Mapping the potential AI-driven virtual hyper-personalised ikigai universe

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„Before that, he'd written over three hundred comic operas, with librettos in Italian, French and English—and staged most of them, with puppet performers and audience. Before that, he'd patiently studied the structure and biochemistry of the human brain for sixty-seven years.“

Greg Egan: Permutation City

Abstract

Ikigai is a Japanese concept, which, in brief, refers to the “reason or purpose to live”. I-risks have been identified as a category of risks complementing x- risks, i.e., existential risks, and s-risks, i.e., suffering risks, which describes undesirable future scenarios in which humans are deprived of the pursuit of their individual ikigai. While some developments in AI increase i-risks, there are also AI-driven virtual opportunities, which reduce i-risks by increasing the space of potential ikigais, largely due to developments in generative AI, virtual worlds as well as AI-driven hyper-personalization. The purpose of this paper is to present a first attempt to map the potential AI-driven virtual hyper-personalised ikigai universe. Moreover, challenges and further ideas are presented.

Keywords

ikigai, i-risks, AI risks, generative AI, hyper-personalization, virtual worlds

Introduction

The Japanese concept of ikigai can be translated as “reason or purpose to live”. It comprises those activities of life, which give humans satisfaction and meaning. The concept of ikigai has been popularized in Western contexts in recent years, yet often misinterpreted, as has been stressed [1, 2] and as can be elucidated by reverting to primary Japanese literature [e.g., 3].

Ikigai has various connotations, two of which are referred to as ikigai kan and ikigai taishō [3]. Ikigai kan encompasses feelings of satisfaction, well-being and a life worth living, thus is a state of mind, while ikigai taishō describes activities, experiences and situations, which create such feelings, thus it is rather a process.

It can be stated that it is very much desirable for humans to have found an ikigai. Therefore, scenarios, in which (a high number of) humans are devoid of any ikigai ought to be prevented. Such scenarios have been coined "i-risk scenarios" [2] and constitute a distinct level of risks, supplemental to previously defined s-risk scenarios [4] and x-risk scenarios [5], which stand for "suffering risk" and "existential risk" respectively, i.e., scenarios where humans (severely and continuously) suffer or become extinct.

Developments in AI and other emerging technologies may lead to i-risk scenarios [2]. This comprises situations, in which AI and other emerging technologies take over much more efficiently activities, which humans used to carry out day by day and considered them as ikigai taishō activities. As a result, the affected humans may struggle to find the reason, for which to get up in the morning and how to meaningfully spend the hours of the day, which are other paraphrases for ikigai.

Therefore, the purpose of this paper is to explore ways to reduce i-risks by applying AI systems for the creation of innovative virtual ikigai taishō activities, which could lead to ikigai kan. This endeavour is timely since 1) i-risks are a serious concern, but 2) have largely been neglected so far and 3) AI systems together with virtual worlds have the potential to alleviate i-risks, especially given recent developments in these fields. While the third point is the main topic of this paper, the first two points are briefly described below:

i-risks ought to be reduced since several studies have shown that having an ikigai has a positive impact on health and wellbeing [for overviews: 6, 2]. Therefore, it is not desirable if the space of potential ikigais for humans is being reduced. In contrast, when it comes to developments in AI and other emerging technologies, it is not only largely overlooked that those may reduce the space of potential ikigais, but there are also no efforts made to harness AI and other emerging technologies for innovative virtual ikigai taishō activities. Instead, prime applications of virtual worlds, e.g., the metaverse, that are discussed are simulations, games, office, social, marketing and education [7]. While some of these, e.g., social and education, may evolve into ikigais as described below, targeted undertakings towards ikigai taishō activities when creating virtual worlds have not been observed.

This paper is structured as follows: First recent developments in AI and their links to i-risks are described. This is followed by the two main parts of the paper, which outline the potential virtual ikigai universe as well as the potential hyper-personalised ikigai universe, supported by these developments in AI. The paper concludes with a summary and with ideas for future investigation.

Generative AI

Since the issue of i-risks was raised for the first time [2] further significant developments in AI took place, of which advances in generative AI are most remarkable as well as most relevant for i-risks, in a positive as well as a negative way as will be outlined.

Generative AI is the umbrella term for machine learning algorithms, which generate artificial digital content such as text, images, audio and video content, based on large amounts of training data. The quality of this content is increasingly of an extent that humans cannot distinguish whether the content has been created by a machine or a human. Notable examples are GPT-3 for the generation of various types of texts [8],[1] DALL-E 2 for the generation of digital images [9], Make-A-Video for the generation of videos [10] or AIVA[2] for composing music (which unlike the other three examples does not work on text inputs). The technique most of them use is called language model or transformer. Details are omitted here as well as the various challenges these systems have, such as bias, stereotypes and creation of disinformation [e.g., 11].

The two points, which are relevant here, are the assumption 1) that these systems will continue to improve based on even more training data input as well as more powerful hardware as it was demonstrated in the recent AI history[3] and 2) that generative AI has a significant impact on i-risks.

Arising i-risks

Various aspects of the reduced space of ikigai against the backdrop of developments in AI and other emerging technologies have been outlined before [2]. Humans who have lost or will lose their ikigai due to latest developments in AI are mostly those whose professional occupations, which they have treated as their ikigai, have vanished or will vanish.[4]

While before this concerned rather monotonous routine tasks, which could be easily automated, it is likely to affect in the (near) future also creative tasks due to the advances in generative AI, as described above. Examples comprise writing (including novels, poems, computer code, movie scripts, instruction manuals and advertising texts), designing (including graphics, branding, animations, cooking recipes and fashion), composing, painting and photographing. In other words, many professions in these fields will likely become obsolete. Of course, it is possible for humans to continue with these activities during leisure time and not for

[1] Recently, the chatbot ChatGPT has been launched and received significant public as well as media attention. It has been built on top of GPT-3.5. See https://openai.com/blog/chatgpt/

[2] https://www.aiva.ai/

[3] See for example: https://www.gwern.net/Scaling-hypothesis

[4] This comes on top of the number of humans who have never found their ikigai and those who have found it, but are too occupied to pursue it because of other obligations.

monetary compensation, but it will be frustrating if much superior AI systems massively outperform them and produce oeuvres of much higher quality in much shorter time.

These advances in generative AI initially increase i-risks, but, as will be outlined below, also provide the opportunity to reduce i-risks. The increase is caused by the expectation that many people will lose their jobs in creative sectors due to far superior generative AI, thus, these people will also lose their ikigai. There are no specific numbers since this is an ongoing process. Potential proxy indicators could be suicide rate, drug addiction or the number of hikikomori, which is a form of social withdrawal, observed in Japan, but also other countries [e.g., 12].

AI-driven hyper-personalization

The second field of AI advances, which is critical to reduce i-risks through virtual opportunities and, thus, is introduced here briefly, is AI-driven hyper-personalization. This field can be divided in hyper-personalized content and hyper-personalized feedback.

The first group comprises tailored individual content for humans based on large amounts of data about the particular human, analysed by AI. Naturally, this is interesting for the commercial sector and has been applied in marketing [e.g., 13] and entertainment [e.g., 14]. In brief: Pertinent data include geographics, demographics and psychographics among others, which are traced through website analytics and consumer behaviour, and which are used to generate personalized content, such as personalized messages, personalized websites and personalized product recommendations. AI-driven hyper-personalization has not yet been used to identify suitable ikigai taishō activities for humans, except to some extent for the sub-field of learning [e.g., 15].

The field of learning can be also used to illustrate the second group introduced above, hyper-personalized feedback. AI-driven systems for hyper-personalized education analyse performance data of students in real-time and establish individual learning plans according to the strengths and weaknesses of the student, which replace the prevailing, but in many aspects ineffective one-size-fits-all education system.

Other fields where AI-driven hyper-personalized feedback is applied are, for example, health [e.g., 16] or marketing for social good [e.g., 17]. For AI-driven hyper-personalized feedback also non-player characters (NPC) or assistants are being used in various sectors such as education, wellbeing [for both e.g., 18] or marketing [e.g., 19].

As above for generative AI also for AI-driven hyper-personalization challenges related to privacy issues, ownership of data, bias [e.g., 15] as well as addiction to hyper-personalized content [for social networking e.g., 20] are not discussed here. The bottom-line here is that AI-driven hyper-personalization has not been used yet to identify individual ikigais.

In a more comprehensive theoretical overview, it has been described how the human needs such as novelty, romantic love and achievements are likely to be fulfilled by an increasingly

enhanced immersive experience in precisely tailored manner through AI-driven hyper-personalization in the future [21]. While in this overview it is not referred to ikigai, the used phrase "need for a sense of achievement" resembles the concept of ikigai in some aspects.

Virtual ikigai universe

As outlined, there is a risk that the space of ikigai taishō activities in the real world declines. This means that to counter i-risks urgently new ikigais are required. Therefore, this paper looks for upcoming virtual worlds as a new space for ikigais; especially virtual worlds, which are potentially created by generative AI, given the current promising developments in this field. Currently, the main application of virtual worlds is entertainment, with some exceptions. Yet, up to now virtual worlds have hardly been considered for ikigai taishō activities. And as will be explained also below, entertainment must not to be confused with ikikai. Those often mindless and passive entertainment activities in virtual space may even lead to addiction, which is certainly not an ikigai.

Therefore, the desideratum is that AI systems create virtual worlds where ikigai taishō activities can be practised, including potentially new, thus formerly unknown ikigais.

Ikigai taxonomy

Detailed taxonomies of ikigai taishō activities have not been found in the literature. A categorization of the following five types of ikigai taishō has been provided [1]:

- Yarigai: Things worth doing
- Asobigai: The value of playing
- Hatarakigai: Work worth doing
- Manabigai: The value of learning
- Oshiegai: The value of teaching

While it appears desirable to refine this classification, it is sufficient for this paper to explore how AI-driven virtual counterparts for each of these categories could look like.

AI-driven virtual counterparts

This sub-chapter serves as the centrepiece of this paper. The aim is to map innovative virtual ikigai taishō day-to-day activities when not only several offline ikigai taishō activities have vanished due to developments in AI and other emerging technologies, but also more time is available [2].

Our hypothesis is that for many if not most known ikigai taishō activities there will be AI-driven virtual counterparts, which are likely to be complemented by yet unknown ikigai taishō activities, which may emerge owing to new possibilities through AI.

Another aspect is the unsolved question whether there are sentient digital minds or could be created in the future [e.g., 22]. This is relevant because ikigai taishō activities often involve social activities, thus, virtual counterparts require NPCs. While sentient NPCs would provide further opportunities for virtual ikigai taishō activities, they would also be moral patients, thus must not be harmed, intentionally or unintentionally [23].

Below potential AI-driven virtual counterparts of the five types of ikigai taishō as introduced above are presented.

Yarigai: Things worth doing

Yarigai comprises a wide range of things. Numerous small or bigger activities may constitute ikigai taishō for individual humans, ranging from a walk in the nature to caring for a pet.

As AI-driven virtual counterparts it is conceivable that, instead of a walk in the real nature, immersive navigating in complex and completely unknown virtual worlds could be explored [e.g., 24].[5] This could be also a virtual replica of an existing place on earth and/or in another historical epoch or on another existing planet. The experiences could be massively augmented, i.e., beyond our normal senses. For example, during a virtual nature walk we may be able to zoom in to inspect tiny insects, listen to the sounds of bats or look at a whole forest with a bird's eye view. Moreover, this could be hyper-personalized as outlined below to match the ikigai preferences of the individual human as exactly as possible.

As for caring for a pet it is conceivable that in a virtual world completely new creatures appear and need attention as well as care. Again, instead of creatures that do not exist on earth it could be realistic replicas of cats or dogs, or even extinct animals. Moreover, this environment could be hyper-personalized, e.g., in a way that this creature appears to the individual human cuter than anything s/he has seen before. As introduced above, in such a scenario the for now unsolved question is relevant, whether NPCs, such as virtual pets are sentient, in which case they must be treated as a moral patient [23]. It must be noted that virtual pets, such as the Tamagotchi, exist already [25], but 1) they have not been considered for an ikigai mapping, and 2) it is likely that that they become much more sophisticated through AI-driven hyper-personalization.

It would be understandable if this initially does not sound attractive to many humans, also given that currently the quality of virtual worlds is not very advanced. However, it has to be considered 1) that developments in AI are progressing fast, as indicated above, and 2) that in

[5] This reference is about uploaded humans, but can to some extent also serve as an illustration for possibilities in virtual worlds without being uploaded.

the past decades humans adjusted to various technologies, which were unimaginable for previous generations [26]. This may sound outlandish, but in the end, there is no significant difference whether an ikigai is to collect real stamps or certain items in the virtual world.[6]

Asobigai: The value of playing

For this category it is important to separate it from games and virtual entertainment, which are comprised by asobigai, but not topic of this paper. Yet, asobigai encompasses also social interactions [1], which are considered ikigai taishō activities by many and for which here AI-driven virtual counterparts are outlined [see also: 27]. Therefore, for this category NPCs are critical, which may be human-like or other creatures. Important is that the human and the NPCs have a common language, noting that in virtual worlds also other creatures could speak human language, or have other means to communicate. Complex interactions with a variety of NPCs can be imagined, which include talking about different topics, problems of the concerned human or philosophical questions, but also gossiping and joking. As described below under hyper-personalization, the NPCs will be perfectly adjusted in terms of knowledge and empathy.

Hatarakigai: Work worth doing

Hatarakigai refers to cases when the professional work of someone is considered by her or him as ikigai. As outlined above, i-risks for hatarakigai may be especially high, taking into account jobs that disappear due to AI and other emerging technologies

However, AI-driven virtual counterparts for many professions are conceivable. Doctors could treat simulated humans, non-human animals or completely different creatures. Researchers could study the physics, chemistry, biology, astronomy, sociology, history etc of completely different worlds and their inhabitants. Creative humans could design anything in these worlds from fashion, machines, houses, landscapes to whole universes [29].

Manabigai: The value of learning

Another common ikigai taishō activity is to learn something, for which the real world also presents many opportunities.

In addition, a variety of AI-driven virtual counterparts can be imagined. For example, if the individual human likes to learn languages, the AI could create a completely new language for the human to learn, in written and verbal form. Also, the just mentioned sciences of completely different worlds and their inhabitants, such as physics, chemistry, biology, astronomy, sociology or history, provide for extensive learning content. The learning methodology may differ significantly from traditional ones and may include immersive experiences of virtual environments as well as AI-driven hyper-personalized individual learning plans according to the strengths and weaknesses of the student.

[6] There would be even no difference at all if we live in a simulation [28].

Oshiegai: The value of teaching

Likewise, teaching is considered by many as ikigai taishō activity, as part of their profession, but also in other contexts.

As for AI-driven virtual counterparts, NPCs would have to serve as students and humans can teach them either knowledge from the real world or knowledge they gained in virtual worlds while embracing virtual manabigai.

This concludes a glimpse of possible AI-driven virtual counterparts for ikigai taishō activities, while it must be stressed that there are considerable unknown unknowns, given that AI systems are much smarter than humans and may come up with highly satisfying ikigai taishō activities, currently unimaginable for us.

Hyper-personalised ikigai universe

After describing the possibility of innovative virtual ikigai taishō worlds, it has to be examined how specific ikigai taishō activities can be matched with individual humans since ikigais are very personal as indicated. AI-driven hyper-personalization is key for this undertaking and two sub-steps can be distinguished:

1) Content: This involves AI systems calculating based on big data a suitable virtual ikigai for individual humans. 2) Interaction: When the human conducts ikigai taishō activities, the AI system provides feedback, which has two purposes: To adjust the ikigai taishō activities based on various parameters in order to further optimize the resulting ikigai kan feeling and to praise the human for the way s/he conducts the ikigai taishō activities.

Therefore, the desideratum is that AI not only identifies within the space of virtual ikigai taishō worlds, as described above, for individuals their suitable hyper-personalized virtual ikigai taishō world, but provides also hyper-personalized feedback, while the individuals practise their ikigai taishō activities.

Ikigai metrics

The precondition for AI-driven hyper-personalization of ikigai is the availability of ikigai metrics. However, not many such metrics exist [2], one of the exceptions being ikigai-9. This approach consists of the following nine statements, which could be seen as sub-components of ikigai kan [30]:[7]

[7] See [31] for the English translation.

- I believe that I have some impact on someone.
- My life is mentally rich and fulfilled.
- I am interested in many things.
- I feel that I am contributing to someone or to society.
- I would like to develop myself.
- I often feel that I'm happy.
- I think that my existence is needed by something or someone.
- I would like to learn something new or start something.
- I have room in my mind.

It is desirable if there were more metrics, yet again big data and AI and provide for an opportunity: When pursuing virtual ikigai taishō activities many more data are recorded, which can be harnessed for ikigai calculation as well as optimization. As it is a feature of machine learning algorithms to discover patterns and trends unbeknown to humans in data, there is a likelihood that AI may reveal further ikigai metrics, i.e., data and parameters, which measure to what extent activities in the virtual world contribute to ikigai kan feelings. Therefore, these activities constitute ikigai taishō activities for particular humans, keeping in mind that ikigai is very personal and differs significantly among humans.

AI-driven matching

As introduced above, this field can be divided in hyper-personalized content and hyper-personalized interaction.

Content

As also introduced above, generative AI will likely be capable to create a broad range of innovative potential virtual ikigais. These ikigai options have then to be matched with the preferences of individual humans as exactly as possible. The goal of this process would be the creation of a virtual environment with the specific purpose of being the ikigai taisho of a specific human.

This could be initiated with a survey about the individual's interests and likings. AI systems would then recommend proven and tested ikigais based on patterns learned from a large range of data; a process comparable with dating apps or suggestions to customers based on previous purchases.

Interaction

The proposed ikigai taisho activities, thus the customized virtual world could then be improved and refined based on further data, which the AI system receives through the behaviour patterns of the human in this world. An example would be that an initial ikigai taisho activity was to explore virtually simulated parts of planet earth, which was then adjusted to the

exploration of other planets and celestial bodies and later further extended to the exploration of fantasy worlds. This process can be continued until the individual has identified for him- or herself ideal virtual ikigai taishō activities, which lead to perfect bliss and feelings of satisfaction, thus ikigai kan. Therefore, AI-driven hyper-personalisation of ikigai taishō activities is an essential complement to the AI-driven creation of an ikigai-suitable virtual world, which does not exist in this sophisticated manner in the real world.

As mentioned above, the second element of interaction comprises accolades and social validation. While this differs from human to human and not everyone requires such feedback to feel bliss and the ikigai-9 components above illustrate that six of them are not linked to social validation, the following three of them are:

- I believe that I have some impact on someone.
- I feel that I am contributing to someone or to society.
- I think that my existence is needed by something or someone.

In a hyper-personalised virtual world the feedback to these three ikigai-9 components would be provided by NPCs, which are empathic as well as perfectly adjusted to the individual human and her or his ikigai. Since the AI will find out precisely the degree of social validation that satisfies the human, the feedback will be much more rewarding than in the real world by creating the thoughts and feelings the human is craving for.

Further ideas and summary

Further ideas

This paper aims to be hands-on for the reduction of i-risks in the near future, while at a later stage the space of potential ikigais for humans may be further increased due to emerging technologies such as human enhancements, brain-machine interfaces and uploading as well as additional developments in AI [for an overview: 2]. One particular progress of brain-machine interfaces would be the direct control of human qualia in a way that the pursuit of virtual hyper-personalised ikigai taishō activities could be directly rewarded with sensory pleasure.

As AI may approach Artificial General Intelligence another AI risk has to be considered, in addition to the mentioned one that developments in AI may increase i-risks, which is that AI systems may turn out not be ikigai-friendly. It is beyond the scope of this paper, but the values of a non-ikigai-friendly AI system would not be aligned with the values of humans. Thus, the goals of such an AI system and humans would be conflicting. Thus, such an AI system would not support humans in finding their individual ikigai or would even prevent them from pursuing their individual ikigai [2].

Another consideration is related to the prevailing global inequalities. One step to counteract this plight would be to provide virtual hyper-personalised ikigai as a digital public good for

everybody. In other words, policies and legislation have to be developed and implemented so that everyone gets access to his or her virtual hyper-personalised ikigai universe [also: 32]. This may also be a remedy to reduce the time humans spent online for (potentially addictive) entertainment activities.

And yet an additional aspect is that this paper may offer another explanation, if we live in a simulation [28], for a potential motivation of the simulator, which is that running this simulation may be the virtual ikigai of this being.

Summary

i-risks have an intersecting set with AI risks in the sense that certain developments in AI increase i-risks. Yet, it has been outlined that there are also AI-driven virtual opportunities, which reduce i-risks. This paper introduces concrete measures to tackle i-risks by mapping the potential AI-driven virtual hyper-personalised ikigai universe. It has been illustrated that advances in generative AI, virtual worlds as well as AI-driven hyper-personalization provide for opportunities to constitute spaces for formerly unknown ikigais.

It has to be emphasized that the focus here is on ikigai taishō activities (which ideally lead to ikigai kan feelings of satisfaction). This is critical as technologies are likely to free up large amounts of time for many humans. Therefore, it may become a challenge for humans to fill their day with activities and experiences that have a sense of purpose.

While, as mentioned, it has been shown that having an ikigai may have a positive impact on health and wellbeing, spending long amounts of time in a virtual world, reduces the time for physical exercise and perhaps for having a healthy diet and enough sleep, all of which are also critical for the health of humans. Therefore, a balance between online and offline life is important, given that before humans also did not spend all their time with ikigai taishō activities.

It is important to reiterate or to clarify what AI-driven virtual hyper-personalised ikigai is not about. It is neither about virtual entertainment, nor about virtual love, nor about virtual religion. The first two are whole different businesses, while the latter one has been described elsewhere [33].

Virtual ikigai taishō activities, which lead to ikigai kan, also must be separated from addiction or wireheading. While ikigai taishō activities may have in common with addictive behaviour the persistent urge to engage in them, these activities neither have negative consequences, nor they cause harm as it is the case for addictions.

Wireheading is reward hacking to stimulate pleasure centers and has been described as a potential x-risk [34]. However, this would be the case if ikigai kan feelings can be reached without conducting ikigai taishō activities, while this paper focuses explicitly on ikigai taishō activities. Also, the potential extension mentioned above to link virtual hyper-personalised

ikigai taishō activities with positive qualia would not be wireheading as it requires to execute the activity.

It is acknowledged that this paper is partly speculative, which is the case for all research about the future, including AI safety research in general. Yet, due to their significance i-risks must be considered as early as possible.

It is possible or even likely that humans would initially reject the outlined virtual ikigai taishō activities and consider them as dystopian. However, it has to be stressed that also in the past humans were often sceptical towards new technologies and then adjusted their behaviour. This applies also to recently emerged technologies, which our ancestors probably would have also considered as dystopian [e.g., 26]. Moreover, humans may be deterred by the belief that activities in virtual worlds are meaningless. However, it has been argued in philosophy that "there's no good reason to think that life in virtual reality will lack meaning and value. Nor is there reason to think its values will be limited to entertainment." [35, p.312] Therefore, if there are values in a virtual world it should be also possible to find virtual ikigai taishō activities linked to these values.[8]

To sum up, it has to be again highlighted that AI-driven virtual hyper-personalised ikigais are neither dystopian nor meaningless, but an opportunity. i-risks are a serious albeit neglected issue considering developments in AI and other emerging technologies. All efforts to tackle i-risks are important and cannot be dystopian. In fact, the opposite, i.e., to continue to disregard i-risks, would be dystopian.

Therefore, this paper aims to conceptualize approaches that make life worth living in times of advanced or transformative AI. It is envisioned that humans will have an online dashboard or platform where they are presented with AI-driven hyper-personalised virtual ikigai taishō activities, in which they can indulge as they wish.

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