Library Journal Analysis for Human-Computer Interaction

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Resumen— **With more and more of our daily lives being automated or at the very least being computer-aided, human-computer interaction is a leading research topic among emerging trends owing to the need for seamless operations as well as growing calls for more inclusion of users who are at a disadvantage. This report seeks to explore recent papers in three journals written on the aforementioned topic or in a related capacity.**

Palabras clave— **journal analysis, human-computer interaction**

I. Introduction

THIS paper summarises the work done in papers from the past twelve months in human-computer interaction and related research fields.

We will attempt to point out the research topics touched on by the authors of these papers. Additionally, we will expound on the methodologies that the authors of the mentioned papers chose to use; this we hope to portray using tables and graphs in showing the comparisons between/among the covered authors. We will then proceed to cover future work projected by the authors and other relevant experts in the field of human-computer interaction. We will then round all this up by providing comparisons among the journals that we have.

The journals upon which this writing are based are as follows:

1. **International Journal of Human-Computer Studies** - with the following information;
- Issue numbers - Volume/Issue 142 to Volume/Issue 154
- Number of issues - 13 issues; from Oct 2020 to Oct 2021.
- Number of articles sampled - 15 articles
2. **Interacting With Computers** - with the following information;
- Issue numbers - Issues 5 & 6 and Issue 1 & 2
- Number of issues - 2 issues; from Jan 2021 to March 2021.
- Number of articles - 12 articles
3. **ACM Transactions on Computer-Human Interaction (TOCHI)** - with the following information;
- Issue numbers - Volume 28: Issues 1 - 5
- Number of issues - 5 issues; from Jan 2021 to October 2021.
- Number of articles - 13 articles

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Research Topic	IJHCS	IWC	ACM TOCHI
Presence & Virtual reality	3	-	-
Speech interaction	1	-	-
Empirical studies of programming and software engineering	1	1	-
Intelligent user interfaces	2	1	-
Interface design and evaluation methodologies	2	1	-
Empirical studies of user behaviour	3	2	2
Wearable computers	1	1	-
Agent-based computing, agent models, coordination and communication	1	-	-
Design and evaluation of innovative interactive systems	-	1	2
User interface prototyping and management systems	-	1	1
Computer supported co-operative work	-	1	-
Mixed and augmented Reality	-	2	1
Pervasive computing	-	-	1
Innovative interaction techniques	-	-	2
Neuro-diversity and inclusion in HCI	-	-	1
Knowledge acquisition, discovery, modelling and management	-	-	3

TABLA I

THE TOPICS FOUND IN THE COVERED ARTICLES.

II. Research Topics

The research topics explored and the relevant articles mentioned above are separated by order of journal they appear in as shown below:

1. International Journal of Human-Computer Studies - with the following distribution of research topics throughout articles sampled from the journal over the past twelve months.
- Presence & Virtual reality - 1; Immersive virtual reality news: A study of user experience and media effects, 2; Teleoperated mobile robot with two arms: the influence of

a human-machine interface, VR training and operator age, 3; A comparison of the effects of haptic and visual feedback on presence in virtual reality, 4;Memory of virtual experiences: Role of immersion, emotion and sense of presence,

- Speech interaction - 1; Comparison of BlindLoginV2 and AudioBlindLogin with the common textual password authentication for the blind and visually impaired using smartphones,
- Empirical studies of programming and software engineering - 1; Gender in the making: An empirical approach to understand gender relations in the maker movement,
- Intelligent user interfaces - 1; Head-worn displays for healthcare and industry workers: A review of applications and design, 2; POMA: A tangible user interface to improve social and cognitive skills of Sri Lankan children with ASD,
- Interface design and evaluation methodologies - 1; User-Centered Privacy-by-Design: Evaluating the Appropriateness of Design Prototypes, 2; The evaluation of a mobile user interface for people on the autism spectrum: An eye movement study,
- Empirical studies of user behaviour - 1; Using the computer mouse for stress measurement â An empirical investigation and critical review, 2; Tablet for two: How do children collaborate around single player tablet games, 3; Observing and predicting knowledge worker stress, focus and awakeness in the wild,
- Wearable computers - 1; Perseverations of the academy: A survey of wearable technologies applied to autism intervention,
- Agent-based computing, agent models, coordination and communication - 1; I just wanna blame somebody, not something! Reactions to a computer agent giving negative feedback based on the instructions of a person,

2. Interacting With Computers - with the following distribution of research topics throughout articles sampled from the journal over the past twelve months.
- Wearable computers - 1; smart watch authentication
- Empirical studies of programming and software engineering - 1
- Design and evaluation of innovative interactive systems - 1; feedback and feed-forward in UIs,
- User interface prototyping and management systems - 1; formal vs informal design,
- Computer supported cooperative work - 1; task models and medical device design
- Mixed and augmented Reality - 1; task-based augmented reality guidance 2; empirical results for HD video and AR content delivery in hyper-connected cars

- Empirical studies of user behaviour - 1; role of emojis and customer experience, 2; physical interaction with digital data in mail-handling
- Interface design and evaluation methodologies - 1; Interactive Exploration of Large-Scale UI Data sets with Design Maps,
- Intelligent user interfaces - 1; applying automated recognition of touchscreen stroke gestures to children's input,
- Empirical studies of programming and software engineering - 1; Managing User-Centered Design Activities in Distributed Agile Development,

3. ACM Transactions on Computer-Human Interaction (TOCHI) - with the following distribution of research topics throughout articles sampled from the journal over the past twelve months.
- User interface prototyping and management systems - 1; Designing Deep Reinforcement Learning for Human Parameter Exploration,
- Pervasive computing - 1; A Longitudinal Study of Pervasive Display Personalisation,
- Empirical studies of user behaviour - 1; Detecting Depression and Predicting its Onset Using Longitudinal Symptoms Captured by Passive Sensing: A Machine Learning Approach With Robust Feature Selection, 2; Investigating Usability and User Experience of Individually Verifiable Internet Voting Schemes,
- Innovative interaction techniques - 1; Machete: Easy, Efficient, and Precise Continuous Custom Gesture Segmentation, 2; GAVIN: Gaze-Assisted Voice-Based Implicit Note-taking,
- Neuro-diversity and inclusion in HCI - 1; The Purpose of Play: How HCI Games Research Fails Neurodivergent Populations,
- Design and evaluation of innovative interactive systems - 1; Towards Dynamic Checklists: Understanding Contexts of Use and Deriving Requirements for Context-Driven Adaptation, 2; Around-the-Head Tactile System for Supporting Micro Navigation of People with Visual Impairments,
- Knowledge acquisition, discovery, modelling and management - 1; Introduction: Performing Rurality with Computing, 2; A Sociocultural Explanation of Internet-Enabled Work in Rural Regions, 3; As a Squash Plant Grows: Social Textures of Sparse Internet Connectivity in Rural and Tribal Communities,
- Mixed and augmented Reality - 1; An Exploration of Freehand Crossing Selection in Head-Mounted Augmented Reality,

III. Methods

A. International Journal of Human-Computer Studies

In the first journal explored, it would be prudent to infer that the primary methods used are cen-

tered around experimental approaches and quantitative studies.

This is understandable owing to the nature of the research topics at hand; The journal seems to be concentrating on quantitative analysis of user experiences while interacting with the machines. This can be gleaned, for instance, from the number of papers looking into empirical studies of user behaviour and as well as of programming and software engineering; which take up a good number of the articles. It could be assumed that the experiments carried out involve a sample of users from a variety of demographics to get a feel of whether different external factors also have an effect of human-computer interaction experiences.

Another of the popular methodologies employed pertaining to participant observation may be gleaned from cases where the paper suggests that the data was collected from recording and later analysing users' physiological responses in real time to come up with statements validating or invalidating the set hypotheses.

We could further make the case that this is the most reliable method of obtaining data as it is the most pervasive one available, albeit it may be perceived as an overkill for some research topics.

Moreover, under the umbrella of survey as a methodology, the use of questionnaires has been employed in the data collection step of some research work. The case can be made for the adaptation of this methodology owing to the fact that provided the rubric of the questionnaire is fair to all demographics of the target audience; this stratagem is inexpensive, practical, offers a quick way to get results, scalable, provides comparable results, provides data that can be easily analysed and visualised, offers actionable data and most importantly maintains anonymity of the respondents.

In addition to these elaborated above, the use of comparison studies and correlation as a research method has been employed in this journal. The authors of the research study [4] in question claim to have considered a number of pre-existing research papers; that were then systematically categorised and a subset of unique papers selected to be included in the study. It would not ,henceforth, be far-fetched for us to infer that this process was done in an effort to select the pre existing research that most leaned in the direction of the target study for comparison and correlation to obtain information to either validate or invalidate the set hypotheses.

B. Interacting With Computers

On the whole, research techniques used in this journal, Interacting With Computers, are much similar to the those in the journal covered in the preceding subsection. As is the case in the first journal, we have observed the use of survey methods, the use of naturalistic observation as well as the use of experimental methods as research techniques in collecting and analysing data for the variety of topics covered

in the preceding section.

The tactic implemented in this journal that does not overlap with those covered in the first journal is the use of case studies as a research method.

This has been used in [5] to carry out research for design factors that would otherwise be deemed non-quantifiable. A case study therefore provides a starting point for the quantitative and qualitative process to be built up from since it is more likely than not to be based on ratified work.

The following are some of the benefits of using a case study as a research method:

- Comprehensiveness; on the whole, a more holistic review is provided. A researcher can use multiple tools which he would otherwise not when using other (stand-alone) research techniques. This ensures time to develop an in-depth understanding of the topic and establish a credible platform to investigate the factors that affect a case study in extensive detail.
- Bias reduction; it is highly likely that a case study is based on a real life application of whatever is being researched. Barring a deliberate attempt to constrain the research environment, it would be credible to purport that the case study will provide an objective view and diversity of perspectives on the research topic. This is in comparison to survey methods, for instance, where feedback given is only based on one respondent's perspective.

As much as case studies invaluable pros, there are some cons that need to be taken into account when determining why a researcher chose not to use this technique in their work. Some of the cons that come to mind are:

- Broad relevance; case studies more often than not fall prey to singularity paradox of research findings whereby the findings of the study might be near perfect but only for cases with a one-to-one mapping with the case study utilised.
- Permissions; participants of case studies may at times be sticklers for anonymity. This translates to a lot of time being needed for the researcher to seek clarification and/or assurance that the information presented by the case study is accurate; time that may not be available in research whose findings are urgently needed.
- Case studies can be time-consuming; besides the con mentioned above, case studies may be dependent on voluntary participants who more likely than not may have their own schedules and timetables; thus causing planning issues with the research timeline.

C. ACM Transactions on Computer-Human Interaction (TOCHI)

Research techniques primarily used in this journal comprise correlation and comparison; some of the articles (indicated in the comprehensive list in the preceding section) considered in the analysis explore

their respective topics from a more theoretical point of view. These articles seem to be dealing with niche research topics and as such are heavily reliant on the little existing research to draw composite facts and make inferences based on them.

Additionally, we have the use of naturalistic observation most especially in the articles centered on rurality and human-computer interaction. This can be justified by the fact that this topic is more sensitive to unique experience of the test subjects. Some of the pros of naturalistic observation as a research technique are:

- Natural Behaviors; participants are more likely to be in their true element since the foundation of the technique rests on the study environment not being tampered with before or during the research.
- Real-world perspective is offered; answers that are obtained much more relevant to the real-life impact of the hypothesis contrary to other types of experiments and observations that can be done.
- Otherwise difficult topics can be studied; for instance, research that includes neurodivergent subjects does not put undue pressure on them as much as other methods would by removing the participants from the environment in which they are most comfortable.

Some of the pros of naturalistic observation as a research technique are:

- Difference in opinion and/or perspective; observers may let their internal biases interfere with their interpretation of the occurrences in the field.
- Time consuming; this process requires immersion into a new environment. The observers may need some time to acclimate themselves to the surrounding, thus losing data that could have been imperative to the study.
- It can be quite hard and borderline unethical to observe a participant without their knowledge for the long periods of time required to conduct the study.

IV. Future Work

In a nutshell, all the research articles considered in the aforementioned journals point to ubiquitous computing being the future of human-computer interaction.

The seamless and implicit nature of service delivery that is characteristic of ubiquitous computing seems to be the driving force. Experts envision a future in which human-computer interaction processes are comfortable for all users involved, while maintaining the levels of energy efficiency that do not have an adverse effect on the environment. The latter can be understood since ubiquitous computing is also characterised by presence of devices in a variety of environments. Faulty energy schemes could therefore have a detrimental impact on the ecosystems affected.

As explained in [7] factors that give ubiquitous computing an edge in the race for the future of human-computer interaction comprise the fact that the applications of this concept share a vision of small, inexpensive, robust networked processing devices.

Ubiquitous computing therefore presents the opportunity to create technologies that do not depend on deliberate interactions by users but equally implicit input from the environment in which they are placed. This further accommodates users who may have impairments that would have otherwise interfered with their interaction with current machines.

Furthermore, research into innovation of proactive context awareness in machines as explained in [8] point to ubiquitous computing or its surrounding subtopics as having being the focal point of the future of human-computer interaction for quite some time now. It would seem that this is a goal which is yet to be achieved to a satisfactory level. Additionally, it is entirely likely that the innovation of better composite tech in networking, for instance, opens the door for the improvement of existing ubiquitous technologies.

V. Similarities and Differences Between Journals

The first journal considered in this analysis, International Journal of Human-Computer Studies seems to have its focus centered around the study of user behaviour. This can be justified by the logic that in order to come up with new or indeed improve existing technologies, it is necessary to have as much information regarding the target users' needs and preferences for the proposed product to be accepted by the market.

Further evidence of this point can be extracted from the methods employed in the research studies that we considered within the past twelve months. The use of naturalistic observation as well as survey methods, commonly used for extensive user-focused data collection, strongly point to the researchers'/authors' interest in the "human" part of "human-computer" interaction dynamic.

This is, in fact, in line with any laws of production that advocate for pervasive market research prior to moving forward with prototype creation. It may be the case that certain edges in the product need to be smoothed out hence studying user as well as creator behaviour is a step toward achieving an optimum balance between maximum creator output and good user experience.

Contrasting the first two journals considered, International Journal of Human-Computer Studies, against Interacting With Computers; similarities can be drawn on the methods of research picked as the research topics being explored.

These journals seem to be centered around the design and evaluation of new and innovative technologies to optimise human-computer interaction. Even

the study of user behaviour is done with the aim of optimising design to ease the target market's interaction and maximise design.

Concerning the research methods picked, it only makes sense that the articles in these two journals have employed more or less the same techniques seeing as the research topics tackled are overlapping.

Besides the overlapping research topics covered in the first two journals, the third journal, ACM Transactions on Computer-Human Inter-action (TOCHI), seems to be more centered on acquiring user-centered knowledge for the sake of improving the experience of marginalised users as well as understanding how users adapt to interacting with computers; as is seen in the works on studying human-computer dynamics in rural settings and studying the experience of medically marginalised users.

With regard to the latter, article [6] gives the example of neurodivergent users being left out by gaming research. It expounds on the fact that any research input made towards neurodivergent users seems to be geared toward correcting their situation rather than creating innovative ways of accommodating them in the use of the ever-developing gaming industry.

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