human is another important area of in HCI systems. This area deals with information acquired by different audio signals.
- Task environment: The conditions and goals set upon the user.
- Machine environment: The environment that the computer is connected to, e.g. a laptop in a college student's dorm room.
- Area of interface: Non-overlapping areas involve processes of the human and computer not pertaining to their interaction. Meanwhile, the overlapping areas only concern themselves with the processes pertaining to their interaction.
- Input flow: The flow of information that begins in the task environment, when the user has some task that requires using their computer.
- Output: The flow of information that originates in the machine environment.
- Feedback: Loops through the interface that evaluate, moderate, and confirm processes as they pass from the human through the interface to the computer and back.
- Fit: This is the match between the computer design, the user and the task to optimize the human resources needed to accomplish the task.

IV. CONCLUSION

As the HCI field matures, it is important to reflect on the knowledge I produces and the forms that knowledge takes.

Such reflection can be challenging in a broad and diverse field, and while we should be wary constraining imaginations, we should embrace giving definition to the knowledge we produce. Doing so provides a valuable map for navigating the field of HCI, and helps new comers take their first steps. It is, after all, those new comers who will uncover new possibilities and push the frontiers of our knowledge even further.

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BIBLIOGRAPHY

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