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A Study on whether Artificial Intelligence can have Artificial Emotions

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Abstract

This paper discusses the feasibility and potential risks of artificial emotions. It is an era of worrying about the overtaking of artificial intelligence from a cognitive point of view, which is considered to be a human domain, and people are now trying to find out human nature with emotion, not reason. Recently, the task of infusing emotions into artificial intelligence robots is emerging as a new topic. First, let's take a look at the development of emotional robots and their main motivations, and why robots' emotions matter. In order to examine whether a robot possessing true emotions is possible, we do not define emotions a priori, but introduce some important roles that emotions play and propose criteria for giving emotions to certain objects. Against these criteria, true emotional robots are unlikely to become a reality in the near future. However, even before robots possessing emotions appear, unilateral emotional communication with robots with a certain degree of autonomy is potentially dangerous, and it is thought that it is good to prepare for it.

Keywords
artificial intelligence, AI, deep learning, artificial emotion and emotion

1. Introduction

While it is essential to predict the social, economic, cultural, and security changes that will result from the widespread application of artificial intelligence and to prepare for these changes at the institutional and policy level, the philosophical challenge of artificial intelligence is directed toward human existence and its meaning. (Boden 1990) (Frankish and Ramsey 2014) Artificial intelligence is an arousing object that triggers human self-reflection. The history of development of calculators and automata is not short, but it was not so threatening as to make us reconsider the nature of human nature until the concept of artificial intelligence appeared in the middle of the 20th century. (Minsky 1986) On the other hand, it is an effort to better understand the identity of human intelligence or rational ability. So, the field of research called artificial intelligence has a dual nature. As part of computer science, it is also a field that explores and manufactures machines that produce intelligent behavior or the software that drives them, but at the same time, it is part of cognitive science that scientifically explores the mind, studying the structure and operation of the human mind. Includes computational modeling to characterize According to a well-known textbook in the field of artificial intelligence (Russell and Norvig 2015), the goal of artificial intelligence is, on the one hand, to implement machine intelligence that resembles human intelligence, and on the other hand, to study a form of intelligence that can be incorporated into artifacts. By doing so, it is to understand intelligence in general and human intelligence.

The way people view intelligence is changing. First, after encountering AlphaGo, many people do not bother to ask if it is really “artificial intelligence”. People have no qualms about adding “artificial intelligence” as a modifier to not only AlphaGo and Watson, but other information technologies. Phrases like “Siri, the artificially intelligent assistant” and “a refrigerator with artificial intelligence” are fast becoming commonplace. This is because, in a situation where

humans have been defeated in an "intellectual" confrontation with machines, the question "wouldn't the machine still understand the meaning?" became difficult. Second, if we can call artificial intelligence machines that successfully perform cognitive tasks regardless of whether they understand meaning, then meaning or understanding are no longer intrinsic to "intelligence." (Kuhn 1957) The richness of meaning inherent in human intelligence is gradually diminishing. Factors other than ability to perform tasks that measure how efficiently a person can produce results are seen as secondary. Third, existing AIs perform only a limited number of tasks. If artificial intelligence is also intelligence, intelligence is not a single ability, but a totality of various detailed abilities that are intertwined and interact with each other. Of course, human intelligence is flexible and general, and in that respect it differs from existing artificial intelligence. Figure 1 shows the history of artificial intelligence (Figure 1).

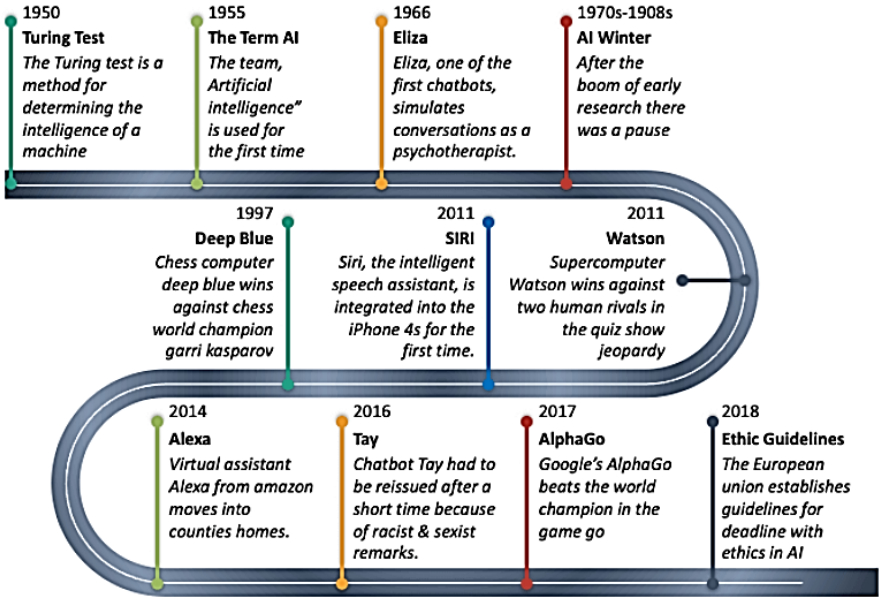

Figure 1. History of Artificial Intelligence

2. Body

2.1 About Artificial Appraisal

Let's consider whether artificial emotions could be realized in the near future by looking at research directions towards the creation of social or emotional robots. Emotional systems designed by roboticists often consist of three parts: emotion recognition, emotion generation, and emotion expression. (An and Chio 2007).

1. Emotion Recognition: Visual recognition of facial expressions and gestures such as lips, eyebrow shape, and frown, and voice recognition according to voice tempo, intonation, and intensity. Some robots, such as pet robots, use tactile information (stroking, Hitting, hugging, etc.) to understand the user's emotions. Pepper, developed by Softbank in 2015, recognizes emotions by observing a person's face, and Emotient, a face recognition company acquired by Apple in January 2016, reads even minute facial expressions through Google Glass, and through this, it can detect human emotions. It is known to have the ability to read the type and intensity. (Lee 2008).
2. Emotional expression: We make facial expressions, gestures, and even react with our voices. Kobian, a robot from Waseda University, uses his entire body to express comedian-like actions, such as a surprised voice and funny gestures. On the day of the announcement, Pepper used various gestures while interacting with Chairman Son Jeong-eun at the presentation room. However, it is known that it is not a reaction to a given environment without notice, but a recorded expression pattern.
3. Emotion generation: Many emotion robots do not simply follow a behaviorist approach, but try to equip robots with emotion models that reflect the achievements of psychology and neuroscience. It not only recognizes the emotional expression of others, but also creates an emotional model based on the expression of others or the surrounding situation, and expresses it with facial expressions, gestures, and voices based on this. In other words,

emotions are created by referring to the input and the current state of the robot, and sometimes motives or personalities are taken into account. (Park and Ry 2008)

Developed at the MIT Artificial Intelligence Lab, Kismet expresses nine emotions in a three-dimensional emotion space (arousal, valence, and stance). For example, anger is an emotion that has a high level of arousal, is negative, and moves toward the object that causes the emotion. Kismet expressed emotions with 15 degrees of freedom, and its successor robot, Leonardo, has 64 degrees of freedom. (Lee and Park 2014)

If we look closely at the key roles that emotions play, we can see that there are prerequisites for these roles to be necessary and possible. First, since emotions involve evaluations of the value and importance of given stimuli, one must have a basic or proto-self model of oneself. I am not saying that robots have to have the same ego or self-consciousness that humans do. It means that you have to be able to assess whether something is helping or harming you "for yourself." Insects as well as mammals and reptiles avoid harmful stimuli and seek beneficial stimuli. Insects cannot be seen as having a self-concept or self-consciousness, but they can be seen as having a primitive self-model. In this regard, it is assumed that individuals with emotions have basic drives or needs. Animals have instincts such as thirst, hunger, and fatigue, and without these instincts, there is no emotion. Second, the various functional roles of emotions discussed above presuppose that individuals with emotions have a considerable level of sensory ability and general intelligence. Emotion is impossible without the ability to perceive stimuli from the environment and combine the information obtained from them with information about states within the individual. It is worth remembering that emotions appear in intelligent animals, and the more intelligent they tend to be, the more expressive they are. Intelligence and emotions are two subsystems that interact within a cognitive structure. Therefore, in order to have the same emotions that humans (or companion animals) have in order to socially interact with humans, robots must have general intelligence beyond humans or higher animals, have bodies similar to those of living things, and must have a body that living things commonly face must be able to adapt to complex and unpredictable environments. There is still a long way to go to artificial intelligence with general intelligence that can act adaptively in complex environments. It is difficult to realistically implement a true emotional robot. (Kim 2016).

Another reason why artificial emotions are not realistic can be found in that the trajectory of technological development is determined only within the social context. Not all technologies that are possible in principle can be realized. Judgments about the feasibility of technology are not simply descriptive. It is also prescriptive. Even if the technology is sufficiently feasible, the technology will not be developed unless there is sufficient demand in the market, strong socio-cultural resistance to the technology, or sufficient persuasiveness to those who have an interest in the technology. Technological development is not determined by the logic of the technology itself. (Pinch and Bijker 1987) (Noble 1984) (Winner 1986/2010) So we have to ask whether we want truly artificial emotions.

There may be exaggerated reasons why people want emotional robots, or there may not be really good reasons to build robots with real emotions.

First, just because robots have emotions on their own doesn't guarantee that future robots will be safer. Second, it is questionable whether a robot possessing true emotions meets the purpose of making robots in the first place. Third, if it is impractical to imbue a robot with the rich emotions experienced by humans, then we are faced with a difficult choice. This is because some emotions will be allowed to the robot and some emotions will have to be suppressed.
In short, since it is difficult for robots to satisfy the preconditions for having emotions, it will be difficult for artificial emotions to become a reality in the near future, and even if it is technically possible, there are many questions about whether humans want robots with real emotions. Therefore, it seems unlikely that artificial emotions will be realized in the near future.

2.2 Prepare for the Dangers of One-Sided Emotional Communication

Let's look at an experiment that shows how robots capable of expressing emotions can affect human behavior. In one study, which teamed with a robot to perform a task, the robot did not judge autonomously and obeyed human commands. In one condition ("emotional" condition), the robot expressed urgency or sensed human stress and responded accordingly, while in the other condition ("non-emotional" condition), the robot's sound was not changed. Participants in the experiment only participated in one of the two conditions, and the research team compared the behavior of those who participated in the two conditions. As a result, the task performance ability of the team that allowed the robot to express emotions through sound was higher in terms of objective indicators than the team that did not. In addition, those who participated in the emotion condition had a higher liking for the robot compared to before the experiment, and a little more thought that the robot should have emotions (Scheutz et al. 2007).

This phenomenon of unconsciously endowing social robots with emotions while easily personifying them can be called the phenomenon of emotional dequotation. Because in people's explicit belief systems, robots' "feelings" are in quotation marks, but in actual behavior those quotation marks are easily lost. This allows people to have a one-way emotional bond with the robot. Even though the other person doesn't really have emotions, we personify them and treat them as if they had emotions, so many problems can arise.

If you ask people whether robots are conscious, if they are persons or animals, or if they can be viewed as moral agents, most will give a negative answer. The dequotation mark phenomenon tells us that people's behavior is deeply influenced on an unconscious level. Humans are social animals, and social interactions with others are hardwired into our genes. When we encounter a phenomenon that simply cannot be physically explained, we tend to automatically infer about the mental state, beliefs, desires, and intentions of the object. In particular, in the case of infants, the range of subjects to which such an attitude is applied is wide.

McCarthy (1995) pointed out the potential dangers of producing human-like robots. Human society is already complex enough to introduce robots with emotions. Even so, it is neither possible nor desirable to claim that the research and development of emotional robots should be completely stopped. A sweeping moratorium would help solve some of the problems mentioned above, but stopping research on social robots while researching other artificial intelligence and robotic technologies is not realistic.

If we can really make robots feel and feel like humans, at least we won't be manipulated by robots in any way other than being manipulated by other humans. Of course, that doesn't mean we won't be deceived at all. People cheat and deceive each other and take advantage of each other. But if robots had real feelings, we might not be fooled by them the way humans fool other humans. However, it is practically difficult to produce truly artificial emotions.

We are well aware of the fact that Asimov's three laws are difficult to implement in practice (Ko 2011). Avoiding such difficulties, consider whether we can prepare a certain device in robots to prevent us from being deceived by emotional robots due to the characteristic of one-way emotional communication.

3. Conclusion

Due to the rich emotions that humans experience, we live a human life. However, artificial emotions or emotional robots are not a logical contradiction. It would not be necessary to fundamentally rule out the possibility that artificial objects such as robots could one day have not only intelligence but also emotions. If an artifact with intelligence at or beyond human intelligence could have some kind of mental state, the discussion of the possibility that it might even possess emotions would not be just nonsense. However, in order to determine that an object possesses emotions, difficult conditions must be met. Only actors who can act adaptively by evaluating the value of stimuli given to them in a complex and sometimes hostile environment for their survival and homeostasis can be said to have the basic conditions for possessing emotions.

In order for artificial intelligence to evolve into a being with real emotions beyond merely recognizing and mimicking human emotional expressions, it may have to possess a body like an organism. I'm not sure we want such AI. Before discussing true artificial emotions that may occur in the future, it is necessary to anticipate and prepare for potential risks that one-sided emotional sympathy with emotional robots may bring.

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