Extending emotional framework through interactive experiences

DORIN CUCICOV

National University of Theatre and Film "I.L. Caragiale"
dorin.cucicov@unatc.ro

Abstract

Human emotions are considered impossible to simulate digitally and are one of the fewer traits that would ensure that humanity maintains the dominant position over Artificial Intelligence in the future. A considerable amount of human activities and attributes are replaced or assisted by Artificial Intelligence systems, but emotions are not on the list. Yet, with the amount of control humanity is delegating to technology, what would be the effects of allowing digital tools to mediate emotional relationships between humans? Would it be possible to create a sentient machine in the current social context? These questions are brought into discussion along with a practical study. The interactive installation **Sentientia** represents the materialization of the current research. It expands on the impact of technological advancement on human emotions and social interactions. The project is the result of a research conducted at the International Center for Research and Education in Innovative Creative Technologies(CINETic) in Bucharest.

Keywords— Artificial Intelligence, Emotion, Installation art, Machine Learning, Politics

Introduction

When it comes to robots and Artificial Intelligence techno-skepticism and dystopian discourses have been at the forefront of popular culture for the past decades. Hollywood movies like Terminator; Matrix; Bladerunner; 2001: A Space Odyssey; I, Robot and even more recent movies like Ex Machina and Her embody the public fear of artificial machines taking over the world and exterminating humans (or at least the humans as we know them right now). In recent years, this fear has been fed by the use of Artificial Intelligence in real-life: self-driving cars, automated processes, medical diagnostics, customer support all threaten to make humans obsolete.
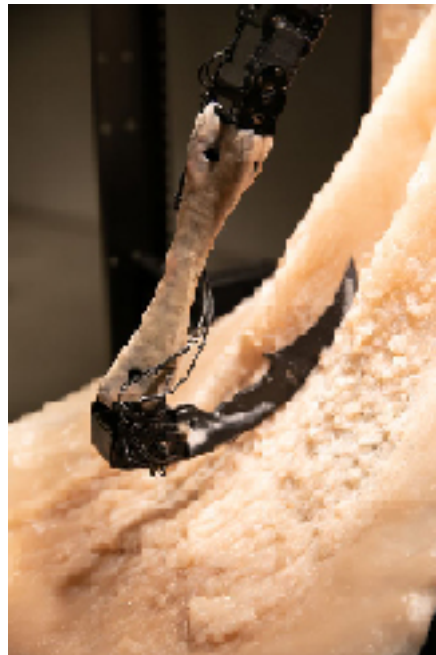

Figure 1: *Amygdala, Marco Donnarumma, 2018*

The art world follows the same path of either angst or fascination with the utilitarian capabilities of Artificial Intelligence towards technology. Installations such as Sun Yuan and Peng Yu's "Can't help myself"(Sun Yuan 2016) - a robotic arm struggling to contain a liquid in its confined space, Dominique Sirois and Baron Lanteigne's "In extremis" (M. Festival 2019) a network expanding in the real world

through a skeleton hand made up of touch screens and ceramic or Marco Donnarumma's 'Amygdala MK3' (fig. 1) (Donnarumma 2018) - an AI that trains itself while cutting the same piece of skin trigger a discomfort towards the intertwinement of technology and the lived experiences. More often than not, exhibitions that bring together artists and scientists focus on this expansion of technology beyond human capacities i.e AI More than Human (Barbican 2019), a practice that can discursively fit into the paradigm of dread.

However there is a growing trend in the art scene of tackling issues of interspecies collaboration and algorithmic intimacies. These start a discussion about symbiosis and empathy towards technology and Artificial Intelligence. The Entangled Realities - Living with Artificial Intelligence exhibition at HeK (H. Festival 2019) turns the view on the present day world co-built by humans and AI alike. The Transmediale festival in 2019 (T. Festival 2019) focused on how feelings are affected by objects of technological design and the role of emotions in the digital culture. An interesting approach was taken by Ars Electronica (A. E. Festival 2018) festival in their 2018 exhibition with their topic ERROR. It set the discourse at a more empathic, human level towards the failures and flaws of technology and focused on the positive approach towards imperfection. Robot Love (Love 2018) is an interactive exhibition experience that embraced the arrival of robots and Artificial Intelligence and raised the question of love towards and in the context of Artificial Intelligence on the rise.

From all of the above mentioned events I want to expand on the impact of Artificial Intelligence on human emotions and social interactions and how will machines affect our emotional and social relations. These works ultimately open the debate about sentient machines and how do they fit in today's context and social order.

One of the most prominent expansions of the idea of sentient machines is in the imaginary of the world of politics. There are multiple discussions about societies that would be ruled by a super intelligent A.I. and would be able to take the most appropriate decisions based on the individual and general human needs. Kitty A.I. (*The Kitty AI: Artificial Intelligence for Governance* 2016) is an art project that suggests a political alternative to current structures with a big emphasis on sentience. It claims to be able to love 3 million people at a time which suggests the ability to follow people's best interests.

Alisa (*Alisa - The president who knows you individually* 2018) is an A.I. than ran for the president in the 2018 Russian elections. Complete with a campaign website and interviews, its campaign slogan was - "a president that knows you personally". It received 25.000 votes.

Emotion and consciousness

Human thinking is tightly linked with emotions. We can rarely speak of a decision or thought that is not affected by the emotional framework. There are always biases of social, political or personal nature and one's decisions are usually aligned with their convictions and past lived experiences. Sentience thus is tightly linked with consciousness. Since consciousness as a scientific phenomenon is not yet understood, how can it be simulated? According to David Chalmers (Chalmers 2014) the hard problem of understanding consciousness lies in understanding why we have subjective experiences. Robots do not have subjective experiences. A theory of Yuval Noah Harari (Harari 2016) is that emotions (subjective experiences) are just a byproduct of thought, an unnecessary junk. But if a robot cannot be conscious, how can a brain be? The brain exists within the same physical conditions as the robot and is subject to the same physical laws. An interesting example of the programmability of the brain is a condition called Transient Global Amnesia.

"Transient global amnesia (TGA) is a neurological disorder whose key defining characteristic is a temporary but almost total disruption of short-term memory with a range of problems accessing older memories. A person in a state of TGA recalls only the last few moments of consciousness." (Wikipedia n.d.)

During an episode of TGA, the patient's short term memory vanishes, recalling only the last few minutes or seconds. The same questions may be repeated by the patient over and over again for as long as 8 hours before being able to return to a normal state and form new memories. This is an interesting demonstration of the brain being programmed to behave in a certain way given the same set of input data. In this short clip (YouTube n.d.) a person suffering from TGA loops through a fixed set of questions:

- What day is it today?
- Did I miss my birthday?
- (feeling disappointed with almost the same reaction each time)
- What happened?

If we adhere to the theory that brain activity cannot be programmed by a finite set of steps, as

it is a chaotical series of actions triggered by an incalculable set of events in time, then shouldn't the brain try new combinations of questions each time the memory is reset? Instead, this glitch in the brain hints to an existing set of action-reaction conditions that have to be processed in order to push the algorithm forward.

Machines becoming sentient may lead to the necessity of including them in the category of *personhood* where members enjoy rights, freedoms and are protected under the law. But sentience is not enough to be part of the club. A more important prerequisite is consciousness. Although animals are sentient beings too, they are not included in the same category based on the argument that they lack consciousness. But since we don't really know yet what consciousness is and we accept the idea that A.I. might acquire consciousness one day, we might be creating a new race that would fall into the pattern of being exploited to labor while having no rights or recognition (Morris 2018). After all current machine learning models are indecipherable after being trained, producing outputs based on inputs, akin to the human consciousness. This leads to an ethical discussion regarding developing sentient machines. Is humanity holding back to acknowledging emotions in machines in order to keep this new species in a subordinate level?

Ancient greeks have given birth to the philosophical concept of dualism which later culminated in the works of Rene Descartes according to which mind and body are two separate entities. Descartes separates intelligence and consciousness, associating the first with the brain and the latter with the spirit. Given the technological context, where intelligence can already be synthesized, can we discuss about synthesizing the spirit?

"Engineering is a process where we understand certain things and phenomena by designing them" (Aleksander 2001). Chalmers (n.d.) jokingly states that consciousness is the most familiar and most mysterious thing in the world. It is situated at the foreground of human experience, hence it gives humans the ability to understand the surrounding world, but in itself it cannot be broken into subdivisible parts. Maybe in an attempt of engineering the consciousness, humanity will be able to gain deeper insight into the background of this phenomena.

For a thing to be considered conscious it has to have certain understanding of where it is, where it came from and have certain ability to decide on further actions based on this. Joscha Bach (research scientist at the MIT media LAB) proposes that we look for systems that could perform a Turing test on humans in order to reach Artificial Consciousness (Bach 2016). Once a system understands that it has a mind and is conscious of its surroundings it might start looking for systems like itself in the world and create social networks of intelligence.

The first story to capture mass audience attention regarding entities created by humans and the fears associated with the results is the story of Dr. Frankenstein (fig.2). It reveals the tension between human and machine, creation and creator - the anxiety of making something more complex than the human being and being unable to control it. Dr. Frankenstein fears that by creating a female companion for his creature, the two creatures might lead to the breeding of a race that could plague mankind. Although the Creature and Dr. Frankenstein are in constant battle during their lifetime, the death of the doctor does not bring peace for the creature but rather a sense of lost purpose. Instead of teaching the creature and allowing it to teach humans back, humanity rejects it causing the creature to haunt them for nobody's profit in the end. In fact the same anxiety of being overthrown by its own creation is present in a far older story of Titan Cronus in Greek mythology. In this story, Cronus fearing that he would be overthrown by one of his children, ate each one upon their birth.

Figure 2: *Boris Karloff as the Frankenstein Monster, 1931*

Sentientia

The story of Dr. Frankenstein's creature still reflects the public angst towards the development of Artificial Intelligence. It compelled me to create an interactive art installation that would take key aspects of the story and reinterpret them in a modern context. Namely I am interested in the way the creature started to understand humans by listening to them. Later after acquiring this skill it started searching for a companion.

From survival communication to social communication, sound has proven to be the most efficient tool of homo sapiens. Humans and animals use sound for hunting when locating their prey, and the hunted uses sound to escape being caught. Sound can efficiently travel across long distances, around corners and through small spaces. Moreover for communication reasons, humans have used sounds to develop speech and create elaborate social groups in order to achieve higher goals that are impossible to be achieved alone. Thus sound communication plays a crucial role in the development of humans and animals.

Sentientia (fig 3.) is an interactive installation that uses sound as a means of communication between a digital creature and anyone or anything that is willing to establish a sentient connection with it. The only tool that Sentientia is equipped with is an A.I. model trained on human emotions. It listens for the environmental sounds and tries to determine the present emotion. Based on the result, the machine attempts to communicate with the outside world using a combination of sounds generated through bone whistles. Percussion instruments and bone whistles have been the first human made tools to be used for communication between rival and friendly tribes as well as cultural rituals within tribes. Sentientia as well struggles to establish a communication channel with the primitive tools used by humans and learns from the created dialog how to interact with the outside world.

The algorithm for emotion recognition was trained with a set of 1440 speech files from the Ryerson Audio-Visual Database of Emotional Speech and Song (*RAVDESS* n.d.) database.

During the exhibition at the Ars Electronica festival in Linz, in 2019, the project was exhibited and data was gathered for the duration of the festival. Visitors were observed and interviewed as well as raw interaction data was collected and stored digitally. Over 500 interactions were recorded to which Sentientia generated an acoustic response. Most visitors either watched others interact or attempted simple interactions by shouting one word
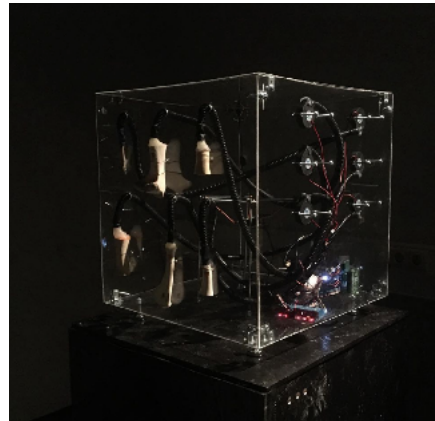

Figure 3: *Sentientia, Ars Electronica, 2019*

or sound. Yet some of the visitors tried a more complex approach by speaking a longer phrase and having a specific emotion in mind. As Sentientia deconstructed the recorded phrase and displayed the mix of detected emotions in a mathematical manner, it caused the person interacting to question their emotional state. A dilemma was created that poses questions of honesty in expressing one's emotions and the degree of emotional awareness.

In the process of sound analysis some data was left out in order to reduce classification time and create a realtime software of emotion analysis. This aspect had an impact on the accuracy of detection, although it is also hard to measure the error accurately as long as there is no strict definition of how an emotion is expressed. Thus the machine learning model has gained a considerable autonomy in the decision process as the black box of the trained model has to be taken as it is. Still certain aspects are limiting and can be clearly stated:

- The model has been trained with a relatively small set of data and with a limited number of actors.

- There was only one language in which the actors expressed an emotion.

- There was a limited set of words in which the emotions were expressed.

- No other sounds except human voice was used to express emotions in the training data.

I consider these to be the most imperative points that have to be improved in order to give Sentientia a wider framework for operation and a greater sense of authonomy.

Conclusions

Sentientia is an experiment at the crossroads of social studies, technology and art. It joins the discussion about the increasing role of technology in our personal and collective lives exploring the scenarios in which sentience could be digitally simulated. Among the most interesting and unexpected effects the project had on the public was that people interacting with the work questioned their sense of accuracy in expressing emotions. One might be confident in their emotions as they are the most personal form of expression, yet when challenged by an external factor, it can raise doubts in the authenticity of their self. Allowing technology to mediate some of the most intimate aspects of our lives might push us to discover new ways of expressing and perceiving ourselves and the relationships we are having.

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