Communicative and Artistic Machines: Some Remarks on Authorship, Copyright, and Liability

Guilherme F. Nobre, and Artur Matuck

***Abstract*—**When the painter Harold Cohen died in the last 27th April some people questioned about the future for its robotic partner Aaron: who will take care of it now and, more important, to whom is to benefit from its production and selling? This paper aims to discuss exactly the extent in which machines can become independent/autonomous communicators and artists, both from a technical (software programming) and legal perspective. In this sense, if machines can be technically programmed to communicate, socialize, and produce art, the issue evolves to the legal outlook: do have machines a legal personhood? Can they be credited with authorship (copyright) and ownership (patents) – benefiting from an economic point of view? And finally what happens if a machine, for instance, misinforms somebody (in a communicative interaction) or infringes any copyrighted material? Here is presented such interplay between technology and law, and between expressive agents – either from silicon or carbon.

***Keywords*—**Communicative machines, artistic machines, authorship, copyright, liability.

I. Introduction

Artificial Intelligent (AI) machines have been expressing themselves through communication and art. In one hand, artificial communicators are engaging in interactions (verbal, written, reading) with humans, generally with commercial interests and commissioned by businesses. In other hand, artificial artists are producing poems, narratives, canvas, drawings, sculptures, etc. – sometimes with financial reward coming from selling, but not always [1]. When such machines are enabled with artificial creativity and generative code [2], sometimes re-encoding themselves in a way to evolve to a totally different entity [3], they may produce copyrightable or patentable works. Beyond the problems related to whether a work produced by a machine could ever fulfill the legal requirements to apply/claim for a copyright/patent protection, there is a more tricky question: who or what is entitled to be paid.

> Computers already exist that using current Ai systems can produce "original" songs, literature and improvements on their own internal programs. To whom should the intellectual property rights in these products belong? Products of computer programs are already attracting patent protection. In Virginia a program by D. Linden automatically designed a satellite communications antenna so original Dr Linden obtained a patent on it. In North Carolina programs developed by Engineoud Software came up with improvements to a jet engine, which have formed the subject of two patent applications. [4, p.614]

This paper aims to approach issues covering AI machines' authorship, co-authorship, ownership, copyright, patent, and liability – either to the potential benefits (rewards) or losses (harm, injury, debits) their works could engender. This is particularly important in a time when machines became independent/autonomous from people, at least in order to express themselves through communication and art; and also in order to produce works whose economic value could impact the human social wealth. Works such as the artistic ones [5], but also belonging to the scientific [6] and technical [7] spheres.

II. Authorship

According to the law only a human person can be an author, at least in order to qualify for the benefits coming from a copyright or patent. The distinction between authorship and ownership is then paramount, given that it does not sound reasonable (to the current legislation) to financially reward a machine. But again, it seems appropriate to analyze in which extension a machine could be judged a perfectly autonomous agent, able to produce works that bear all the properties to be copyrighted or patented but one: non-human made. The first step would be to determine whether such machines are (or can become) perfectly independents from human intervention or, on the contrary, they remain attached in any degree to the first code input.

> More and more robotics and Autonomous Intelligent Systems (AIS) systems are now able to create or invent. (…) Some of these systems are able to create works of authorship, software and some are even capable of inventing better versions of themselves. [8, p.8]

The idea is simple: in theory only a machine capable of evolving in a way to become a 100% non-copyrighted and non-patented agent, in itself, would qualify as to have an identity, an independent entity. Given the fact that a computer program is a form of linguistic encoding (symbols in syntactic arrangements), meaning that it is "a literary work in the form of a computer program" [9, p.21], in practice an intelligent machine could be seen as a work that produces another works. In the case a human person owns its copyright or patent, therefore she/he could claim also the ownership over the works it produces. Otherwise, a machine can be also encoded to evolve

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in a non-predictive manner, through learning and self-re-encoding[1], in a way to establish itself as a new entity (with the later code having zero reference to the former). In this case scenario, the works produced hold no link to any previous copyright or patent – and in theory a machine could be entitled as its author.

> We have seen that it could be theoretically admissible to vest authorship to a computer program, at least in those jurisdictions that do not explicitly exclude this possibility, or where legislators established that the author should be a person. In particular, under Canadian legislation, copyright protection in favour of computer programs could be viable, at least in those cases where computer works are not distinguishable from human works, for example in the contentious case of A.I. However, to vest authorship to a computer program in terms of utilitarian analysis brings us to an even more obvious conclusion than that achieved when dealing with the creative requirement. If we give an incentive to a computer program, which as it is not human has no need of incentives in order to produce more works (unless it has been instructed to behave that way) who are we actually benefiting? The answer is nobody. [10, p.627]

Although the authorship can be theoretically granted to a machine, it does not solve the problem of the ownership – that implies financial benefits. The system of copyright and patent was based on incentive: in order to society to get more and better inventions and creative people, it would be necessary to reward the authors and inventors of such works and discoveries. But does that make sense when the author/inventor is a machine? Of course, in practice even a machine has bills to pay such as electricity, maintenance, the resources it uses as input to produce its works, etc. The point seems to remain, again, in the extent such machine would be dependent of humans to keep going on (like managing a trust in its behalf, for example) or to refrain it in doing so (enforcing legal liabilities, for instance).

III. CO-AUTHORSHIP

Although some countries keep denying any possibility for a machine to become an author (in U.S. "the definition of the term "authorship" implies that (…) it must owe its origin to a human being" [4, p.607]), the idea that a machine could be credited as a co-author jointly with a human person sounds less doubtful. The more the human presence is detectable and clear along the process, the more the current legislation may apply without deeper pressure or *ad hoc* adaptation. Remember: if there is any trait of human participation, the machine interplay goes back to be seen as an assistant tool – not an independent, perfectly autonomous entity.

> Disagreeing with CONTU, the OTA authors suggested that interactive computer programs might legitimately be considered co-authors of the output they produce. But co-authors with whom? The programmer? The user? Both? And what about authorship in works whose production is predominantly automated and non-interactive? Who is the author of those? Who owns the copyright in them? These were all wide open questions(.) [9, p.23]

If a machine can be entitled with co-authorship, the problem comes to: co-author with whom and to who's benefit? In such an arrangement, no matter how intelligent the machine is or how impossible its productions would be without it, the focus will rely over the human part of the equation. Then, as long as the human co-author(s) is/are appointed and granted with the full copyright or patent, the co-authorship between persons and machines is expected to become more and more acceptable. As a consequence, the tendency is to keep considering that only "*people* conceive, not companies(, nor) animals (or) a computer." [11, p.45-46]

> In so far as (partial) human authorship is involved in the creation of works, the ownership of them will vary from country to country since rights ownership is not harmonized within the EU. It can either be the creator of the software who is deemed the owner of the rights; or it could be the owner of the software; or it could be both. It can also be the entity or person who invested financially in the software. [8, p.8]

Right now the legal systems are unable to allow payment(s) to machines as a matter of reward for their (co-)authorship in a work, at least as long as the machine is considered as the sole and final beneficiary of the reward. In theory a machine can be credited with authorship and co-authorship, and could also apply/claim[2] for a copyright or a patent (in very few countries and under very few legal systems, indeed), but nowhere a machine would attain a full legal personhood to get paid without any human custody or tutelage. Therefore, in practice there shall be always a(n) (in)direct person to earn/pay on/in behalf of a machine, and to make sure such agency will keep the human society's interests first – never the machines'.

IV. OWNERSHIP

The ownership over copyrightable and patentable works' financial earnings aims the maximization of the aggregate social wealth. The idea is to maximize the net positive effects coming from the balance between the public/private benefits and costs. It is a system made by humans and for humans and, therefore, unless a machine can fit in and reinforce such schema, there is no future for attributing copyright or patent ownership to machines. In other words: why should humanity renounce from the benefits produced by society in behalf of an exclusive advantage for machines?

> The law as it is currently configured cannot vest ownership of the copyright in a procedurally generated work in the work's author-in-fact, because the work's author-in-fact—a generative software program—has no legal personhood. Intuition and the principle of transitivity both suggest that the programmer of generative software is the logical owner of the copyright in the works generated by his or her software. He or she is, after all, *the author of the author* of the works. [8, p.21]

[1] "An Ai system will through its learning (…) rewrite the basic program itself. It will be reacting (and) it learns from its previous mistakes, and will be "aware" that it must modify its behaviour and thus its program. It will in essence be rewriting the program as it develops." [4, p.613]

[2] In the sense of being appointed as the author (copyright) or inventor (patent) in the application process.

Put differently, how any remuneration to a machine would ever make social (human) sense? Unless machines become so advanced to gather and to institute their own separated society and legal system (which is so far an utopia), they must comply with the human rules and interests. Actually, does not matter how intelligent, creative, independent, self-encoding, and autonomous machines can become, the point is that they are a product of human industry and shall be treated as a component into the human social and productive environment. As such, granting authorship or ownership to a machine could only make sense (for hypothetical sake only) as an intermediary process, that means, as a way to serve better the utmost human purpose – which is the maximization of the social wealth.

> Indeed, patents have already been granted on inventions that were designed fully or in part by software. (Although the) patent statutes on their face do not allow for a computer to be listed as an inventor. [11, p.43-45]

Even if there is "no reason why a computer, (not) its inventor or owner, cannot satisfy the requirements for a successful application for a patent" [4, p.607], the benefits coming from such patent must belong to humans only, either in a more direct link (when a person is designated as the beneficiary) or in a more indirect way (when a legal entity such as a company is created to represent the interests of several persons). In both examples there would be always people "inside and behind" the machines, and the supreme goal should be kept invariably as the positive net effect those machines and their outcomes may have over the human[3] social public good (when people can be found "ahead and around" those artificial systems).

V. COMMUNICATIVE MACHINES

The idea that computers can be seen either as a tool, a media, or a social actor was stated by [12], a researcher dedicated to study persuasive computers, and invites us to think about very complex machines – able to communicate and socialize. As for the former, communication may be thought both as models able to be programmable on machines and as an evolutionary outcome to whoever or whatever may be implicated with it. As for the later, machines will need communicative skills in order to interact and socialize with people – machines that are capable of independent/autonomous self-expression. Then, communication could be artificially engendered as well as naturally emerged – does not matter if to humans or machines.

> In computer sciences, communication has been understood as synonymous with interaction, relationship, dialogue, conversation. In such a framework, it is sometimes difficult to perceive the difference between communication and argumentation, rhetoric, persuasion, bargaining and recommendation. (…) Certain authors have been working with computer simulations of communication emergence and evolution. Sometimes they use a software simulation, at other times they prefer physically embodied devices. In any case, the computer-robot simulation research shows that communication arises spontaneously and evolves to become an effective tool to solve particular social tasks. The most remarkable is that the systems were not at all equipped with a specific drive for communication, this had to be learnt. This process can be called evolutionary robotics(.) [13, p.2]

Conversely, 'artificial communication' is the name for the result of any technical procedure that has actually modeled, programmed, or enabled communication into any agent, whereas 'artificial communicator' would be the label for such agent whenever it is a machine. In theory, it is possible to think on technical procedures to (re-)implement communicational abilities on humans – usually in the field of health recovery. For example: brain implants to regain motor and talk capabilities (e.g. like those lost in accidents or never attained by birth), technological devices to warrant communication to handicapped persons (e.g. Stephen Hawking's communicational devices), and so forth. So, 'artificial communication' is not restricted to machines only. However, on the other hand, 'artificial communicators' are indeed confined to machines.

> I have been looking for embodied artificial agents which are capable of persuading people (through communication) about political issues. These very special political artifacts must do politics by themselves, so they are supposed to be autonomous artifact politics. As a matter of fact, they are intended to be politician artifacts, for example: e-politician, e-citizen, e-deputy, e-candidate, e-elector, e-campaign assistant. In sum, autonomous, intelligent, proactive, adaptive, evolving, creative, communicative systems that can reason, argue, bargain and debate about political subjects in order to persuade people are becoming more and more realistic. We can go further and imagine androids and humanoids as politician artifacts, performing emotions, humor, politeness, flattery and becoming more natural, human-like and life-like. [13, p.3]

Such artificial communicators are already among us, communicating and socializing in many interested ways – although with a varied degree of success. Verbal interaction software such as Siri, Cortana, Now, and Echo, or online shopping assistant chat-bots (written interaction), or even 'silent' algorithm-based reading robots that continuously scan the web[4], etc.; they all work to promote their companies' businesses. In short, they intend and are commissioned to communicate for commercial reasons. But a question related to the authorship and ownership of those 'artificial communicators" arises: who is to be held legally responsible and liable for the communication/socialization they produce, if and when something goes wrong?

VI. LIABILITY

Machines that communicate and socialize with humans are responsible (or at least co-responsible) for their conduct, and therefore are also legally liable – right? Well, not quite so. As machines do not have legal personhood, in practice they in

[3] The adjective 'human' is necessary since there are artificial agents *societies* been developed and studied, as well as there are initiatives on programming *sociability* on machines.

[4] According to [14, p.674-681] "Copyright ignores robots. (...) The rule is surprising. Robotic readers get a free pass under the copyright laws. Copyright is for humans only."

themselves do not exist for law. But it does not mean that there would be no control over them, if something wrong or bad happens. In such a case, the people who benefit from such machines are supposed to be found responsible for them, and liable. The humans who keep the machines under their custody do have legal personhood and shall respond for any problem – simply because machines "cannot be held liable for copyright infringement" [11, p.34], or for any other.

> The (human) programmer might be an author; the (human) user might be an author, but not the program that connects them. (…) Annmarie Bridy added that our copyright system "cannot vest ownership of the copyright" in a computer that "has no legal personhood." (…) Robot readers can't infringe, and we won't let robots be authors, either. Copyright is not the only field of law to flirt with the idea that what happens in silicon stays in silicon. [14, p.667-673]

But what happens if an 'artificial communicator' misinform, lie [15], mistreat, or engage in a discussion with a person; or even by misfortune make a comment that is taken as offensive, inappropriate, or inconvenient? Sometimes a pinch of humor may have such non-intended effect (for computational humor see [16]). As any person may know, to communicate is risky, and to socialize is highly demanding. The research on programming machines with ethics is not new (see for example [17]), and that should include communicational ethics as well (Grice's maxims and Habermas' ideal speech rules applied to machines can be found at [13]).

> Here we are simply creating personality to determine authorship issues presented by the autonomous production of computer generated works. However if we are to grant authorship to such machine personalities then we must consider responsibility. In the same way as a company can be sued, a machine could be sued but how would it meet any financial obligations imposed? [4, p.618]

Unfortunately or not, machines cannot be prosecuted – even if they deserved. As a way to convene persuasion (which is a type of communication), machines have been capable of flattery [18], politeness [19], apologizing [20], and so on. Nonetheless the efforts to enable persuasive machines with ethics [21], sometimes the communication fails – or worse. Once more, one 'carbon unit' (a person) must be found responsible for her/his 'silicon counterpart' (a machine). Similar to finding a person to benefit from the works done by the intelligent/autonomous machine, it will be necessary appointing a prosecutable legal person (people or company) to stand on behalf of such machine whenever it may commit an infraction or a crime. Here, what happens in silicon ought to be brought to carbon.

VII. Conclusion

As a product of human industry, machines should be ever kept under somebody's custody and tutelage – either in a direct (a person) or indirect way (a company). In this sense, AI machines' works may comply with the utmost goal of human society: to help to maximize the aggregate positive net effect (advantages minus disadvantages) over the public wellness and wealth. In doing so, machines could be credited with (co-)authorship and ownership, no problem, as long as their human counterparts can be identified and easily reachable by justice.

> Our current patent laws do not seem particularly wellsuited to handling the proliferation of computer-generated publications and inventions that may soon be headed toward the Patent Office and, thereafter, to the courts. [11, p.51]

Machines capable of self-expression through communication and art are not different. Artistic works can entail advantages (e.g. selling, aesthetic) and disadvantages (e.g. copyright infringement, disturbance of the senses). The same can be said about the artificial communicators: whose activities may promote businesses, increase selling, help to gain market share, foster some people's interests (advantages); but also may have deleterious previewed-or-not consequences, such as misinformation, interaction discomfort, cognitive dissonance, discussion engagement, feeling of bulling, etc. (disadvantages). And, no matter how independent/autonomous an AI machine can be, both the artificial communicator and the artificial artist must have a human counterpart to stand on/in their behalf – for the better and for the worse, legally speaking.

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