



LEGAL DEFINITION OF ARTIFICIAL INTELLIGENCE

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ABSTRACT

In the physical world, we make a person liable for something when a certain loss has been caused due to his activities. However, this has been possible because there was an existing definition of both, the offense committed and the liability to be fulfilled. In the present topic, no specific boundary can be drawn including specific items as a part of Artificial Intelligence and excluding the others. We live in an era where an Artificial Intelligence program asks a human working on the computer to prove that he is not a robot by punching in specific characters.

Artificial Intelligence is everywhere in the 21st century. The 1980 New York Times headline “A Robot is after your job” could just as easily appear in September 2018. The field of Artificial Intelligence dates back to the 1950s, and the concepts underlying Artificial Intelligence go back generations earlier to the ideas of Charles Babbage. Without doubt, there have been significant developments and refinements, and yet, even today we lack a proper definition of the term ‘Artificial Intelligence’.

Defining Artificial Intelligence is not an easy task. Most of the definitions that do exist tend to define Artificial Intelligence in terms of “creating a computer process that acts intelligently” or “creating a computer process that can mimic human behaviour.

Other definitions refer to “rational behaviour” or “doing things that are hard for a computer to do” and are equally unhelpful in this aspect.

Artificial Intelligence may be defined as “creating a computer process that acts in a manner that an ordinary person would deem intelligent”, and consideration is given to some of the various types of Artificial Intelligence and Artificial Intelligence technologies that might be of concern to people in the digital forensics community. Because legal systems do not have an exact definition of artificial intelligence yet, we have to examine what could be considered as Artificial Intelligence in philosophy and science.

According to the Oxford computer science explanatory vocabulary, artificial intelligence is that part of information technology which deals with creating programs capable to solve problems requiring human intelligence.

Keeping all such definitions in mind, a legal definition had to be brought up which can include within itself, the changes to come in the future as well as the findings of the past. An analysis of all the existing definitions and their drawbacks shall be done and a legal definition may be introduced with all the essential elements for the definition to be sustainable.

INTRODUCTION

Various groups of ascertainable individuals have been granted the status of “persons” under law, while that status has been denied



to other groups.¹ One of such groups is Artificial Intelligence or Intelligence Machines. However, before the task of granting the status of person to Artificial Intelligence, it is the need of the hour to have a legal definition of the word Artificial Intelligence itself, as there is no proper uniform legal definition of AI in present legal arena.

The “AI technology” definition essentially asks whether a given task, if performed by a human, would require human mental processes. A medical diagnosis program, for example, would by this definition, be AI per se. AI, seen as a purely pragmatic undertaking to demonstrate intelligent behaviour, has been easily demonstrated by many computers.²

“AI simulation” calls for a program to duplicate the internal state of a human brain engaging in the same task. This, of course, presupposes an understanding of the internal state of a human brain. Adoption of this view would make AI definitional impossible to demonstrate until human brain states are understood sufficiently to be effectively copied.³

“AI modelling” requires the computer to mimic the outward behaviour of a human engaging in the same task. A successful computer would pass the “Turing test” (named after the English writer who

proposed it in 1950): an interrogator: separated from the person (or machine) being interrogated and communicating only by teletype, would be unable to tell for certain whether a person or a machine is replying. Essentially, this definition forces the evaluator of the computer to use the same test for evaluating the intelligence of the machine as a person would use for evaluating the intelligence of any person. Of course, it also makes the definition highly subjective.⁴

The “AI theory” definition is best, stated as a set of two goals: to make computers more useful, and to understand the principles which make intelligence possible. The second goal implicitly assumes that the trait of intelligence not only has principles, but that those principles can be understood. Demonstration of AI would occur when a useful human trait was selected, analyzed and duplicated-within a machine.⁵

GENERAL PHILOSOPHICAL BACKGROUND OF ARTIFICIAL INTELLIGENCE

The rapid development of information technology has given birth to many phenomena in recent decades that have shaped fundamentally the arrangements of human society. Good examples are digitalization of books, acceleration of communication, and the development of information society in general. There is no doubt that one of the most astounding phenomena is the function of artificial intelligence (AI), which has inspired many futurologists, authors, and artists. Software that includes AI functions is not just a

¹ Marshall S. Willick, *Artificial Intelligence: Some Legal approaches and Implications*, published in *AI Magazine*, Vol. 4 No. 2: Summer 1983 available at <https://aaai.org/ojs/index.php/aimagazine/article/view/392> Last accessed on 26-10- 2018 at 12:00 pm

² *ibid*

³ *ibid*

⁴ *ibid*

⁵ *ibid*



simple tool in the hands of humanity anymore. They make individual decisions in the context of the tasks, which they were written for.⁶

As of now legal systems do not know exactly the definition of artificial intelligence, we have to examine what can be considered as AI in philosophy and science.

According to the Oxford computer science explanatory vocabulary, “*artificial intelligence is that part of information technology which deals with creating programs capable to solve problems requiring human intelligence*”.

Stuart Russel and Peter Norvig distinguished between four approaches in terms of AI development's philosophical concept:⁷

- 1) *System thinking as human*: This trend considers such systems AI that model the functions of human mind and cognition.
- 2) *System acting as human*: This approach is linked to the British mathematician Alan Matheson Turing, who claimed in his famous Turing-test that the criteria and purpose of AI is human-like acting.
- 3) *Rationally thinking system*: This viewpoint considers the purpose of AI in developing more rational or perfect systems than human cognition.
- 4) *Rationally acting system*:

⁶ Daniel Eszteri, Liability for Operation and Damages Caused by Artificial Intelligence - With a Short Outlook to Online Games, 153 *Studia Iuridica Auctoritate Universitatis Pecs Publicata* 57 (2015)

⁷ Stuart J. Russell - Peter Norvig, *Artificial Intelligence - A Modern Approach* (2nd edition) (Upper Saddle River, New Jersey: Prentice Hall, 2003), Chapter 26

This approach is of modern information technology sciences. It does not aim its purpose to create systems that think or imitate human-like behaviour just to behave rational (for example to clearly diagnose diseases, predict natural disasters etc.).

ASPECTS OF ARTIFICIAL INTELLIGENCE

(a) AI as an entity:

It is clear that the behaviour of AI reaches a critical point when communication takes place between the software and human beings or things. It usually takes place when the Artificial Intelligence software and the controlled hardware (a computer or a robot) somehow change the real/physical world, for instance when it helps to assemble a car in a factory. In such cases the physical manifestation of Artificial Intelligence takes place, the software 'exits' from cyberspace. The question is that who should bear the legal responsibility for the actions of synthetic beings?

(b) AI as software:

We have to keep in mind at first instance when classifying AIs by current legal regulation that they are computer programs; software. In scientific literature, parallel definitions of the legal classification and concept of software can be found. From the information technology perspective *software means computer programs, processes and possibly documents and data related to operation of the information system. From another point of view, software consists of algorithms, its computerized representation and programs*⁸.

⁸ Supra (footnote 7)



ATTEMPTS TO DEFINE THE LEGAL CONCEPTS OF AI

The term itself has become degraded to the point where it is freely deployed to describe virtually any programming challenge as yet unconquered' or to promote new software products with its eye-catching allure. *The expression originated at a research conference in 1956 to denote early efforts aimed at producing a "thinking machine."*⁹ Although a concise definition of AI is impossible and a catalogue of its current directions would quickly grow obsolete, the objectives of AI scientists may be grouped into two broad categories: *the development of computer-based models of intelligent behaviour, and the pursuit of machines capable of solving problems normally thought to require human intelligence*¹⁰

Defining Artificial Intelligence is not simple. There is no one clear definition of AI. Most of the definitions that do exist tend to define AI in terms of "creating a computer process that acts intelligently" (but what is intelligence?) or "creating a computer process that can mimic human behaviour" (do humans always act intelligently, what happens if a computer can normally perform better than a human being?¹¹).

Before stretching upon the definition of artificial intelligence as whole, it is pertinent to define terms involved to constitute AI.

⁹ Samuel, AL, Where It Has Been and Where It Is Going, Proceedings Of The Tenth International Joint Conference On Artificial Intelligence 1152, 1154 (1983)

¹⁰ Steven J. Frank, Tort Adjudication and the Emergence of Artificial Intelligence Software, 21 Suffolk U. L. Rev. 623 (1987)

¹¹ Faye Mitchell, The Use of Artificial Intelligence in Digital Forensics: An Introduction, 7 Digital Evidence & Elec. Signature L. Rev. 35 (2010)

The word Artificial means something, which is made by human beings, especially in imitation of something natural or something created by the human skill. The intelligence means that the ability to acquire and apply knowledge and skills.

The words Artificial Intelligence itself makes the picture clear as to what it requires to call or term an entity or software or device as artificial intelligence. In a very abstract sense, it can be referred as something, which functions on similar intelligence which human possess. Thus, artificial intelligence attempts to emulate the mental steps of human beings. Therefore, defining AI can be as difficult as defining a human being comprising of the numerous unique characteristics or features which separate it from other creatures. The difficulties lies in the fact that AI consist the fundamental feature of human mental process which distinguish it from other organisms. The definition as existing today can be summarised as follows:

In words of Philip Jackson Artificial intelligence is defined as "the ability of machines to do things that people would say require intelligence."¹²

Maruerite E. Gerstner in his article refers AI as *any artificially created intelligence, i.e. a software system that simulates human thinking on a computer or other devices: e.g. home management systems integrated into household appliances; robots; autonomous cars; unmanned aerial vehicles, etc.* Something that some decades ago was only science fiction, such as software systems dealing

¹² Philip C. Jackson, Jr., Introduction to Artificial Intelligence (Dover Publ'n, Inc., 2nd edition 1985)



with various issues and replicating thinking processes of humans by means of hardware and other technology, has become the reality of science today.¹³

In terms of the above definitions, it is clear that AI is different from conventional computer algorithms. The aim of the development of Artificial Intelligence is at making it self-training (the ability to accumulate personal experience) or machine learning. This one and unique characteristic enables AI to act differently in the similar or identical situations, based on the actions previously performed. This is very similar to human behaviour. Cognitive modeling and rational thinking techniques give more flexibility and allow for the creation of programs that can “understand,” i.e. that have the traits of a prudent person.¹⁴

ATTEMPT TO DEFINE ARTIFICIAL INTELLIGENCE WITH REFERENCE TO TORTIOUS LIABILITY

Artificial Intelligence in Tort law can be said to be a set of techniques used by humans or any other beings for some aspects through machines. If this use of techniques results in damage to another party then what is the liability and who will be liable is the question which arises. To answer certain questions it has to be made clear as to what is Artificial Intelligence under tort law.¹⁵

Now, the concept of Strict Liability and Vicarious liability is prevalent under tort law

from a very long time for knowing the liability. If any tort is committed by an AI then these concepts will apply and will make the owner of such AI to be liable. But then the question arises as to upto what extent can owner be made liable. Is it always, that the owner of AI can be made liable for torts committed by AI or else a method or different mechanism has to come into play is a major question which can be posted.

A single definition of AI is also not possible as it will lead to basic question and matter of debate over ‘intelligence’. Question may arise as to whether an individual who uses a defective product in the provision of a service should be held to strict liability. Then the issue of remoteness of damages may arise where it relates to limits of liability for damages resulting from a negligent act.

ATTEMPT TO DEFINE ARTIFICIAL INTELLIGENCE WITH REFERENCE TO CRIMINAL LIABILITY

Intelligence is perhaps the most impenetrable term used in Crime Analysis, as proposed by the International Association of Crime Analysis (2014). With the technology available in the hands of toddlers today, the potential available to offenders in terms of mobility or IT resources allow them to commit numerous crimes with great effect and minimal risk of getting caught. Thus, with the rise of Artificial Intelligence comes forward the question about legal responsibility for crimes committed by an AI as the AI acts autonomously with limited control from humans. This study aims to define AI for legal purposes and analyze whom to hold liable when an AI commits a crime *de lege lata* (the law as it exists).

¹³ Maruerite E. Gerstner, ‘Liability Issues with Artificial Intelligence Software’ (1993)

¹⁴ Paulius Cerka, Jurgita Grigiene, Gintare Sirbiky, Liability for Damages Caused by Artificial Intelligence, Computer Law & Security Review

¹⁵ George S. Cole, Tort Liability for Artificial Intelligence and Expert Systems, 10 Computer/L.J. 127 (1990)



Criminal Artificial Intelligence may be defined as a concept that gives priority to both- Investigation as well as public safety. The aim in the first part is to analyze individuals or groups involved in crime and in the second part; the aim is focused towards preventing the occurrence of the crime.

There must be a defined legal duty for the defendant when the AI acts autonomously and the defendant omits to intervene in the situation. The defendant cannot shrug off his legal responsibility by saying that the use of an AI always constitutes a serious risk for harm. Limited foreseeability and unpredictability of the AI's actions will however constrain criminal liability. The actor cannot be expected to avoid harms that he could not have possibly foreseen from his/her position and neither can he/she be held liable for the harms that he did not cause. AI can also be used as an agent to prevent or perpetrate a crime. However, the challenging features of AI persist.

AI is so axiomatic that the scientists over the world have not yet reached a consensus about the definition of AI. The law has also not been provided with a legal definition of AI yet since the legislators instead of looking at the present or the future, tend to regulate occasions that have already occurred.

The English word *artificial* is synonym with words like factitious, synthetic and unnatural. A thing that is artificial is man-made or constructed by humans, usually to appear like a thing that is natural.¹⁶ The

¹⁶ 'artificial, adj and n.' Oxford English Dictionary Online (March edn, 2017)

Swedish word for artificial, *artificiell*, and the French *artificiel* have equivalent synonyms. The Latin precedent *artificialis* origins from *artificium*, meaning handicraft or theory.¹⁷

The word intelligence is more complex to define as most of the definitions relate to the human intellect. In English, as well as in Swedish and in French, the word has many meanings. Intelligence is explained as the 'faculty of understanding', 'the action or fact of mentally apprehending something' or simply as 'intellect'.¹⁸

Thus, artificial intelligence might lexically be understood as an unnatural or synthetic intellect. Yet, AI represents more than this literal explanation. Words, as trivial parts of a sentence, give the sentence a practical meaning.¹⁹

The computer scientist Nils J. Nilsson provided the debate with a broad and important definition of AI a few years ago: '*Artificial intelligence is that activity devoted to make machines intelligent, and*

<www.oed.com.db.ub.oru.se/view/Entry/11211> accessed 24 September 2018

¹⁷ 'artificium' Pocket Oxford Latin Dictionary: Latin-English Online (3rd edn, 2012) <www.oxfordreference.com.db.ub.oru.se/view/10.1093/acref/9780191739583.001.0001/b-la-en-00001-0000945> accessed 2 October 2018.

¹⁸ 'Intelligence, n' Oxford English Dictionary Online (March edn, 2017) <www.oed.com.db.ub.oru.se/view/Entry/97396?rskey=q14evJandresult=1> accessed 8 October 2018.

¹⁹ P H Matthews, 'Word' The Concise Oxford Dictionary of Linguistics (online edn, OUP 2014) <www.oxfordreference.com.db.ub.oru.se/view/10.1093/acref/9780199675128.001.0001/acref-9780199675128-e-3678> accessed 23 October 2018.



intelligence is that quality that enables an entity to function appropriately and with foresight in its environment.'

According to this definition, both virtual assistants and a human brain are intelligent. The definition includes both narrow and general AI technology. The assistant is performing tasks on command, and the assistant tells the user when it cannot perform the task or assist the human otherwise.

Although Norvig and Russell's taxonomy is broad, it serves with different attributes of a potential AI, rather than a clear definition. The taxonomy is also targeting extremely developed and advanced general AI which do not exist yet.²⁰ It will consequently leave narrow AI systems that already exist out of the scope.²¹ Narrow AI systems are intelligent when solving a specific problem, but would not pass general intelligence tests such as the Turing Test.²² However, Nilsson's definition doesn't relate to any

definitions of Human Intelligence. This definition is also neutral and evolution resistant as they include AIs of today (SIRI, autonomous cars and search engine algorithms) as well as tomorrow (human-like robots and autonomous weapon systems).

Evidently, there are many different kinds of AI that already exist or will exist in the near future. Common to all kinds is that most of the AIs were created with a good intention, irrespective of how they were used after that.

Below are the key features that are common to all kinds of Artificial Intelligence.²³

Autonomy- Humans are only limitedly involved or in the future not involved at all in the AIs decision-making. The autonomy varies between the different fields of AI, from autopilot mode in autonomous cars where the driver is required to stay in charge of the car, to the high frequency trading algorithms that function without humans engaging in their activity.

- Unpredictability- Like us humans, you can never know for sure how anyone else than yourself will react to something. An AI lacks cognition and may react totally different than a human facing exactly the same situation. In addition, most AIs discussed here are self-learning, i.e. they learn from mistakes and by processing a large amount of data. The outcome of the AI's conduct is unpredictable, when the conduct is not a result of an instruction

²⁰ John Frank Weaver, *Robots Are People Too: How Siri, Google Car and Artificial Intelligence Will Force Us to Change Our Laws* (Praeger 2014). John P Holdren and Megan Smith, *Preparing for the Future of Artificial Intelligence* (Executive Office of the President of the United States, National Science and Technology Council, Committee on Technology, 2016)

<https://obamawhitehouse.archives.gov/sites/default/files/whitehouse_files/microsites/ostp/NSTC/preparing_for_the_future_of_ai.pdf> accessed 8 September 2018.

²¹ Virtual assistants, the software in an autonomous car or algorithms used in high frequency trading at the financial markets are examples of narrow AI.

²² Or any other test of general intelligence. Eg Shane Legg and Marcus Hutter, 'Universal Intelligence: A Definition of Machine Intelligence' (2007) 17:4 *Minds and Machines* 391.

²³ Mireille Hildebrandt, 'Criminal Liability and "Smart" Environments' in R.A. Duff and Stuart P Green (eds) *Philosophical Foundations of Criminal Law*



from the programmer, but a self-learned strategy.

- Unaccountability. As long as AI lacks legal personality, they can behave in a way that for a human would have given legal consequences. The situation with accountability is comparable with the ones concerning animals. For example, a dog can bite a human to death, but will never be held legally accountable for their actions. As a consequence, we need to find a principal for the crime to hold liable. Increased autonomy equals decreased human control. Still, criminal law regulates human conduct. The general basis for criminal liability is usually the act requirement.

However, only human acts are a ground for imposing a punishment. Thus an AI's crime must be possible to ascribe to a human that can fulfil *actus reus*, the guilty act.

It is not possible to state that there is, or is not, a general duty to act to avoid harm that an AI causes. It is additionally impossible to state that one of the actors is always responsible for the AI's conduct *de lege lata*.²⁴ The actor's responsibility over the AI depends substantially on the actor's degree of control over the AI. The closer the actor is, the easier is it to argue that the actor is responsible for the harm the AI causes.

The legal position when an AI uses machine learning technology and its criminal behaviour emerges spontaneously is unclear. The foundation of the *actus reus* in criminal law rests on the fundamental concept of voluntariness regarding criminal behaviour.

Erroneous behaviour that the AI gives rise to without human involvement, raises the difficult question concerning whom to hold liable and also, not all crimes an AI commits have an offender to prosecute. The law as it is very vague. The option of making the actor liable under the strict liability rule is always at hand; however, it would not be justified to do so when the actor has no control over the working of the AI system.

CONCLUSION

The project has analysed the situation of Artificial Intelligence in the field of law when it comes to defining it. There have been many definitions laid down by various authors on different aspects of AI but a concise definition still lacks due to the philosophical debate as to what 'intelligence' is and how it can be determined.

So, it is clear from the detailed study that the existing definitions of Artificial Intelligence are non-exhaustive. A single concise definition of Artificial Intelligence is not possible due to its different components in different fields which lead to variation and change from time to time.

Therefore on the basis of above attempts by different scholars it can be said that "Artificial Intelligence may be a person or software or entity or an algorithm which functions on the same considerations such as experience, past behaviours, interactions with someone or something which determines the mental process of human beings". The definition in this form is precise and an attempt made by the researchers of this project to give it an exhaustive form.

²⁴ The law as it exists



The possible definitions in different fields can be met with separately as per the intention of the legislations. For example, AI can have different definitions in different laws, such as an AI definition of crime different from an AI definition of torts.

The major aspects and components involved of an AI describe the nature of formation of a definition. The ingredients of definition should include all the aspects to deal with the issues of non-compliance and this in practicality not possible as observed in the research study.

Therefore, concluding on a brighter side it has been observed that so far the attempts made with the definitive part of AI are not in vague as it has dealt with a lot of issues. The focus would be to cope upon the change in the definitions with the change in the technology and science.

