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Comparative Analysis of Human-AI Interaction Patterns Across Industries

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Abstract. Artificial intelligence (AI) is widely applied in various industries, and technological advancements have promoted the development of Human-AI Interaction (HAII). However, HAII has limitations in different industries such as varying levels of development, insufficient attention, and poor effectiveness. This paper adopts a systematic literature review method to review the relevant literature on HAII in healthcare sector, education sector, financial services, manufacturing industry, and retail sector. By extracting and analyzing the interactive characteristics of AI, the interactive features and conceptual models of AI in key industries have been summarized. By analyzing the commonalities and unique characteristics of different industries, examining the challenges faced by HAII, a universal framework has been summarized. The framework is a HAII interaction principle that can be applied to all industries, ensuring a human-centered interaction experience for users and promoting the advancement of AI interface design. The research results provide a reference for relevant personnel engaged in the AI industry, and provide a design reference for industries that want to provide a better HAII experience in the future.

Keywords: Artificial intelligence, human-AI interaction, general framework, across industries

1. Introduction

With the development of AI, the co-evolution of human and AI is an inevitable topic and trend [1,2]. This will also be the mainstream direction for empowering various industries in the future [3,4]. In current research, in the present research, the design of Human-AI Interaction (HAII) has been preliminarily analyzed from the perspective of AI characteristics [3], the conceptual model of interaction design and the foundation of interaction scenario are proposed [5]. Other scholars' research also covered different industries, such as healthcare [6-8], finance services [9-10], education sector [11,12].

The current study has not fully covered HAII, resulting in uncertainty and new problems when AI is applied in practice [5]. For example, interpretability [13], privacy security [14], trust [8]. Currently, head companies have issued design guidelines [15,16], however, there are some challenges and limitations in the practical application [17], and there may be a lack of people-oriented considerations [18]. Since most applications are focused on algorithmic and technical advances [3], for design professionals can flexibly apply the HAII principle in product design there

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is still a certain distance [5]. There is still a gap in user experience in interface design [3]. How AI interacts with humans remains to be studied.

This paper summarizes the interaction characteristics and interaction conceptual models of HAII in common industries, and extracts the general framework of human-computer interaction design according to the results of differentiation analysis and classification. This general framework focuses on integrating HAII designs from various industries and provides design trends for future HAII designs. From the perspective of interaction design, this paper fills the research gap of HAII.

The contributions of this paper are: (i) this paper designed a novel, for different industries, a general HAII design framework. (ii) This paper will improve and enhance the interface design of HAII in real commercial applications. (iii) This paper promotes HAII in future society to be more effective, complete, and more human-centered to enhance human capabilities.

The thesis is structured as follows: Section 2 reviews relevant literature; Section 3 presents the methodology; Section 4 analyzes industry-specific; Section 5 conducts cross-industry comparative analysis; Section 6 establishes general human-AI interaction design framework; Section 7 discussion; Section 8 conclusion.

2. Literature review

2.1. Theoretical basis of human-computer interaction

Human well-being should always be considered a primary goal when AI interaction design faces human-centered challenges [19]. Focus on and reflect on the needs and values of target users [20], empower humans [21], and ensure that humans are the ultimate decision makers with control [5].

Norman, in his book [22], laid out the fundamental principles of interaction design that are relevant to HAII today. In their study, Ahmad et al. proposed to test the effectiveness of HAII through feedback, and the interaction would need to meet the user's feedback needs and provide a feedback path [18]. Xu et al. proposed that Ai interaction systems fully combine and utilize AI and human capabilities, and that human feedback can improve AI performance, forming a feedback loop [5].

2.2. The state of cross-sectoral AI research

At present, the research of HAII belongs to the exploratory stage in various industries, and the development degree is different under the influence of different industry properties. The common problem of most studies is the neglect of the interaction design of AI or the interaction framework of the system. Because of the promotion of technology and policy, HAII research in the field of health care and education is more in-depth and developing more rapidly, and some of the research already has a clear conceptual model. Adopting a stage-based participatory approach, Larasati et al. examined users' expectations of UI in the healthcare field [8]. Using The Wizard of Oz Technology, Hussain et al. developed an interactive model for AI-assisted clinical diagnostic decision-making, as well as an interactive prototype for obstetric scenarios, taking full account of the interpretability of AI [23]. Córdova-Esparza examines AI systems strategies that can be embodied in interaction design in the field of education [11].

HAII research in the financial and retail sectors is at a developmental stage and less systematic. Drawing on a real-world case from the financial industry, Cho et al. proposed how specific interactions with chatbots should be designed, as well as interaction characteristics [24]. Chen et al. categorized the interaction characteristics of chatbots in AI interactions in the retail industry and

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proposed the positive impact of multiple interaction characteristics on user experience [25]. HAII is less popular in the manufacturing industry and has many challenges due to the complex application scenarios. Interaction design interfaces in manufacturing have been studied by Alt et al [26]., but more from a technical perspective mapping.

2.3. Research opportunities

With the rapid development of AI technology, there are many application interfaces built by technical personnel, which is bound to lack the attention and consideration of interaction design. In addition, the industries involved in AI technology, interaction subjects, functional needs, and application scenarios are complex and different. These all influence the design of generic AI interactions. HAII can transform AI algorithms into interactive elements that users can use and understand. Establishing a common framework for HAII design is conducive to providing a more superior user experience and promoting the development of AI in various industries.

3. Methodology

This paper adopts the Systematic Literature Review method to standardize and integrate the existing literature related to HAII through systematic retrieval of academic databases, and classifies the literature according to the set objective screening criteria to ensure the reliability of the research.

The literature search was conducted in Google Scholar using the keyword TITLE-ABS-KEY (("human-AI interaction" OR "human-computer interaction") AND ("healthcare" OR "finance" OR "education" OR "manufacturing" OR "retail")). Additional high-quality references were identified through manual citation searches. Since HAII has received more attention in recent years as technology has evolved, the screening period is set beyond 2020. Figure 1 shows the literature collection from the initial search of 1,550 articles to the screening of 86 high-quality articles.

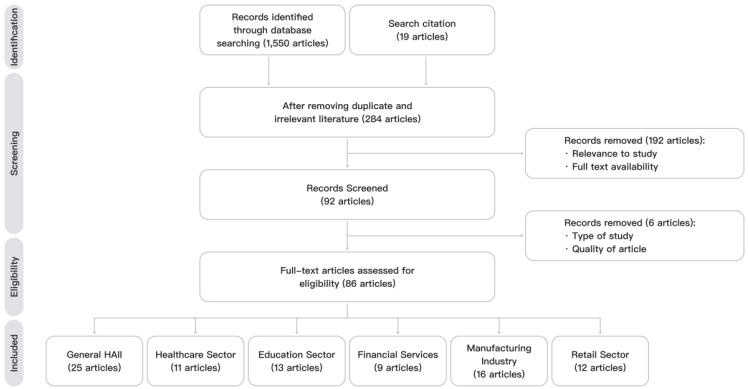

Figure 1. Systematic literature review process (picture credit: original)

The five industries of healthcare sector, education sector, financial services, manufacturing industry, and retail sector have the most extensive impact on socio-economic benefits and social activities, and are the most universal industries. Based on the analysis of the collected literature, it is found that most and relatively popular studies are conducted in these five industries. As shown in Figure 2, their research has developed rapidly in recent years. In addition, the service form, service audience and application environment of these five industries are unique, and it is enough to test the universality of HAII application in different industries, which is conducive to the research.

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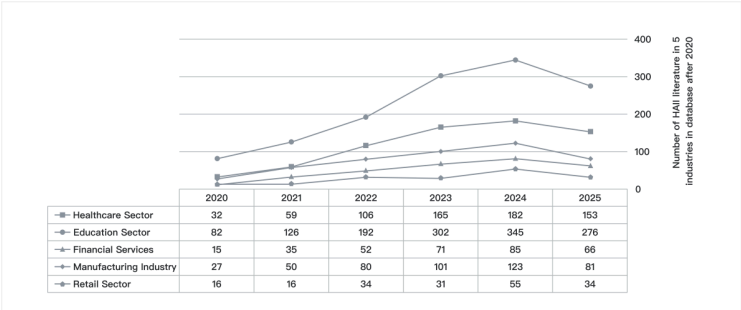

	2020	2021	2022	2023	2024	2025
Healthcare Sector	32	59	106	165	182	153
Education Sector	82	126	192	302	345	276
Financial Services	15	35	52	71	85	66
Manufacturing Industry	27	50	80	101	123	81
Retail Sector	16	16	34	31	55	34

Figure 2. Number of HAII literature in 5 industries in database after 2020 (picture credit: original)

4. Industry-specific analysis

4.1. Healthcare sector

4.1.1. Interaction patterns and characteristics

The AI applications in the healthcare sector can be divided into: medical diagnosis, drug development, virtual health assistants, medical research, and clinical decision support [20]. The core factor that distinguishes these applications is the differences in interaction between different medical scenarios. Medical diagnosis and clinical decision-making both assist doctors in diagnosing and treating diseases, but the application scenarios of medical diagnosis have higher accuracy. Drug discovery and medical research are both discoveries and innovations in the medical field. The Virtual Health Assistant is the only application that interacts with patients to provide health-related services and support. Different scenarios have an impact on the interaction subjects and workflow interaction methods. Clinical decision support and virtual health assistants are typical applications of AI doctor and AI patient interaction in the medical industry, which cover the main stakeholders in the medical field, have universality, and are also the content of most relevant literature research. Therefore, this chapter takes these two types of applications as examples for research. Therefore, HAII in the field of healthcare should be divided into a doctor's end and a patient's end. The interaction mode of the doctor's end can adopt interactive dashboard [6], plugin mode, dialogue mode, etc. The patient side mainly adopts a dialogue mode. However, in the complete medical journey, the interaction between patients and doctors is the main touchpoint, and in this case, AI doctors and AI patients have information exchange [23]. As shown in Figure 3, the interactive conceptual model is the interaction between AI doctor patient, with two systems centered around doctors and patients.

The doctor-side interaction should reflect visualization, the patient's data is displayed through the dashboard, and some abnormal data and risk data are highlighted. For patients in critical situations, strong prompts are provided through visual pop ups. Pay attention to patient classification in the dashboard and use visual labels to distinguish patients. In addition, stronger professionalism is needed to ensure the safety of patients. Medical errors can have serious consequences when they occur [7], and error-proof design is the bottom line to ensure safety. Errors need to be reduced by constraints [22]. For example, in physical constraints, when doctors prescribe controlled drug doses, they prompt them to confirm or set a key again. In addition, the interactive system also needs to have usability, quickly switching from the general interface to the voice broadcast interface in emergency situations, providing intermittent voice prompts for doctors to assist them in rescuing

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patients in the emergency room. Finally, multimodal generation is also required, as human senses such as hearing, vision, and touch can receive feedback, and the importance of information determines the feedback mechanism [22]. Important information can be presented through voice prompts or warning sounds, as well as alert animations and tactile vibrations.

The patient side is more inclined towards the role of an assistant combined with a doctor, and interaction focuses more on providing emotionalization during dialogue, which is more empathetic towards patients [7], thus maintaining the ethical principles of HAII in the medical field. For example, the corpus design during interaction is more user-friendly, providing comfort for patients with severe illnesses through progressive communication. Multimodal understanding brings convenience to patients and is also user-friendly for special populations, such as people with disabilities and the elderly. When designing for special populations, their abilities and potential problems should be fully considered [22]. Provide a voice input method for patients who find it difficult to type. In addition, multimodal interaction can also upload images for AI analysis.

4.1.2. Privacy data

Compared to other industries, healthcare sector data is very sensitive [14,27]. The privacy data of patients may be collected without knowledge, there may be a risk of sharing during storage, and the use may increase the possibility of data leakage [7]. The threats to patients' privacy data are divided into unintentional threats and intentional threats [14]. Unintentional threats mainly refer to errors and biases that may occur when collecting and storing data. For example, when patients input data, avoiding lengthy text input can be achieved through form design, where some content is checked or double checked to reduce input errors. Intentional threats are more likely to occur during data usage, where malicious intrusion or modification of data leads to data leakage, and are a key focus of privacy protection. Set the history of patient data modification on the page, including clear memory of time and specific content.

4.2. Education sector

4.2.1. Interaction patterns and characteristics

The rapid development of conversational AI in the field of education depends on the widespread application of Large Language Models (LLMs) in education, such as personalized learning, teaching innovation, teaching decision-making, and improving interactivity [11]. The interaction between AI, teachers, and students should be the union of AI and teachers to ultimately create a student-centered learning environment [21].

When teachers interact with AI, firstly, it has auxiliary functions, which can assist teachers in completing repetitive tasks, save teachers' time and efficiency, and focus their attention on more meaningful teaching [12,21]. For instance, the teacher assistant of iFlytek can assist teachers in developing teaching materials and providing teaching strategies before the course. In the course, AI provides clear and automated task management forms to assist teachers in classroom and student management. After class, AI assists teachers in grading homework and test papers. But often times, teachers need to reconfirm and judge the creativity of AI, so interaction should be controllable, and the dominant control belongs to the teacher [21]. The manual operation button of "adopt" or "reject" for AI response settings provides teachers with the opportunity to decide on more reasonable options or personalize AI's auxiliary permissions and scope.

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AI can also enhance students' self-learning ability. When interacting, it has professionalism, ensuring the authority of knowledge, high response accuracy, and consistency between output content and teaching content [11], annotate the sources of the knowledge points involved, so that students can easily match them with the teaching content. In addition, there is guidance for students, and in reality, teaching students is gradually inspired. AI should also uphold this moral code [11]. In interactive design, use questioning to engage in dialogue with students and gradually guide their learning. AI should also have anthropomorphic and affective features, changing the role of agents according to the situation to make the conversation natural, and adjusting response strategies and encouragement mechanisms based on students' different abilities [11]. Multi modal output methods can be adopted, using digital people of different roles for video lectures or voice broadcasts, and adding dynamic design positive feedback to enhance students' confidence. Baidu's AI studio supports educational work and enhances students' reading experience through multiple tone outputs. Interesting AI can better attract student groups and provide diverse simulated classroom interactivity to enrich user experience. For example, Tencent's ai arena adds gamified elements of challenge classes to enhance fun and appeal, and strengthen interactivity. Finally, interaction also has disciplinary differences. Language teaching can use game based interactive methods, programming teaching can create sandboxes, and humanities teaching can use narrative, simulation and other methods.

4.2.2. Hallucinations

The response output in the education sector may cite more academic and complex vocabulary, and seemingly correct concepts may have errors [28], which can affect students under the illusion of AI. Students of different ages have varying levels of acceptance of AI. Immature individuals tend to believe that AI is correct, and being indoctrinated with incorrect or age-appropriate content is detrimental to their physical and mental development as well as the development of the education sector. When designing the login page, provide age group selection and subject selection. In the process of student interaction, teachers can intervene and provide assistance when faced with decisions.

4.3. Financial services

4.3.1. Interaction patterns and characteristics

Currently, AI applications in the financial industry are more focused on customer-centric virtual advisory roles [29]. Therefore, this chapter selects virtual consultants as the research object. The interaction mode for customer service mainly adopts conversational interaction or chatbots [10].

When virtual advisors interact with clients in the financial industry, the interaction of AI systems must be trustworthy, and interpretable AI can enhance client trust. Increase pre-explanation to enhance the transparency of AI [29], explain the generation process of AI, break the technical "black box", and make it easier for customers to understand the internal logic. For example, using grayed out text to display the AI thinking process in the response. When distrust occurs, supplement it with post hoc explanations, such as linking or footnotes to indicate the source of some data. In addition, security is the core of the financial industry, and customers have a high perception of financial information security during the interaction process, which is also the basis for enhancing customers' trust in AI systems. AI systems need to let customers know that information is subject to security monitoring, such as using security visualization icons or text annotations to convey to customers that

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the system has security guarantees. The AI interaction in the financial industry has strong professionalism, providing customers with knowledge services related to terminology or business in scenarios similar to financial planning. Through structured styles, pop-ups, cards, floating layer interaction to allow customers to view optional comments, the initial dialogue interface can also be added to the customer may be interested in the knowledge of the question and answer.

4.3.2. Data security

The financial industry has stronger security, and there is a risk of financial databases and private financial information being leaked, which may cause significant economic losses [9]. Providing customers with privacy and security protocols is one of the methods, and in terms of interaction, providing pre-fabricated measures to prevent risks before they occur. For example, intelligent monitoring of the current network security environment uses visual tags on the interface to display the security status, giving customers a sense of security. When handling sensitive information, a pop-up window prompts the customer to authorize and steps the user to complete the operation, reducing the possibility of risk occurrence. Timely mitigate risks when they occur, such as quickly interrupting operations, using pop-up alerts and soothing customers, protecting customer data security in a timely manner, and maintaining customer trust.

4.4. Manufacturing industry

4.4.1. Interaction patterns and characteristics

Human-Machine Interfaces (HMI) is the key to achieving intelligent production in the manufacturing industry [30], serving as a medium for interaction between humans and manufacturing machines. The HMI interaction design that integrates AI must have usability. In complex manufacturing environments involving more precise operations, technicians are prone to confuse operations [30]. In the interface design, the distinction between different operations should be higher, reduce the difficulty of information, consider mapping [22], reduce the memory load of operators. Automation can reduce repetitive tasks for technicians, allocate manpower to more important tasks, and transform technicians into decision-makers [30]. AI promotes collaboration between technicians and machines, assists in decision-making, and enables technicians to flexibly handle production activities. When encountering problems in production, AI provides technicians with direct cause analysis and sets preview buttons for viewing and adjusting, directly solving the problem and saving search time. If errors occur in the production environment, they can cause very serious losses [31], and even threaten the lives of technicians. Error-proof design is crucial. To prevent errors, it is necessary to ensure consistency in production instructions and provide corresponding and appropriate feedback for operations.

Currently, XR is also widely studied in the manufacturing industry [20]. The application of XR provides support in both the production and maintenance phases. By visualizing, technicians can pay attention to real-time information, such as displaying assembly instructions for parts, providing safety tips, and offering detailed instructions for maintenance procedures. In addition, it can also monitor the changes in the status of technicians during work, adjust their work in a timely manner to prevent safety accidents, and ensure their safety in the production environment.

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4.4.2. Privacy and security

The privacy and security of factories involve confidentiality technology [32]. Set access permissions for content that requires confidentiality, and enhance the confidentiality awareness of operators. Confidentiality content should always display strong prompts on the page. On the other hand, making AI systems more user-friendly can help increase the trust of operators and enhance their awareness of confidentiality. Operators should try to avoid privacy and security issues related to themselves when using AI, as well as avoid manipulating them.

4.5. Retail sector

4.5.1. Interaction patterns and characteristics

The application of AI in the retail industry mainly focuses on satisfying consumers' shopping experience, including customer service agents, using chatbots [33]. However, most of these rely on dialogue and digital human modes for interaction. Although they provide consumers with communication shortcuts, they have limitations in inclusiveness and hide issues of digital inequality. AI model training in the Internet is mainly in English. Users in non-English speaking countries will have barriers to use, resulting in low after-sales service efficiency. It is easy to vacancy digital services for consumers with language barriers.

AI satisfying consumers' shopping experience needs through conversational interaction is the core of the retail field [25]. AI interaction should have high efficiency, providing effective information and information that meets consumer needs to improve consumer interaction efficiency. When conducting information retrieval, users provide recommendations for keywords that consumers are most interested in recently. Provide a quick and clickable GUI for further product information that consumers may want to know. On any page within the application, consumers can quickly activate AI in any situation. Interaction should also have usability, reduce complex interaction operations, have simple and clear interaction logic, so that consumers can quickly get started with the operation. The purpose of consumer use is to find desired products, quickly screen products for consumers, present them in a simplified graphic and textual arrangement, or click to enter the recommended product page. Finally, the interaction also needs to have reliability, providing consumers with more comparisons and ratings of products, and labeling products with brands. Recommended content and long tail services both need to be context sensitive.

The essence of digital human interaction is the form of dialogue, but it is more reflected in emotional expression and multimodal experience than simple dialogue [34]. Digital humans assist consumers in efficiently completing their shopping journey. Consumers can communicate with digital humans through voice and respond by introducing products through text and images. Digital humans interact with consumers through dialogue, casual chat, and gamification, providing them with an immersive experience of social and entertainment, and improving their overall satisfaction.

4.5.2. Privacy data

Consumer privacy data is facing multiple risks such as excessive collection, leakage, and abuse [35]. In order to deal with this problem, enhancing the transparency of AI system is an important way to solve the problem of privacy. For example, when collecting consumer information, informing consumers of the scope of data collection, purpose of use, and duration of use by checking the confirmation box ensures consumers' right to know and helps to enhance their trust.

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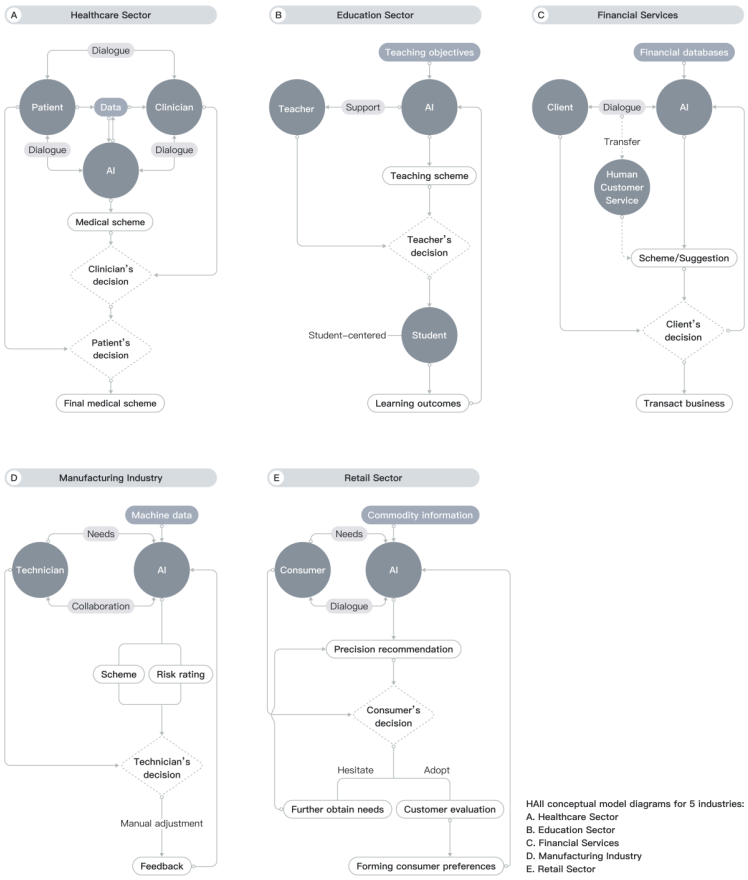

Figure 3. HAII conceptual model diagrams for 5 industries (picture credit: original)

5. Cross-industry comparative analysis

5.1. Common patterns identification

Through the cross-industry analysis in the previous section, a commonly chosen interaction mode in the industry, namely conversational interaction, has been revealed. This phenomenon can be understood at two levels:

Driver layer: Natural language processing (NLP), as one of the key areas of AI, can effectively recognize and generate language [36]. Therefore, it has promoted the widespread application of chatbots in various industries [33,37]. This way of communication back to nature, reflecting the people-oriented, users are generally satisfied.

Application layer: Among these 5 industries, interaction efficiency is a universal interaction goal. Dialogue based interaction not only has higher usability, but also provides users with customizable services [37], enhancing personalized user experience.

5.2. Distinctive characteristics analysis

As shown in Table 1, the complexity of HAII is affected by the differences in characteristics among different industries. HAII research in healthcare shapes the interaction between AI, doctors, and patients more broadly. This industry has the highest risk, and the application of multimodal technology has improved the diagnostic and nursing efficiency of the healthcare industry, protecting

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patient safety. The education field is inclusive, with AI teachers and AI students as interactive subjects, and personalized learning supports the differentiation of different disciplines. Financial services have high requirements for security and sensitivity to legal compliance. Currently, there is a lot of discussion on customer experience research and risk. The special feature of manufacturing lies in the complex industrial environment, where AI assists in the interaction between operators and machines, and providing support for operators is the goal of interaction. The research on HAII in the retail industry is more about the interaction between consumers and AI, focusing on ensuring an efficient shopping experience for users by recommending highly suitable products. However, the same interaction principles are involved in the five industries, namely professionalism, emotionalization and usability.

Table 1. Analysis of differentiation characteristics of HAII in various industries

Industries	Risk levels	Target users	Decision makers	Application scenarios	Task types	Interactive principles
Healthcare sector	Extremely high	Clinician	Expert	Case report generation	Content generation	Visualization
				Treatment plan generation	Content generation	Professionalism
				Auxiliary diagnosis	Decision support	Usability Multimodal output
		Patient	Non-expert	Healthy partners	Enhanced personalization	Emotional
				Auxiliary diagnosis	Decision support	Multimodal comprehension
Education sector	Medium	Teacher	Expert	Courseware generation	Content generation	Auxiliary
				Homework correction	Task execution	Controllability
		Student	Mixed decision-making	Instant Q&A	Information retrieval	Professionalism Leading
				Educational simulation	Enhanced personalization	Emotional
				Educational game	Enhanced personalization	Interactivity
				Virtual laboratory	Enhanced personalization	Differentiation
Financial services	High	Client	Non-expert	Intelligent customer service	Task execution	Trust Security Professionalism

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Table 1. (continued)

				Production direction	Decision support	Usability
Manufacturing industry	High	Technician	Expert	Intelligent quality inspection	Task execution	Automation
				Fault Warning	Task execution	Error-proof design
Retail sector	Low	Consumer	Non-expert	Intelligent customer service	Task execution	Efficiency Usability
				Intelligent recommendation	Enhanced personalization	Reliability

5.3. Influencing factors examination

The target users of different industries are different, and their acceptance of AI varies, reflecting different interaction conditions. For example, the application of AI in the medical field carries unpredictable risks, and patients may trust doctors more, thereby reducing the use of AI [7]. In industries with similar risks, users with higher levels of expertise trust AI more and interact more smoothly using AI. They have stronger decision-making abilities for AI, can make correct decisions, and avoid being influenced by illusions.

Each industry faces unique challenges in HAII, and privacy issues are one of the key topics. Therefore, it is necessary to define the risk level of the industry. There are a large number of specialized technologies in healthcare, and the interaction is difficult to control. Errors in industries with extremely high risks can lead to serious consequences. Financial services emphasize security, while manufacturing emphasizes the complexity of the production environment. Therefore, high-risk industries are related to property and personal safety. The AI illusion in the education industry only affects students. Medium-risk industries will have a greater impact, but not an irreversible one. Experience bias can occur in retail, with the lowest impact in low-risk industries.

AI technology supports various modules of application. For example, Personalized learning systems or environments (PLS/E) promotes personalized enhancement type task modules in the education industry [38]. Natural language processing (NLP) produces human-understandable language and supports content-generation modules [39]. Deep learning techniques have improved the quality of information retrieval [40]. In addition, technologies such as multimodality and computer vision directly affect the interaction categories of AI.

6. General human-AI interaction design framework

6.1. Principle extraction from comparative analysis

Based on the analysis of the differences in the previous chapter, a general framework is summarized, as shown in Figure 4. The framework dimensions include the corresponding structure of target objects, risk levels, task types, and interaction principles. The target object is defined as the ultimate service object, and the users of the organization and institutions meet the standards of the expert user group, most of whom belong to the ToB scenario. Individual users represent non expert users and face ToC scenarios. The boundary for distinguishing the degree of risk is blurred, and it can be divided into extremely high risk, high risk, medium risk, and low risk. Further definition of risk

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levels is needed in the future to clearly distinguish boundaries. The task types and interaction principles here are only extracted from the reviewed literature, which has limitations and needs to be expanded in the future.

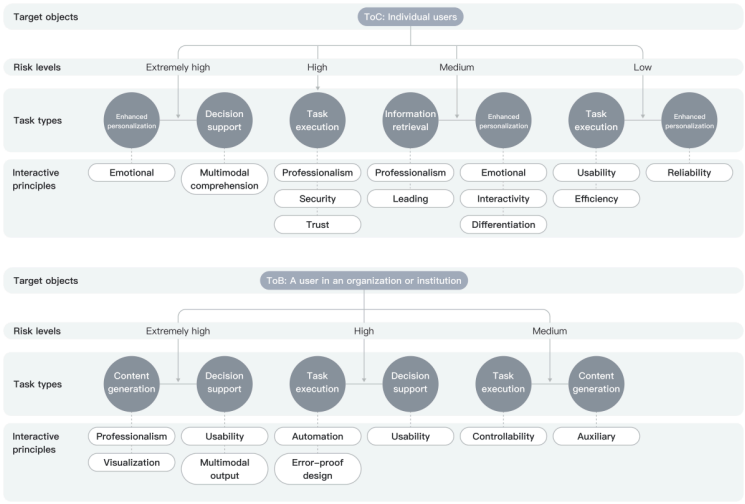

Figure 4. General Human-AI Interaction design framework (picture credit: original)

6.2. Implementation guidelines and recommendations

Putting people first is the foundation of HAII design, targeting the highest level of users. Firstly, user research should be conducted to determine the user profile, corresponding to the target object level in the framework. Afterwards, conduct industry analysis, deeply analyze application scenarios, and analyze the corresponding risk level of the industry in the framework. Secondly, the specific implementation purpose of determining product functions is to meet user needs. At the same time, appropriate technologies should be selected based on the functions to jointly form the task types of the product. Finally, design the interaction according to the corresponding design principles.

7. Discussion

This paper presents a generic HAII framework that can be applied in different industries, providing a HAII design direction tool for future researchers. Other researchers can filter corresponding interaction principles based on the four levels proposed by the framework, and further add and expand new functional scenarios on the basis of the framework. In terms of practical applications, this paper conducted interdisciplinary research on HAII, explored the interactive characteristics of HAII in five industries, and provided interactive conceptual model examples for other industries. Other industries can design and modify the implementation principles of HAII proposed in this paper based on actual application scenarios, laying the foundation for designing more people-oriented HAII applications for the industry in the future. This paper only studied and compared five key industries, without comparing other industries. The extraction of interaction patterns and features is limited and only covers some characteristics. Due to limited time and literature collection, this universal framework has limitations. It is not a comprehensive framework, but rather a design suggestion that needs to be adjusted appropriately in practical applications based on examples.

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8. Conclusion

This paper proposes a universal HAII framework. By conducting a literature review of key areas in healthcare, education, finance, manufacturing, and retail industries, AI interaction characteristics were extracted from these industries, and the framework was proposed through analysis and summary. This framework has universality and innovation, promoting the progress of HAII interface design in various industries, advancing the development of human centered HAII, and making AI a tool to enhance human capabilities and bring value to society. In the future, frameworks will continue to be optimized and explored. Verify the usability of the framework through practical testing and user testing, further explore other industries not mentioned in this paper, and expand the framework to achieve standardization.

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