From: Mathew Thomas
Sent: Thursday, 23 January 2020 2:52 PM
To: ai2ip
Subject: Re: Invitation to Participate in Public Consultation on Artificial Intelligence and Intellectual Property Policy

Dear Sir,
I am not a part of any organisation but as **an individual working in the field of IP(personal).**
The **list of policy issues** are as under which are open:
(a) Should a patent be granted for use of AI in weapon systems, particularly anti -satellite weapon systems?(Because of non militarisation of space)
(b) Can and should patents be granted to AI systems that generate inventions on its own?
(c) Should copyright be granted to works generated by AI?
(d) Should colour trademarks(TMs) be granted to a TM, generated by AI?
(e) Who should be responsible for bias in an AI system, when it learns on its own and generates a bias, whether it should be the machine or the creator human being who created the system?
(f) In countries where racism or casteism or ethnicity is surreptitiously advocated and differentiated, can the creator of an AI system which develops a bias be made responsible or should the AI system itself be held responsible because its learning on its own, from data?
(g) A system of vehicle using AI in an autonomous vehicle who would held responsible for accidents, caused by corruption of data? Should the company or autonomous vehicle be held responsible?
(h) How do we check non-bias in an AI system before it is brought into use? Who should be the checking agency since it is specialised?
(i) Whether an option to be given to an individual whether he would like an adjudication for question by an AI machine or a human being in cases where a routine response to a query?
(j) How would be responsible for loss or theft of data generated by an AI machine, whether it should be the machine or the owner of the machine?

(k) Who would be responsible for sharing of data by an AI machine with another AI machine without an approval of the individual whose data is being shared?

These are some of the open AI issues that I am trying to answer and would like the policy from WIPO to answer these questions whenever it opens up in discussion.

Thanking you,
Dr. Mathew Thomas

Preface to AI

The field of AI exhibits a recurrent pattern, early dramatic success followed by unexpected difficulties.

Prof Hubert Dreyfus[1]

As of date there is no patent granted to an invention created by AI without human intervention. The patents for AI are granted to the creators of AI and not to AI *perse*. So is it with copyright, because in both patents and copyright the rights are granted to the human creator.

This is going to change on the near future when AI systems will create original products or inventions on their own. As on date all inventions created by an AI will be granted a patent to the owner or the creator of the system. Artificial Intelligence systems in the future will be able to create inventions and even define its boundaries as with claims. AI systems do have the capability to choose between alternatives on its own, it stands out as creative, autonomous and can rationalize on its own to a great extent. They continue to learn from the data that they have in the system and correct themselves to a large extent.

The greatest impact of AI will be on low level jobs which will be taken away by the impact of AI. The jobs most sought will be those complementary to AI technology. The bigger concerns with AI as machines get more intelligent, is how to get the system to ensure fairness, justice, transparent and be accountable to humans. The AI industry is growing and more countries are putting in place strategies and policies to make AI accountable and justiciable. The future is with AI and it will the main driver for economic growth. The author is of the opinion that the fields that will have greatest impact will be medical, education, pharmaceuticals, vehicles, autonomous weapons and justice delivery.

It is estimated that the AI industry is set to be a $70 billion industry by 2020.[2]

While the developments in drug synthesis, facial recognition, natural language processing, self-driving vehicles, weapon systems etc., is driving growth of AI, it would be no surprise to note that modern day living would be ruled by AI. It would be intrusive and larger privacy issues remain to be determined. The development of medicines with the use of AI is a telling example of how intelligent systems can be used to discover new chemical molecules and medicines- an AI system called Generative Tensorial Reinforcement Learning, has helped design six promising treatments for fibrosis in just 21 days,[3] where as physical search and discovery would have taken months or years of

[1] Prof. Hubert L Dreyfus, UC Berkeley, for Rand Corporation, 1965, 'Alchemy and Artificial Intelligence,' accessed 17 Sep2019; [further reading and available at https://www.rand.org/content/dam/rand/pubs/papers/2006/P3244.pdf].

[2] Reuters, 'Tech CEOs Declare This the Era of Artificial Intelligence', available at http://fortune.com/2016/06/03/tech-ceos-artificial-intelligenceFortune, 03 June 2016

[3] https://www.expresscomputer.in/artificial-intelligence-ai/ai-helps-to-design-drug-in-just-21-days/41669/?utm_source=newslettter&utm_medium=newsletter&utm_campaign=09092019, accessed 09 Sep

scientific experimentation and drug discovery in the labs. This is just one of the examples of AI being used in pharmaceutical/chemical compounds discovery.

What distinguishes AI is its ability to be knowledge based and in creating knowledge as an independent output, without further human intervention in its process. But the feature so far is that knowledge so created by the AI is treated as that of the creator of AI. When Christies auctioned the first AI created painting in 2018, the estimate for the work was between USD 10,000- 40,000.[4] However the image was not created by a human artist, but by an AI.

> The portrait, however, is not the product of a human mind. It was created by an artificial intelligence, an algorithm defined by that algebraic formula with its many parentheses. And when it went under the hammer in the *Prints & Multiples* sale at Christie's on 23-25 October, *Portrait of Edmond Belamy,* sold for an incredible $432,500, signalling the arrival of AI art on the world auction stage.[5]

The Painting 'Edmond De Belamy'[6]
[© Obvious].[See instagram@obvious.art]

2019. The AI system is called GENTRL standing for generative tensorial reinforcement learning and is used in generative chemistry.

[4] https://www.christies.com/features/A-collaboration-between-two-artists-one-human-one-a-machine-9332-1.aspx accessed 11 Sep 2019.[Refer to the link for an insight into the auction].

[5] Id.

[6] ©Obvious. [*See* instagram @obvious_art. It is collective by artists, AI engineers and researchers. The project is part of the Generative Adversarial Networks (GANs). The collective determines the notions of creativity of machines.]

Now, the surprise is the signature, a machine code signature for the painting placed at the bottom right and runs like this:

$$\min_G \max_D \mathbb{E}_x[\log(D(x))] + \mathbb{E}_z[\log(1 - D(G(z)))]_7$$

[© Obvious].

So now the question is, aren't AI machines intelligent? But the law so far doesn't grant a copyright or a patent to a machine. That's a dilemma! But the author is confident that concept of ownership and authorship will change given the dynamics and fast changing scenario of AI. The concept that machines can think and rationalise is still far-fetched as a reality to many of us. But with the ingress of AI into our daily lives it will not be far off when machine created works will be granted patents based on creativity, originality, novelty and industrial application. Sophia from Hanson Robotics, a sentient robot was granted a citizenship by Saudi-Arabia. Sophia uses artificial intelligence, facial recognition, visual data processing and voice recognition.

AI systems generally do not have a bias in their results and now a question need to be asked whether a bias in its results/analysis can be taught to a system? It is this author's belief that it can be taught to have a bias. For example if a particular government social welfare scheme is to reach out to people without caste or creed distinction, it can be taught to omit citizens of a particular class. As AI systems grow more cognitive, can reason and think as humans, it can be taught to subtly develop a bias and may develop biases as humans do. Quintessentially a black box problem! Essentially what it would come about is to have choice whether humans would want that decision to be made by a machine or another human being. That would be difficult to even fathom and then there would be a need for systems that would supervise another system. This is so because machine learning systems can improve on its own without having the need for a human intervention and how it does this to not in the traditional sense, but it does so in functionals sense by adapting its behaviour based on a set experience to improve its experience.[8]

Yet despite this the unanswered question remains? To whom should AI created inventions or artistic/literary work be conferred? As of now it is straightforward, with the invention or copyright being granted to the author or patentee. But this is a very contentious issue and would require a change in law both copyright and patent laws to make it feasible to grant the copyright or patent to machines. Who knows maybe in the next decade to make up for shortfall of judges we may have justice will be meted out by AI justices?

The future of AI, holds great potential with this system but it also fraught with endless possibilities that could be dangerous to the society and the human race. It is Stephen Hawking, who said, "The development of full artificial intelligence could spell the end of human race… It would take off on its own and re-design itself at an ever

[7] Id.

[8] Harry Surden, 'Machine Learning and Law', 89 Washington Law Review, 87(2014), p 88; available at https://scholar.law.colarado.edu/articles/81, accessed 12 Sep 2019.

increasing rate. Humans, who are limited by slow biological evolution, couldn't compete and would be superseded."