

Ethical Reflections on Computationally Enabled Design in the Age of Digital Intelligence

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ABSTRACT

As technology continues to evolve and computer technology continues to improve, computational empowerment has become an integral part of our lives and work. When humans and machines begin to merge, we must be ready to embrace a whole new philosophy of life. In the field of design, the application of computing technology also provides designers with more tools and resources to create new works more efficiently, but computationally-enabled design also brings a series of ethical issues. In this regard, designers should seriously examine and think about the real function and value of computationally empowered design, and establish a design ethic that adapts to the needs of the times, in order to guide AI in a positive direction to promote social progress. This paper discusses the ethical issues and coping strategies of computationally empowered design in the age of digital intelligence mainly from three aspects and also three spatial and temporal dimensions.

Keywords: Empowerment, Artificial intelligence, Design ethics, Design for good, Human-AI relationship, Digital intelligence, Ethical reflections

PAST HOT SPOTS: THE DEVELOPMENT RELATIONSHIP UNDER THE MUTUAL PROMOTIONS OF “BOTH SIDES”

Computing Enabled Design

“Computing is one of the meta-features of our time.” The development of technology supported by computational techniques has brought about great changes in the field of design. Futurists such as Hans Moravec and Ray Kurzweil see ubiquitous connectivity as a step in the evolution of superhuman intelligence: the technological singularity. People are no longer limited to traditional computer media such as keyboards and mice; computing has permeated everyday life, and technologies such as “Surround Intelligence”, “Internet of Things” (IoT). Concepts such as this have led to the imagination of intelligent interaction that has transcended material existence to become a ubiquitous presence. We seem to vaguely see that the world in the screen and the objects in real space have come to life by being connected through embedded sensors. At the same time, embedding computing in real life scenarios seems to offer clearer opportunities to make objective objects more attuned to the subjective human body and mind.

In the field of design today we are moving beyond the traditional design thinking of the 20th century into a phase of automatic evolution, development and change. This shift is from simplicity to complexity, not from complexity to simplicity, and therefore needs to be realised through the processing power of computers and the support of the Internet. In such an era of mass production of intelligent products, the application of digital technology has become an important part of daily design work, and the empowerment of computing for design becomes particularly prominent when the attributes of computing merge with the nature of design. For example, computers provide more data analysis and processing techniques, enabling designers to gain a more comprehensive understanding of user needs and behaviours, so that they can design products and services that are more relevant to users.

Moreover, in today's era, computation has become an intrinsic property of all objects, systems and events and serves as an indispensable medium. Design work is more multidimensional with the support of computational attributes, such as virtual reality VR, augmented reality AR, etc., which enable designers to express and validate design concepts more intuitively, and improve design efficiency and quality. In addition, computing technology has also intelligentised some of the design work, such as AI drawing and intelligent typesetting, adding more possibilities and innovative space to design. Programmed art can produce a series of ever-changing images rather than a single subjective image. Design is also increasingly integrated with art, engineering, and computer science. Computing-based artificial intelligence technology has the ability to receive, process, and share data, connecting dispersed individuals into a whole and stimulating the design potential of a multi-dimensional world.



Figure 1: AI's function of instantly producing finished drawing based on sketches (adapted from the new intellectual platform).

Professor Cooper, Director of the Visual Language Studio at MIT, has pointed out that viewing computers as a liberating force allows designers to collaborate more closely and make their work more intuitive. However, while algorithms project the real world into the technological world, they will also project human-designed technological systems into the real world again, thus unleashing many new ethical issues in the process of computationally empowered design, such as the loss of human autonomous creative ability brought about by artificial intelligence technology. Even if the methods and techniques of setting art change with the development of the times,

the essence of art remains the same. Because, art is not method, and method is not art.

Design Embodies Algorithms

The essence of design is to solve problems and satisfy needs, and the relationship between design and the future is closely dependent on the interaction between design and computing, so computing-enabled design to solve practical problems has become the future development trend. In the era of digital intelligence, design can use algorithms to complete design results more efficiently, while the design process also shows the value of algorithms. Contemporary design has become an algorithmic thing with computational attributes, with visualisation, digitisation and other new media features. In the design process, data analysis and model construction demonstrate the support of algorithms, and with the aid of computation as a technological reality, super-physical and superspatial design may be realised in the future.

Today, as computational technologies become increasingly intelligent, algorithms have become one of the necessary attributes of contemporary design objects. The balance between form and meaning in the field of design is facilitated by setting parameters and inputting random numbers in order to generate various design solutions to practical problems, rather than just finding a perfect external representation. In this regard, machine learning, as the core technology of artificial intelligence, plays an important role. Through the use of machine learning, designers can better mine and utilise data, and demonstrate the patterns and trends hidden behind the data through design. For example, “information design” through the use of highly interactive, visually expressive programs and software can produce a variety of visual graphics that show the complex information hidden behind phenomena in a simple and intuitive form, helping people to understand reality more clearly and take practical action. Today, graphic designers are also using technology to build rich visual worlds through active communication with users.



Figure 2: Examples of information design (downloaded from ZCOOL website).

“Today’s designers walk the line between knowing and not knowing,” but isn’t that what designers do best, giving shape to things that don’t yet exist? Design itself is a technology, both in the broader sense of design and in the definition of technology, and the two are inextricably linked. Optimisation

and decision-making problems in design can be solved by algorithms, and the design process is being progressively reduced to the act of choosing. At the same time designers can optimise algorithms as they are used, helping them to iterate and improve. If computer software shapes designers' creative processes and creative aesthetics, then in order to truly pursue the path of creativity, designers must also develop their own computational tools. In addition, creativity and innovation in design benefit from the assistance of algorithms, and designers can also expand the design space by using generative adversarial networks, evolutionary algorithms, etc., to find new inspiration and possibilities for algorithmic practice.

CONTEMPORARY REFLECTIONS: ETHICAL ISSUES IN THE CONTEXT OF MULTIPLE PROBLEMS

Addiction and Manipulation

In the 1960s, the American designer Victor Papanek first put forward the concept of design ethics and emphasised the relationship between design and morality. Nowadays, in the process of computationally-enabled design, the ethical issues behind design have become more and more prominent. First and foremost is the issue of addiction and manipulation resulting from people's dependence and addiction to computing technologies. The tantalising goals, effortless progress, and tension of unfinished games all lead to addiction. The successive explosion of brainless mini games such as "Jumping", "Fun", and "Sheep" continues to confirm the existence of addictive factors in game design. In addition, the popularity of short videos cannot be separated from the cyclic design of wanting to know what the next video is, and people's prolonged refreshing of social platforms is even more closely related to the design of the successive likes and feedbacks behind them, in which people are unconsciously manipulated by the product designers into a numb state, and are trapped in the digital vortex created by digital machines such as APPs, intelligent algorithms and other systems.

The fundamental reasons behind this kind of problem mainly stem from the following two aspects. On the one hand, it stems from companies' excessive pursuit of user click-through and retention rates, as well as their neglect of users' real needs and well-being. In this regard, technology companies should strengthen data management and avoid making designs that misuse user data and manipulate user behaviour, such as price discrimination against existing customers and algorithmic discrimination, while providing a more transparent and controllable algorithmic decision-making process. On the other hand, it stems from the neglect of the problem of people's dependence on computing technology, especially the convenience of generative AI that intensifies people's dependence on intelligent machines. In this regard, the society can be called upon to promote the popularisation and cultivation of digital literacy through educational methods, so that more people can rationally use and evaluate computing technologies. As a designer, we should also try our best to design products from the perspective of generating value for

the good, rather than designing products for the purpose of creating addiction. For example, cool colours can be used in some unimportant interactions to reduce over-attraction to users.

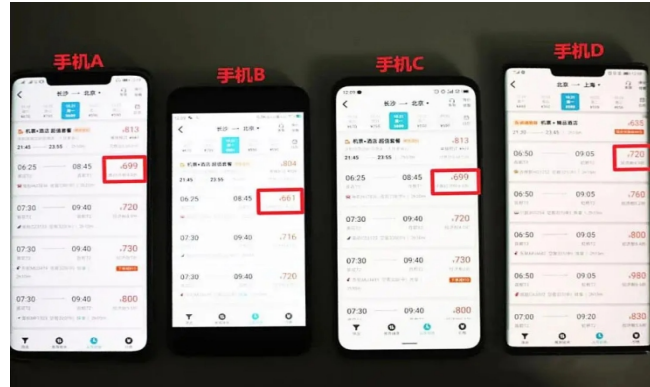


Figure 3: Example of platform big data-enabled price discrimination (from Phoenix 21st century business review).

At the same time, several huge business intelligence giants based on big data have a virtual monopoly on how data is collected and constructed, and the issue of preference reinforcement arises when data is sold to third parties, raising a host of ethical questions. For example, as machines become more capable of monitoring and controlling people, individuals become increasingly less able to control and protect themselves. This makes us wonder whether human beings will fall into single-minded computational thinking and instrumental rationality in the future, thus leading to the decline of humanistic thinking and value rationality? Will mankind ultimately be controlled by computation to the point of entertainment to death?

Knowing the world requires methods, and the method of transforming the world is based on knowing the world. Similarly, algorithms provide methods for human beings, but they cannot completely replace human beings to create methods. Whether out of habitual self-confidence, the urge to challenge human limits, curiosity about the potential of technology, or driven by commercial interests, they trigger various desires and lead to addiction and manipulation. In addition, it is crucial for designers to tame a mess of data with simplicity and order, and develop design rules that are more suitable for a digital society. Therefore, not only do we need society to pay attention to these issues, but we also need to push ordinary people through design to think more about the nature of human beings and where their core values lie when facing the challenges of machines, and to actively become creative subjects in the human-machine civilisation from the inside.

Emotion and Privacy

Computationally empowered design also raises ethical issues of emotion and privacy. The protection of human privacy and dignity is the most serious social responsibility challenge. Algorithms based on big data bring

convenience and fulfilment in exchange for people's emotions and privacy. On the one hand, there is the problem of neglect of human emotional expression and communication caused by over-reliance on computational technologies. The "singularity" already, machine intelligence is growing by leaps and bounds at an immeasurable rate, so attention to human emotions must be on the agenda. On the other hand, it is the misuse of users' personal information and emotional data by companies that brings about user privacy and security issues. In the age of artificial intelligence, the intervention of algorithm-supported AI technology in important fields such as security and healthcare; the privacy risk posed by the surveillance application of face recognition technology; the "Trolley Problem" and so on, all of which have become dilemmas faced in the age of AI.

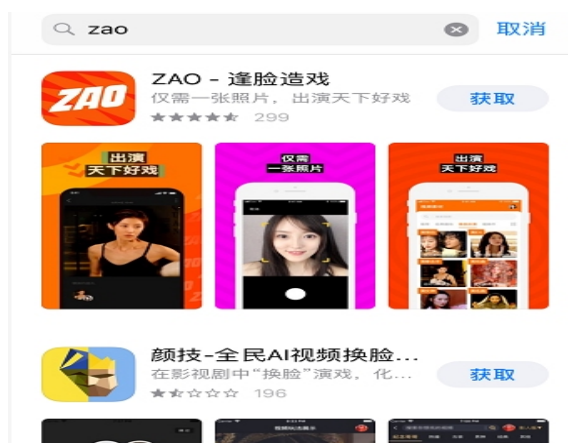


Figure 4: The ZAO face-swap app that sparked a privacy crisis (from the internet).

In Visual Design in Action, today's mantra is "produce faster, distribute faster, communicate faster". When the age of computing arrived, the nature of design changed. This change removes the boundaries between design and art on the one hand, and on the other hand highlights the need for designers to work with and for others. Therefore, the beauty of design can contain the beauty of art, but not only the beauty of art, it can take it as one of its constituent levels, but there must be other levels, such as the beauty of technology, algorithmic beauty. And when it comes to algorithms, it is necessary to be critical of the times, especially the need to bring out the human emotions in the era of computing, in order to truly constitute the beauty of design empowered by computing. For example, the unique emotional connection between users and products can be enhanced by providing users with DIY opportunities, moderately increasing customisation features, and meeting the personalised needs of user groups.

The era of digital intelligence has redefined the relationship between humans and AI, which involves not only the loss of human emotional communication, personal privacy and loss of defence, but also an impact on a philosophical level. One of its direct results is the gradual popularisation of

analogue human-to-human communication into human-to-machine communication. In this human-machine communication, the machine is regarded as the object of communication, but there is no human-like moral constraint for this object. Therefore, as a designer in the future should pay more attention to the user's emotional needs, in order to design a more humane product as its mission. As a company, not only should users be able to independently choose whether to share their personal data or not, but also should strengthen the protection of people's emotional rights and interests, in order to achieve the purpose of controlling the balance between technological development and human values. As Marcuse said, "the control of technology truly embodies rationality in favour of the interests of the whole social group and society".

EXPECTATIONS FOR THE FUTURE: A GOOD VISION IN THE PURSUIT OF DOUBLE BALANCE

Society - Balance of Validity and Credibility

In the age of digital intelligence, society expects computationally-enabled design to achieve a balance between validity and credibility. In his book *Out of Control*, Kevin Kelly points out that there are two trends between artefacts and natural life: artefacts are becoming more and more like living organisms, while life is becoming more and more influenced by engineering. The decentralised nature of computing as an essential attribute of the dominant contemporary technology gives more power to future design. But future designers will no longer bring greater value and benefit to society if they only pursue efficiency and innovation without considering the reliability and credibility of the design outcome. In the face of exponential technological growth, there is no turning back from the current practice environment for designers. Therefore, designers need to take into account the process of utilising AI products to reduce the likelihood of secondary misuse or abuse after their output.

In addition, design for good in social practice should be the dominant purpose of design. To this end, on the one hand, design education and training should be strengthened to enhance the professionalism and ability of designers, so that they can consider the requirements of validity and credibility comprehensively in the design process, and identify potential ethical issues from conception. On the other hand, it is necessary to strengthen the types of methods and tools for design assessment and verification to provide more scientific and reliable assessment and verification. At the same time, since the ability of modern people to control things and themselves is extremely unequal, it is also indispensable to establish and improve design ethics and norms, and to promote the construction of design industry codes and regulations. The progress of society will be proportional to our integrity, and creativity is rooted in the human values of sincerity, integrity, and belief in the significance of work, and only those who disregard material gain for the sake of new endeavours can make real progress possible in the future.

In the book *Design and Nature*, it is mentioned that "design is not centred on man, but on the harmonious coexistence of man and nature." Harmony is also the ultimate value pursued in the age of artificial intelligence, covering

the harmonious relationship between humans and humans as well as between humans and robots. Therefore, the process of design is not a unilinear process of advancement, but should be a cyclical process of continuous search, judgement, selection, and testing in the process of interaction with the entire natural environment. While traditional design products need to be inclusive and take into account the use of various special populations, the process of computationally-enabled design needs to anticipate the balance between the validity and credibility of the design results and reconcile the ratio of the two in a timely manner. Nowadays, we need to move from the “spirit of mechanical purpose” to the “spirit of organic system”. At the same time, designers in the digital age need to have the ability to embed values and responsibilities into the design results, and to establish true, good, and beautiful social and spatial relationships.

Individuals - Balance of Individuality and Commonality

In the age of digital intelligence, individuals expect computationally-enabled design to achieve a balance between individuality and commonality. Can a social robot centred on companionship replace person-to-person companionship? In the game *Detroit: Become Human*, Marcus the robot makes a declaration before all of humanity, “You have given us life, now it is time to give us freedom.” The alienation of technology will also trigger the alienation of the way humans perceive and express their emotions. As Albert Einstein said, “It is a scale that makes the bad more difficult and the good easier.” Therefore, in the future, computationally-enabled design will not only consider satisfying the special needs of individuals, but also give more consideration to the common interests of society and public values. At the same time, only by maintaining dialogue between human and human, people and machines, and machines and machines, can all things continue to be optimised and progress.

In the future development of human-computer interaction, it is necessary to think critically about how people and machines can be rationally configured in the practice of technological development and realise their respective characteristics in this relationship. Thucydides once said that “human nature is human nature” and perhaps it is the imperfection of being human that gives users the opportunity to experience a more authentic companionship and social relationship. Perhaps it is the imperfections of being human that give users the opportunity to experience more authentic companionship and social relationships. In this regard, not only do we wonder if we can give up some of our material pleasures for the sake of the survival of the human spirit? Or even intentionally slow down some technological development? In any case as a single individual should endeavour to live as a happy person, deriving pleasure from an ordinary and short life.

The texture of humanity will be more deeply appreciated in moments of materialistic inflation. For this reason, designers and technology companies should pay more attention to human participation and feedback, respect the individuality and diversity of users, and make the design more in line with their intrinsic needs and expectations. At the same time, designers

should focus on social responsibility and public values to avoid discrimination and prejudice in design, and the perspective of design can be further refined in terms of function and form, utility and beauty, and rationality and irrationality. Finally, society should encourage diversified design innovation and support individualised design needs, while also focusing on social sharing. In the future world where reality and ideals are combined with computing assistance, we need to accept irrationality, embrace uncertainty, endeavour to balance the human-computer relationship as human individuals and communities, and establish a more resilient human-computer interaction model.

CONCLUSION

“The future of big data-enabled AI may never look like a human, but that’s not guarantee of our survival.” In the age of digital intelligence, computation-enabled design not only brings about opportunities and innovations, but also a series of ethical issues that urgently need our self-reflection. By exploring past hotspots, current reflections and future expectations, we can see that history does not provide solutions, and the opportunities for innovation are unique. The pursuit of a “double balance” between computation and design is essential. Only by balancing effectiveness and credibility at the social level, and individuality and commonality at the personal level, can we realise the beautiful vision of computation-enabled design and make design more valuable.

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