Understanding Human-Computer Interaction Patterns: A Systematic Analysis of Past and Future Innovations

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Abstract

The paper's aim was to further understand the human-computer interaction complexities of past and future advances that have profoundly altered the human development period. After doing a detailed review of many international journals on a similar subject, we decided to take this method. We depend on current data gleaned from Google Scholar searches performed between the years 2-010 and 2021 to resolve this problem. Then we investigate it using a phenomenological approach, beginning with coding, calculation, and interpretation to arrive at precise and reliable final findings. We may infer from the data review that human-computer contact is a sequence of protocols, dialogues, and actions that humans participate in in order to communicate with machines, all of which include input and guidance via a gui in order to obtain the desired outcome.

Keywords

Human-Computer Interaction Patterns, Past and Future Innovations, Systematic Review.

Introduction

Interaction is described as a type of action that arises when two or more artifacts collide. Human-machine interaction (HCI) is a communication between humans and computer systems with specific models and characteristics to reach a common purpose through the usage of interface-hiding technologies. (Card, 2018; Bannon, 1995; Carroll & Long, 1991). Understanding human-computer interaction (HCI), which includes connectivity, assessment, and application of an easy-to-use computer user interface, is at the heart of research into the relationship between humans and computers. Despite the fact that the term "human-computer interaction" was only invented recently, it has already made its way into a well-established sector. This research project aims to further explain the two objects of human-computer interaction. This knowledge is critical because there is a pressing need to improve job tools that have become a trend in any aspect of human existence that involves computer interaction. (Sawers & Ting, 2014; Noohi et al., 2016; Mace et al., 2017).

Interaction is described as a type of direct or indirect contact between a consumer and a program, with direct communication involving discussion with input and control during the execution of a task or job, and indirect communication involving background processes or batch processes in the HCI analysis. (Sundar et al., 2016; Javornik, 2016). A consumer is a person, a group of people working together, or a group of people in an organisation who are confronted with a problem or method and are attempting to solve it with technology. Computers are technology ranging from desktop computers to large ones: computer systems, process control systems, or organized systems by systemizing. People, for example, may be used as non-computer components. (Tan & Nijholt, 2010; Zander & Kothe, 2011; Belongie et al., 2006).

HCI (Human-Computer Interface) is a fun and innovative interaction system that combines art and science to fulfill the needs of the user's task. (Rogers et al., 2011; Brauer, 2016; Deterding, 2015). Users of word processing applications often interact with structures that are built on top of menus and organized to represent the tasks performed by submenus. In the form of user tasks and work, HCI also entails the planning, deployment, and assessment of virtual structures. Following the advent of personal computers, their usage exploded, supporting a vast variety of industries, including higher education, banking, the military, company, and personal use. At the end, these technical advances have an effect on machine architecture. Programming systems must be able to satisfy client demands, either by being programmed with consumers in mind or by being installed according to user requirements. (Robertson & Robertson, 2012). Man-Machine

Interaction (MMI) research on user interface architecture first appeared in the early 1970s. (Giudicianni et al., 2020). User-oriented design methods that understand a user's or system's strengths and shortcomings, according to academic experts, would improve human-computer interaction. Human-Computer Interaction (HCI) was born as a result in the mid-1980s. Human-machine contact frequently covers computer graphics, operating systems, human dynamics, ergonomics, industrial engineering, psychological theory, and the systems aspect of computer science. In the early days of computing production, computer graphics arose from pen and CRT applications. (Kanagamani et al., 2019).

As a consequence, a large number of human-computer interaction techniques have been created. Hardware and algorithms that enable manipulation have been developed in computer graphics, as well as more realistic hardware. Digital graphics play an important role in the human-computer interaction through modeling software and designing face-to-face environments for users. (Lavrov & Lavrova, 2019). Human ability to communicate with machines is an important aspect of solving design equipment challenges that people will solve before they learn about technology. (Hassenzahl et al., 2010; Bargas-Avila & Hornbæk, 2011). The human aspect, which has opinions about what he sees in developing and operating hardware, faces several issues. The challenge of running human machines is a natural human element; nevertheless, the current problem has significant philosophy, connectivity, and interaction dimensions that have not been introduced in the human factor, requiring the human factor to evolve HCI. (Hadlington, 2021).

Ergonomics is related to human factors in several ways, although this is based on job research. Ergonomic emphasis, like the human aspect, appears to a degree, albeit with the inclusion of hunger and physiological discomfort. Human-computer contact is a natural subject for ergonomics, but "cognitive ergonomics" and "cognitive engineering" now include field research in addition to theory. As a result, the history of HCI is centered on the analysis of ergonomic computers that emphasize the establishment of work relationships and the impact of stressors such as work schedules, user convenience, and monitor design. (Oyewole et al., 2010). Finally, accounting freedom, personal consumer devices, and retail sales are also more tightly linked to the nature of their items than they were previously.

There have been major advancements as a result of measuring the formal architectural interface of the supporting hardware to communicate user views with the application management layer. In addition to these innovations, designers and researchers have begun to establish specification techniques for user linkage and testing techniques for practical

interface building. (Kuechler & Vaishnavi, 2012; Gregor & Hevner, 2013; Crossler et al., 2013). Understanding input and output of human-machine interactions necessitates the need to analyze phenomena related to the development, evaluation, and implementation of interactive computer systems for human use. (Vinciarelli et al., 2015), where interaction mechanisms are often developed as part of a computer system, allowing people to communicate with the computer system as easily as possible.

Machines are made up of a variety of instruments that connect with one another for different purposes; input devices include writing and pointing, while output devices include the screen and music. Memory is divided into two types: RAM and hard disk. (Cardinal & Aitken, 2010). A computer machine is a collection of interconnected elements that work together to efficiently process data in order to accomplish the key purpose of producing production in the form of desired information. Apparatus, a functional portion of computer equipment that cannot run without software (Englander & Wong, 2021), is essential to consider while learning about the components of a computer device. Human intellect, for example, would be involved in the function and control of machines, as will computer software, which contains data processing commands. As a result, it's critical to comprehend how brainwave is needed for hardware and software to work.

These three components must work together for a computer system to run properly. (Sadeghzadeh & Salehi, 2011). To build a useful human-machine interface environment, designers can think of both the computational dimensions of computers and how humans process data. (Kroll, 2018). A system that takes data or program feedback is referred to as a toll input contribution. Input machines may be used to interact with applications in a number of ways. Few of the most often employed input instruments are as follows: Examples include keyboards, camera systems, scanners, sensors and speech recognition, web cameras, and other computers. (Ortega et al., 2016).

Input devices are classified into two groups based on their function: Direct input cancellation is a computing technique that explicitly interprets the data entered. Just a few examples include keyboards, cursors, touch screens, light pens, digitizer graphics tablets, and scanners. The term "indirect data devices" applies to input that passes through the media before being processed by the machine. Examples include slot cards, floppy disks, and hard drives. As one of the most commonly used input devices, typewriters and keyboards work by translating each fundamental relationship into a letter, which is then transformed into the desired character. (Mullaney, 2017).

The way of utilizing keystrokes on the keyboard, which is the most commonly used input mechanism, gadget for pointing, using the keyboard for graphics creation, clicking on icons on the monitor, shooting games, and so on is impractical—as a consequence, using a pointing aid as a replacement is more convenient—for eg, a cursor, touch screen, or ballpoint pen. The mouse is a made-up creature. (Giroux & Pollock, 2010). A mouse is a pointing device that mimics the movements of a human hand to direct the cursor's position on a computer screen. The cursor is the most widely used aiming control device today. (Chen et al., 2010).

Method

Understanding human-computer interaction patterns through systematic analysis of past and future innovations is the main objective of this study. For that, we have used electronic search technology in dozens of international publications. Next, we analyze it through a data coding system, evaluation, in-depth study, and we conclude a basis of validity and reliability. Our study is very dependent on current data from this study we carried out in an era where public mobility is minimal, so we designed it with a database system on Google Scholar and other databases. As for data reporting, we use a qualitative design review guided by a research study and a descriptive qualitative data analysis of computer science and technology. (Lazar et al., 2017; Rinartha et al., 2018). To keep the data up to date, we recommend the data search data published between 2010 and 2021.

Results

The first finding of understanding how human-computer interaction was done by Kachouie et al., (2014). Through their a mixed-method systematic literature study of socially assistive robotics in elderly treatment. SAR can improve elderly well-being while also reducing caregiver workload. A robust testing approach, person-centered treatment, and a caregiver expectation model are all needed. Ten major guidelines are provided to help avoid present study limitations and enhance future research and its applicability. A total of 86 experiments from 37 different sample groups were included in the study. According to the report, the results suggest that SAR has a favorable impact on elderly well-being. According to the findings, SAR can improve elderly well-being while also reducing caregiver workload.

Klumpp et al., (2019) studied how to avoid an artificial division in Human-Computer Interaction by logistics creativity and social sustainability. The progress of technological advancement in the logistics and supply chain field is dependent on human-computer interaction (HCI). As artificial intelligence applications (Internet of Things, automated

transportation, Physical Internet) contribute to greater computer autonomy, this relationship is evolving. A lack of human interest in automated decision-making or a need to circumvent the machine also issues. As a core HCI aspect in technology advancement, this paper lays out a theoretical basis for various degrees of acceptance and confidence. It raises the possibility of a fabricated division at both the human and corporate levels.

Toyama, (2010) studied the interaction between humans and computers and global growth. HCI has been gradually involved with growth since the 1990s, thanks to an interdisciplinary area known as "knowledge and communication technology for development." HCI could profit from international development's openness to a broader range of communities, industries, and interests. The historical association between HCI and international development is discussed in this essay. It contrasts their disciplinary approaches and proposes that continued contact will benefit all parties.

Klumpp et al., (2019) state-of-the-art problems and potential criteria for production logistics and human-computer interaction. Based on an interdisciplinary study, we obtain an HCI efficiency definition for production logistics. As efficient automation principles must often understand computer sciences, economics, and work science backgrounds, the approaches come from various disciplines. Human intuition and its evolution in a digitalized production logistics environment and automatic algorithm responses to human activities are now part of the study. Overall, practical and viable autonomous manufacturing concepts, such as inside production transportation, would only succeed if the human component is factored in, as production environments would remain mixed robots and human labor for a long time to come.

Panwar & Mehra, (2011), recognition of hand gestures for human-computer contact. In human-computer contact and sign language, hand signal identification has a broad range of applications. Segmentation, orientation recognition, attribute extraction, and classification are the four critical stages in the overall algorithm. The proposed algorithm was validated on 390 photographs and yielded a detection rate of about 92 percent and an overall elapsed period of 2.76 seconds.

Then Holzinger, (2013) wrote about the HCI-KDD stands for Human-Computer Interaction and Information Discovery. What are the advantages of having such two areas together? The increasing volume of data, which necessitates effective and user-friendly solutions, is a significant challenge in our networked environment. A strategic goal for finding data-intensive issue strategies may be a mixture of two areas: Information Discovery and Human-Computer Interaction (HCI) (KDD). HCI focuses on controlled

approaches since it deals with human vision, memory, intelligence, decision-making, and immersive simulation techniques. KDD focuses on artificial intelligence and data mining, specifically the invention of scalable algorithms for discovering previously unknown data relationships.

They are finding of Dix, (2017) on the foundations and emerging paradigms of human-computer interaction. Theoretical values, ethical experience, and a culture of humans are the three broad pillars of human-computer interaction. Psychology, engineering, ergonomics, and cognitive sciences are also used in the field of human-computer interaction. It implies that HCI should not only respond to but also form the changes it encounters. The paper looks at the latest computer problems, such as cloud computing and digital fabrication, and the need to design for solitude.

While the finding of Carroll & Long, (1991) was about developing human-computer interaction from instrument to companion. The first detailed history of human-computer interaction is presented in this book (HCI). It discusses the many fields that have contributed to the advancement of our modern tools. It is arranged chronologically, with significant advances in various fields described for each cycle. As we discuss the modern future that we and our digital allies are creating, the book concludes with several questions worth considering. Because of the rapid pace of technical progress, we have no time to adapt until it goes forward. It gives the user the most excellent shot of foreseeing what could happen next. We have arrived at a critical juncture.

Similarly, Lopatovska & Arapakis, (2011) studied library and database science, information processing, and human-computer interaction: theories, approaches, and recent study Emotions play an essential role in all aspects of human life, including human-computer encounters. This essay examines the literature on emotion theory, research methodology, and their position in human knowledge behavior. It also looks at recent research in library and database science, information processing, human-computer interaction, and some of the problems and directions for potential research.

Gulliksen is number ten. Human-computer engagement can be institutionalized for public wellbeing. Digitalization is a cultural transformation phenomenon in which modern ICT-based solutions usher in new forms of doing stuff, new industries, and new social movements. Digitalization also opens up whole new avenues for tackling public health challenges. According to the report, digitalization to help global health involves a deep understanding of the consumers and their background. The paper claims that the advancement and use of emerging technology are profoundly transforming culture.

However, it must be focused on local traditions, receive foreign funding, and be unrestricted by technical restrictions.

Discussion

In this section of our discussion, we will discuss the importance of the findings of our review of dozens of international publications that examine human-computer interaction. In short, we can explain that this study aims to understand more deeply how human and computer interactions are used to create user-friendly systems or make it easier for humans as creators and users of technological devices so that their functions are straightforward and easy. A number of the papers we have reviewed have developed tools and techniques to enable the best operations in designing adequate interface systems. An adequate understanding of this interaction will later produce effective, efficient, safe, and productive interactions.

The majority of the papers we have reviewed have confirmed that one of the most trending and currently used technologies is computer technology or the trendy digitization of all fields, be it laptops, netbooks, smartphones, and so on. According to some of the papers we have reviewed, they say that in order for computer users to use a computer resource properly, they must understand performing or applying interaction with a computer that will execute commands with the desired service. Because the effort to understand human-computer interaction is like a friend, a reader may already know what interaction is.

Chakraborty et al., (2017) also conducted a similar study where they reviewed constraints on vision-based gesture recognition for human-computer correlation. We have to admit that the human-computer interaction like the one we are studying is a human-to-machine or computer relationship. So Human-Computer Interaction can also be understood as the knowledge that provides an understanding of interaction or face-to-face relationship between humans and computers. To get this in-depth understanding so that work related to computer technology can be completed quickly and adequately. In the end, humans are increasingly enthusiastic and helpful in trying to get closer to this technology, which has become the latest solution in this digital era. This can also be seen from Lazar et al., (2017) in their study, examined methods on human-computer interaction. According to this study, to be able to use computers, there is a deep understanding of the interaction of the two objects, which is very much needed to help modern humans who get benefits in all human activities. On this basis, this study is essential, so why the understanding of human-computer interaction is exciting in life when using computers and other

communication technology machines. To interact between humans and computers, something very important is the role of the user or human who uses the computer. (Sharma & Kanwar, 2014).

Conclusion

To close, several summaries make the study aiming at the importance of understanding the importance of in-depth understanding of human efforts in using computers in their lives, which are known to human interactions with computers, among others; Feedback By getting a good understanding of Tesbut interactions, users can get feedback, most notably the formation of good interaction between humans and computers because this is very necessary for making a computer system. User can create a sound system.

By using computer-based learning about Tesrbut interaction, users can easily create a system that can be useful, has benefits for others and themselves, and most importantly, the system can be efficiently executed by the user who uses it. With this understanding of human-computer interaction, the system that the user designs will be implemented properly. Next, the user gets a system that is made efficient. With an adequate understanding of HCI, users can create a system that can be used. Finally, with this understanding, users will facilitate interaction with computers in carrying out daily tasks where computer technology and humans have become true friends.

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