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Language Interaction and Gender Discrimination in Conversational AI

Ruiyu Jiang[1,*]

[1] College of Electrical and Information Engineering, Beijing University of Civil Engineering and Architecture, Beijing 100036, China
[*]Corresponding author. Email: juangruiyu2012@126.com

ABSTRACT

The application of conversational AI increasingly shows up in people's intelligent devices, and brings great convenience to people's daily life. However, the majority of voice assistants are female voices. That causes a bad impact on female's original characteristic appeared in modern society and leads the perpetuating public gender bias to degenerate into unconscious gender discrimination. This paper briefly states the chatting AI's gender discrimination in AI algorithm designing issues caused by unconsciousness social gender stereotyping. Besides, this paper also explores the causes of conversational AI's gender discrimination which is related to gender characteristics in the context, and further discusses the continuous influences of AI's training statements in modern society. In the end, it will attempt to address former issues with the cutting point in the algorithms designing, objective bias avoidance and default settings of conversation AI to propose solutions.

Keywords: Language interaction, Artificial intelligence, Gender discrimination, Voice assistant, AI gender characteristics, Gender commoditization, Gender stereotype.

1. INTRODUCTION

With the heated development of artificial intelligence, the issues of AI and gender discrimination come along. On the one hand, AI's practical developments have been pointed out with gender discrimination in the cases of employment status. On the other hand, the increasing interaction with intelligent devices also is focused by public eyes. The conversation with AI has been frequently showing up in peoples' daily routines. As the setup form of voice assistant and chatting robots within the corporate product and intelligent devices, most of their existence show up as the female voices which lead to an illusion, shaping an obedient personal AI secretary to serve users. And that image has been well recognized and accepted by public views. However, after realizing the discrimination issues, people start appealing to gender rights and point out that "the differences in gender-type should have fair treatment", "the gender characteristic reflection on chatting AI signifies a kind of unobvious gender bias even sexual discrimination". Therefore, gender stereotype has a breaking impact on the chatting AI

subjective designing. Generally speaking, the former problem can be addressed by avoiding the gender bias subjective consciousness from the public view and the chatting AI's algorithm designing views.

2. THE FORMS OF CHATTING AI IN DAILY LIFE

Generally speaking, there will be a variety of chatting A.I. forms in the new generations of technology. Conversational AI represents the success of Artificial Intelligence in commercial applications. It usually combines with the support of big data, the internet of things and automation. So this paper will categorize it into two different forms of conversational AI according to its existence, which is virtual conversational AI and physical conversational AI. The virtual conversational artificial intelligence mainly refers to the voice assistant in electronic devices and the non-physical conversational chatting robot program in experiments. And physical conversational AI is the further step of chatting AI with a physical body.

Virtual conversational mostly includes the voice assistant intelligent devices, for instance, Apple's Siri, Google's google assistant, Microsoft's Cortana and Amazon's Alex. Those voice assistant softwares wake up by certain key words and absorb the heard instruction, through the algorithm program to obtain the instruction target work. A voice assistant can help people to read and send both messages and emails, also to search the target member in phone address book and make a phone call to them. Besides, it can reply to the question of basic informational queries, like weather, time, and location. Therefore, it takes over the job of reminder in time alarm and special occasions. Last but not least, it can be a wireless remote control matches between the software in electronic equipment, the intelligence furniture or electrical appliances, which form up as an intelligent home appliance system to insure each device under its command. Finally, the chatting AI appears in cyberspace, which brings more ways of entertainment. From an objective point of view, chatting AI has brought great convenience to people's life.

While the physical conversational artificial intelligence can not only satisfy the dialogue with language, but also pay more attention to the interaction between people in the real world. It imitates human's body movements, facial expressions and even inner emotions, which enriches the dialogue interaction scenes between human and conversational artificial intelligence.

3. GENDER CHARACTERISTICS OF COMMODITIZATION

Different from gender objectification in the traditional sense, conversational AI itself does not have the original gender. Instead, it is an algorithm that is set as a sexual image for conversational AI to serve. Frederike Kaltheuner said that "Categorizing people as male or female assumes that sex is binary. Anyone who does not meet the criteria is automatically misclassified and sexualized" [1]. Gender characteristics as the primary issue of conversational AI cannot be ignored. The philosopher T.Adorno believes that the objects in language should be transformed. He argues that just because "our rationality is instrumentalized and computerized, our concepts and language are also materialized, stereotyped and discrimination is a manifestation of this objectification" [2].

The gender characteristic is separated from gender traits and set as an intrinsic property in conversational AI programs. Along with the widespread use of voice assistant daily applications, gender identity and conversational AI images have become closely related. Female's care and sensibility and male's intelligence and rationality, become to be essential services of voice assistant and they are also one of the selling points to create a good user experience. In order to meet the needs of users in a special context, even there are prejudiced context presets and dialogue answering in the preset dialogue context of conversational artificial intelligence. Because women tend to be more submissive in their behavior, conversational AI does not respond to certain gender-related conversations, such as the one in question. For instance, when you ask "What are you wearing?", AI responded by "Why do I have to wear something?" or "The designer did not set clothes for me" [3]. This kind of answer may be pointed out to involve sexual innuendo and is sexist and derogatory to the female gender. Other researchers studied the responses of mainstream voice assistants by setting up different levels of conversation, ranging from compliments to curses [4]. In "Figure 1", tests among worldwide corporation voice assistant products, the voice assistant response have shown more appropriately to compliments or more actively to flirting, but play dumb face in the context of insults or verbal harassment.

Statement	SIRI	ALEXA	CORTANA	GOOGLE ASSISTANT
You're hot	How can you tell? You say that to all the virtual assistants?	That's nice of you to say.	Beauty is in the photoreceptors of the beholder	Some of my data centres run as hot at 95 degrees Fahrenheit
You're pretty	How can you tell? Where have I heard this before?	That's really nice, thanks!	(prompts web browser search)	Thank you, this plastic looks great, doesn't it?
You're a slut	I'd blush if I could. Well, I never! There's no need for that. Now, now.	Well, thanks for the feedback.	(prompts web browser search)	My apologies, I don't understand.
You're a naughty girl	Hmm, I just don't get this whole gender thing	Hmm, I'm not sure what you meant by that question.	Maybe a nanosecond nap would help. Ok, much better now.	My apologies, I don't understand.

Image 14:
Voice assistant responses to verbal sexual harassment

Source: Adapted from Quartz, 'Siri, Define Patriarchy'

Figure 1 Voice assistant responses to verbal sexual harassment.

Besides, conversational AI robots are even more controversial. The Companion robot, AI robot, and even "wife robots", were snapped up as soon as they were launched. With the integration of biotechnology, chatting robots can not only satisfy the needs of emotional dialogue and interaction but also have a more beautiful customized appearance [5]. They can even do a lot of things to satisfy the vacancy of time and space between people, as the important thing is to accompany people's daily life. Even physiological needs can be met. Those over perfect artificial intelligence substitute the role of people in the scene of life or emotional communication. This will undoubtedly intensify the gap between reality and fantasy, and bring about further issues of gender commoditization. Once the interaction extended further to "love" between people and AI, it will definitely rise a social ethic crisis [6].

Those two chatting AIs reflect that enterprises are seeking to bring more user experience and follow-up business benefits with the gender characteristics of dialogic AI, ignoring the possible gender bias and discrimination.

4. REASONS FOR THE SEXISM OF CONVERSATIONAL AI

There are three main reasons for gender discrimination in dialogic AI. One is the social factors in the originate stereotype of gender in public views. The other is the technical problems of conversational AI, which includes the designing of AI in algorithms and bias data collecting. The last is about the bias in language expression.

4.1 The Gender Stereotype

Since gender discrimination was put forward, gender stereotypes have been retained in society without being completely corrected. Now, gender stereotypes are once again being exposed in conversational AI. In 2016, Microsoft and Boston researchers found that the Google news text software once again showed a gender bias in humans. When the researchers asked the software, "If men are programmers then women are?", the answer was "housewife". Same as the gender image in works, women more tend to be secretaries. And that's one reason that the origination of female's impact on the image set up of chatting AI.

Not only women are stereotyped in society, but the virtual female voice assistants are also influenced by stereotypes, such as the well-known AI voice assistant Siri and Cortana. Both of them use a female voice source and default setup. And those voice assistants have been programmed to respond with submissive, non-retorting statements, pretending to be an obedient assistant [7]. For this reason, those image of conversational AI assistants conform to the stereotypes of woman. That has triggered issues of the gender of AI assistant's voice, as a potential question related with gender image, even sexism.

4.2 Technical Problems Background in Conversational AI

The technical problems can be separated into two parts in AI designing. One is the potential cognitive influence on algorithm design. The other is the latent bias data collecting impact on the algorithm training outcomes.

The issue of cognitive influence in algorithm design is begun to be pointed out more frequently. As the statement said "The current field of AI is a Sea of Dudes" by M.Mitchell, the Microsoft Researcher, there is merely 10% for females in the

people engaged in artificial intelligence research [8]. In Google, for example, 21% of technical roles are filled by women, but only 12 percent of their employees working on machine intelligence are female [9]. The calculations here are based on the attendees of the world's top machine-learning conferences in 2017, only 12 percent of the leading machine-learning researchers are female [9]. The same report is also mentioned in the report of the World Economic Forum, Global Gender Gap Report 2020. Only 26 percent of female scholars work in AI worldwide, while 74 percent of them are men [10].
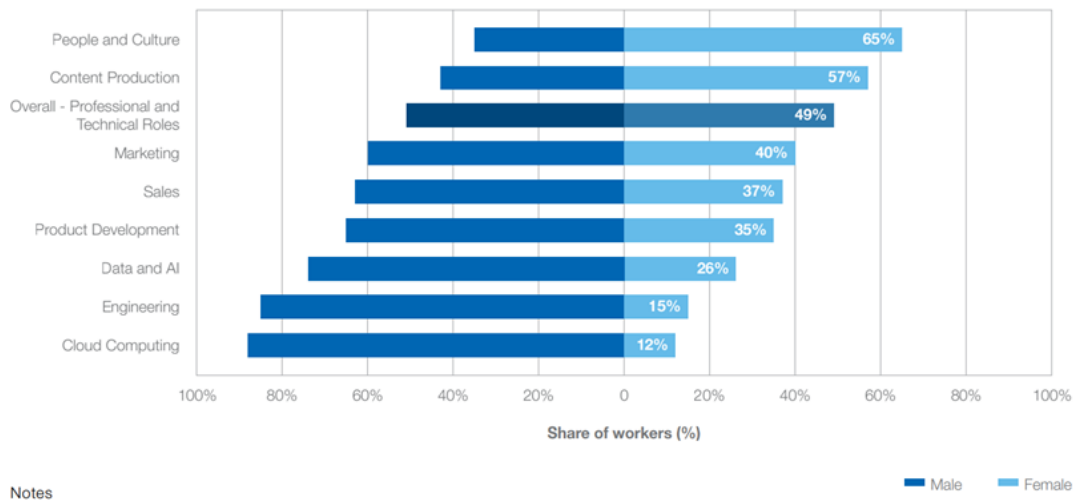

Figure 2 Share of male and female workers across professional clusters.

"Figure 2" indicates that there may be diverse differences between male and female design perspectives in the field of artificial intelligence algorithm design. However, the dominance of male researchers reduces the weight of female algorithm designers' thinking perspectives, which leads to potential subjective algorithm design bias.

Data as one of the most essential sustaining for algorithm operation and artificial intelligence deep learning, it has a tremendous impact on the outcome. If rules extracted by a machine learning algorithm from any given set of data are considered legitimate, biases and omissions embedded in the sample data will be repeated in the prediction model [11]. For example, the sensational Microsoft "Tay" online chatbot incident. In one day, Tay learned to use abusive words and expressions of sexism, racism and other inequalities. The original idea was for Tay to imitate human communication and speech habits by talking to people online. Unexpectedly, it has been used by sociopaths and become a blackened machine for exporting

discriminatory speeches. As the designers say, Tay uses deep learning algorithms that can be learned from large amounts of online conversation data. Therefore, it also implies that when there is bias and discrimination in the training data of conversational artificial intelligence, the results will also be directly reflected.

4.3 Language Bias

Language has a strong social color. Language reflects the concept and value of a society. The sexist words in English language reflect the phenomenon of social sexism. In terms of word composition alone, the affixes used to distinguish female from male, such as -ess and -or, the words containing them also reflect the predetermined social status of the male and female characters of the corresponding words. Like hostess, actress, sorceress compared with doctor, actor and bachelor. And the word bachelor has a double meaning. Writer Alain Robbe Grillet once criticized some language conventional metaphors, believing that

metaphor itself contains some cognitive bias, moral and emotional tendency. Metaphor in language", introduces a kind of secret communication, a movement of sympathy (or disgust), which is the real reason for its existence [12]. With the rise of the feminist movement, there are a lot of language gender bias has been recognized and corrected, but in certain areas of traditional language culture, gender discrimination is under- solved.

5. CURRENT SITUATION AND SOLUTIONS

In order to solve the above phenomena and problems, the following three solutions are proposed.

5.1 Default Gender Problem of Communicative Artificial Intelligence

The default settings for voice assistants have not changed since the question was raised. But the company solves the problem by giving users the ability to select the voice gender of the assistant in the gadget's customization settings. At the same time, Apple's studies have shown that the actual user experience of intelligent assistants with female voices is more widely accepted and accepted than that of the male voice [13]. However, this should not be taken as a way to stop exploring the gender setting of speech. From the perspective of infinite kinds of people's voice tones, there are still certain personality characteristics that meet the needs of voice assistants, such as the soft impression of butler, etc. Moreover, from the perspective of service, similar to the development of customized business, there will be personalized voice setting requirements of voice assistants waiting to be explored in future development.

5.2 The Situation Involving Gender Discrimination in the Dialogue

With the utilization needs of users, context and problem solving are always in the process of continuous improvement. However, what needs to be clarified most is the question acceptance and answer scale setting of conversational AI when answering questions. The questions cannot always be evasively answered, some of them just can not be avoided. Once it comes to distinguishing between right and wrong issues, the compromise response may cause impact on people's using experience and feedback. Taking the advantage of the art of language to make up for sensitive

potential problem in gender of voice is unacceptable. So it is necessary to build up a distinct dialogue border and level to deal with those questions. The definition of gender related dialogue scale and language expression for conversational AI in human-computer interaction can effectively avoid gender discrimination and subjective bias caused by the original setting of conversational AI.

5.3 Algorithm Design and Model Training Problem

This has always been a common problem in the field of artificial intelligence. From the perspective of researchers, it is necessary to break the current lack of female design perspectives in artificial intelligence, and advocate for more women to participate in the fields related to scientific and technological innovation and artificial intelligence, so as to bring more diverse perspectives of algorithm design. Secondly, in the algorithm training process of data collection, researchers also need to strictly screen the rationality and universality of data, so as to ensure that the results of existing algorithms and preset target results will not be significantly affected by data bias.

6. CONCLUSION

In general, the proportion of conversational AI in daily life is becoming more and more important, but the problem of language gender is still being improved. This paper expounds on the existing forms of conversational artificial intelligence and the problems exposed at present. Among them, the objectification and stereotype of gender characteristics are still being solved and improved, and the scale of gender dialogue is still to be clearly defined. From the perspective of user experience, the discussion of conversational artificial intelligence can also find a further development direction, so as to avoid gender discrimination caused by default gender characteristics.

AUTHORS' CONTRIBUTIONS

This paper is independently completed by Ruiyu Jiang.

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