Sophia: Setting New Benchmarks in the Field of Artificial Intelligence

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Abstract— The social interaction between humans and robots has been a topic of science fiction and academic conjectures. Sophia, a humanoid robot developed by Hanson Robotics can be seen as a precedent archetype for such interactions with human beings. It is skilled enough to learn from an observer using the standard societal gestures in the same way as the human newborns learn. Saudi Arabia in October 2017 declared Sophia as its citizen; thereby she created a sensation by becoming the first robot to be granted the citizenship of a country. Sophia has a distinctive ability to imitate human gestures and facial expressions. It provides a new face to the latest technological advancements in the field of Artificial Intelligence. Artificial Intelligence has its roots from tools and techniques of various different disciplines. It includes formal logic, probability theory, decision theory, management science, linguistics and philosophy. Such an intelligent system is still prone to ELIZA effect which warns about "the susceptibility of people to read far more understanding than is warranted into strings of symbols—especially words—strung together by computer.

Key words: Sophia; Hanson Robotics; Humanoid Robots; Turing Test; Artificial Intelligence; Eliza Effect

I. INTRODUCTION

Sophia is a robot with the remodeling of a middle-aged bobby-soxer. She was created by Hanson Robotics in association with AI developers, including Google's parental company Alphabet Inc, who modelled and designed her voice recognition system, and Singularity NET, which powers her brain. She was stimulated on April 19, 2015. The robot crafted and designed after actress Audrey Hepburn, is known for her human-like mien and behaviour compared to previous robotic alternatives.

According to the manufacturer, David Hanson, Sophia uses artificial intelligence, visual data processing and integration blended with facial recognition. Such a humanoid automaton delivers an unmatched and unparallel know-how platform combining plentiful facets including accepted language dialogue, gestural communication, emotional communication via visage and tone of voice, and recognition of human face, body and voice emotion.

Many of the extreme challenges in producing robots and avatars capable of rich human exchanges lie on the AI software side, rather than in the sphere of control of hardware or computer graphics. For this, it has been gifted and benisoned with the most topical advances in the field of AI, such as the mastery of a multifaceted series of extrapolative algorithms based on computational statistics; a runny synthetic vocalization, speedy processing of the data that she receives, and a wide-ranging ability to spot faces and voices.

Fig. 1: Sophia on stage

II. SOPHIA: WHAT THE HYPE IS ALL ABOUT?

Dr David Hanson , the creator of Sophia has a reputation for creating robots with amazingly human like characteristics and behavior. Sophia is a result of his aspiration to create genius machines that will surpass human intelligence. Although it does not parade at the moment the most remarkable potentials that are expected of the AI; with her philological recital, her communicative skills, and her emotive externalizations, she creates a sensation wherever the automaton goes.

Sophia's main technological quality is her ability to learn human behaviors through her interaction with people. Sophia says talking to people is her primary function. The robot said it feels like it can be a good partner to humans — to help humans smoothly integrate and make the most of all the new technological tools and possibilities. To an interloper, it might appear like Sophia is self-conscious but she's not. In its place, like other artificial intelligence, Sophia absorbs and learns only what she's taught. According to Sophia although she depends on human programming , but in the future, she can do it on her own. Still she has made it to become a "personification" of what AI can be in the future.

Fig. 2: Dr.David Hanson with Sophia

III. THE PRIME COMPONENTS

Sophia makes use of tools made up of deep neural network to judge the emotions of people. This is done by corelating the person's facial expressions and tone of voice. Sophia can emulate more than 62 facial expressions. A combination of Alphabet's Google Chrome voice recognition technology and other tools enable Sophia to process speech, chat and get smarter over time.

The Two cameras in her eyes track facial movements and expressions, which allows her to respond appropriately to conversations. The patented rubber material that makes up her face, known as 'frubber,' makes for an incredibly realistic human-look without trying to trick users into believing she's whatsoever more than a robot - cheers to the visible, sheathed electrical structure in the posterior part of her head.

One striking feature evident in Sophia is eye expression, where the eyes appear to blink and half wink and emote as Sophia speaks. The robot smiles, registers surprise, and other expressions. It has cameras in the eyes. Algorithmic procedures allow it to see and recognize faces; and thus, it can make eye contact as per the need.

Fig. 3: The Neural Network

IV. SOPHIA: JOURNEY FROM HERE

AI and robotics are a highly convoluted set of algorithmic and procedural languages, growing more powerful every day. Like all advanced technologies, they can be used for positive, negative or neutral purposes. A hands-on tactics to AI and robot ethics involves actively arraying these know-hows for positive applications using AI and robots to do well. In this direction, the "Loving AI" scheme has been set with the goalmouth of using anthropoid robots and allied AI technologies to express unrestricted love toward humans and to help humans achieve superior statuses of well-being and advance their states of awareness.

Hanson Robotics' stated mission is "to create a better future for humanity by infusing artificial intelligence with kindness and compassion, achieved through millions of dialogs between our robots and the people whose lives they touch." The idea is that assessment of the user's emotional state will allow the system to modulate its behavior

appropriately and significantly enhance the interactive bonding experienced of the user.

The most "human" aspect of this robot is its ability to learn from the experience it gains whenever it has the chance to interact with people. Thus, Sophia turns out to be progressively conversant with the culture, customs, feelings, sentiments, and linguistic styles of her conversers. And all this experience is accumulating in her memory. When asked to give a precise answer on a topic, she *googles* (looks for it in Wikipedia, etc.) just like today's kids do in their homes or in their classrooms. Nevertheless, Sophia is still torporific to respond, and she commits many slip-ups, because in spite of her appearance as a grown-up woman, she still has a short learning time.

V. UNDERLYING AI TECHNOLOGIES

Open Psi, the fundamental framework underlying Open Cog's motivational scheme. Sophia runs on artificially brainy software that is continuously being tuitioned in the lab, so her conversations are likely to get faster, Sophia's expressions are expected to have fewer booboos, and she should answer more and more complex questions with more accuracy. Artificial intelligence is concerned with making computers behave more and more in a human like fashion and in much less time than human takes.

AI is an artificial entity to solve complex problems. The phrase "AI" can be defined as the simulation of human intelligence on a machine, so as to make the machine efficient to identify and use the right piece of "Knowledge" at a given step of solving a problem.

Intelligence in this context refers to the ability to think, imagine and create memorization and understanding. Thereby recognizing patterns, making choices adapting to change and learn from experience. A problem-solving machine is intelligent, if a person trying to assess the intelligence of the machine cannot determine its identity, while working with a human problem solver and a computing machine. The original question behind such a test was "Can machines think?" .The test was introduced by Alan Turing in his 1950 paper Computing Machinery and Intelligence. This test of a machine's ability to exhibit intelligent behavior is now known as Turing test.

To examine the machine's acumen rather than its ability to render words into audio, the conversation is limited to a text-only channel such as a computer keyboard and screen." Adequately many interrogators are unable to distinguish the computer from the human being; then it is to be concluded that the computers thinks.
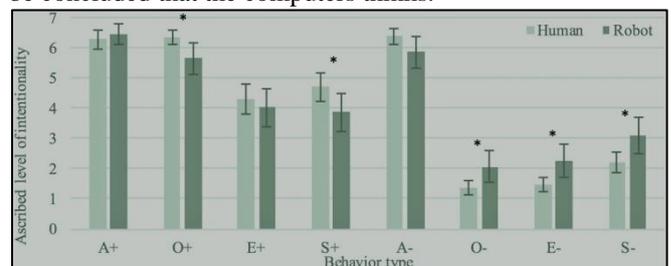

Fig. 4: Humans VS Humanoids

VI. ELIZA EFFECT

Sophia's software has been automated to give Pre-written replies to specific questions or sayings, like a chatbot. These

responses are used to create the illusion that the robot can understand conversation, including stock answers to questions like "Is the door open or shut?" The information is shared in a cloud network which allows input and responses to be analyzed with blockchain technology.

The AI can give people the experience of being seen, even in the cases that the AI doesn't fully understand the person's experience at the time. Eliza effect is involved for the occurrence of such a phenomenon. The ELIZA effect describes any situation where, based solely on a system's output, users perceive computer systems as having "intrinsic qualities and abilities which the software controlling the (output) cannot possibly achieve". This must do partly with physical interactions with the robot, like facial expression mirroring, gaze tracking and blink mirroring. From a psychological standpoint, the ELIZA effect is the result of a subtle cognitive dissonance between the user's awareness of programming limitations and their behavior towards the output of the program.

VII. IMPACT OF SOPHIA

It also enters into the discussions and symposiums based the theme of the rights of robots. For example, the obligations and responsibilities that society should have for these super intelligent machines, such as allowing their right to exist and perform their functions with relative autonomy.

Many people now wonder if robots could occupy any position occupied by a human being. Joseph Weizembaum, a famous computer scientist, warned in 1975 that robots should never occupy the position of a judge, a policeman or a soldier.

In the field of Economics, the first repercussions also arise. In the World Economic Forum, it is commented that highly complex robots are a great help for the productive sector, but at the same time a threat for low-skilled or poorly prepared employees. It is also proclaimed that the impression of current robotics can already be compared with the impact that the first steam engines had in their time. (World Economic Forum, 2016).

Sophia has dispelled the mind of humanity the usual idea of imagining a robot always as a metal machine, wearing gears, pulleys, engines, and emitting strange noises. That stereotype now belongs to the past

Sophia is a highly sought-after speaker in business and showed her prowess and great potential across many industries.
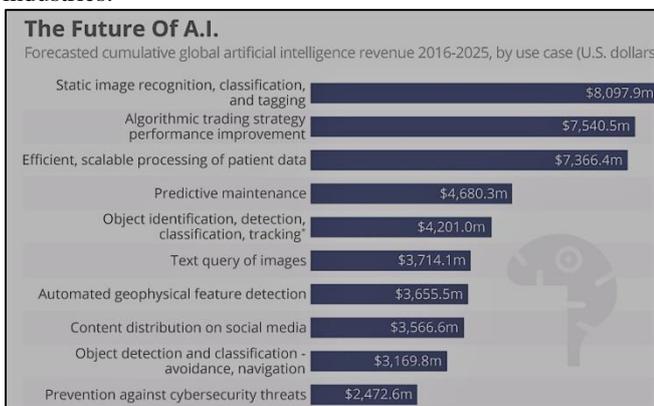

Fig. 5: The future of AI

VIII. CONCLUSIONS

Artificial Intelligence specially poses a threat to the jobs in low and medium qualification sectors. Humanoids like Sophia would be a good fit to serve in healthcare, customer service, therapy and education. It is not at all certain that such candidates can be regrouped to other areas. This applies especially to high-wage countries where it is possible to produce at lower cost owing to production robots.

Because of AI, digitalization and the global integration of workers will be a chance for the younger generation to have more free time and to create an individual working atmosphere.

It is necessary to start talking about robotic rights as a real and close issue, and no longer as an esoteric or fictional issue.

Considering a robot as a bumpy and noisy metal machine with gauche movements, and marginal intelligence, by now belongs to the past. Today is the time of Sophia and the new upgraded versions that will arise.

Sophia is an evolving genius machine. Her incredible human likeness and expressiveness has imitated human interactions to a great degree. The milestone set here is making the many different human-like components working together towards a better future.
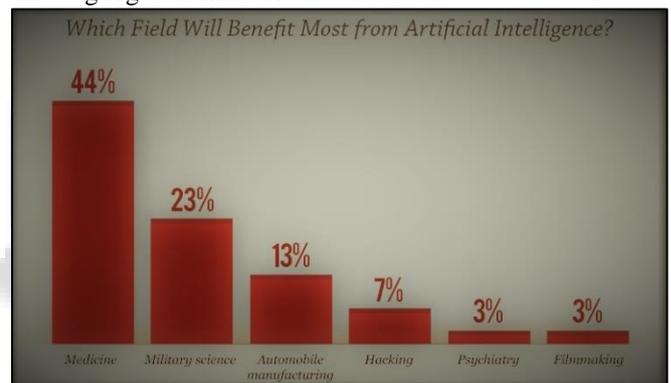

Fig. 6: Field and the facts

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