

Artificial Intelligence (IA) and Art

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Abstract:

This essay is an attempt to answer a question: could the robot not only imitate an artwork, but also invent a melody like that of Chopin or a story in the manner of Flaubert? In the first part analysing the various trends of research into artificial intelligence research, in different parts of the world: at Sony's Technology Research Laboratory and Creator of Paris, in the Department of Musicology of the University of California headed by David Cope, of Microsoft in France, of the University of Cambridge, in the Microsoft Research Asia, and in the Facebook Research Department, directed by Yann Le Cun, I raise the arguments for and against this hypothesis. In the second part, I point the difficulties that a robot would have to imitate a writer's style due to the complexity of words revealed by the manuscripts, the often-innovative syntax and the difficulty of listening to the community.

Palavras-chave:

Artificial intelligence. Le Cun. Genetic criticism.

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INTRODUCTION

Literary or artistic criticism and those who practice it have certainly been confronted with the artistic inventions of a robot and may wonder if it is possible for a machine to surpass the human mind. Let us recall with some dread and admiration the victory of the IBM Deep Blue computer over the chess champion, Garry Kasparov, in 1997, and that of the IBM Watson computer over the two champions in the game Jeopardy, in 2011, and also that of the Google AlphaGo computer over champion Lee Sedol, in the game GO, which is more difficult than chess, in 2016 (HARARI, 2016).

To imitate an author's style, the artificial intelligence system called NLP (Natural Language Processing) uses grammar and syntax resources and identifies relationships between words, sound, etc.²

Applied to the arts and literature, would the principle make it possible for a robot to invent a story in the manner of Flaubert, a painting after Rembrandt or a melody similar to those of Bach?

It has already been tried for Rembrandt, Bach and others, but the robot can only start its invention from the already painted canvas or from the already composed Bach melody. It is imitation, and not creation. Therefore, I ask: can the robot invent a style, without going through imitation (ROZIÈRES, 2019)? Can it capture the wealth of the construction of the writer's or composer's manuscript or the painter's experiments? Nothing is less certain!

MUSICAL COMPOSITION

The composer and director of the Spotify Technology and Creator Research Laboratory, François Pachet (apud MANENTI, 2016), attests to the need for a composer in the case of musical creation:

Even in automatic mode, it is a creation, with a composer who makes choices in style, production, mixing... It remains the artistic commitment of an author. We are not trying to replace musicians with automatons... But all these attempts always lead to the same question: Can artificial intelligence compete creatively with man? Can the machine create emotions with its art?

¹ Translation by John Milton.

² "NLP is a sub-area of computer science, artificial intelligence and linguistics that studies the problems of the generation and automatic understanding of natural human languages. Natural language generation systems convert information from computer databases into human-understandable language, and natural language understanding systems convert human language occurrences into more formal representations, more easily manipulated by computer programs. Among the challenges of NLP is the understanding of a natural language, and helping computers to make sense of human language and the generation of natural language [...] The automatic learning paradigm induces the learning of rules through the analysis of typical real-world examples instead of using general learning algorithms [...] However, research has increasingly focused on statistical models, which make flexible and probabilistic decisions based on ways of adding real weights to each input characteristic. Such models have the advantage of being able to express the relative certainty of many different possible responses instead of just one, producing more reliable results when this model is included as a component of a larger system" (PROCESSAMENTO DE LINGUAGEM NATURAL, Wikipedia, 2020).

However, David Cope, Professor of Musicology at the University of California, reports an opposite experience. He created the programme EMI (Experiments in Musical Intelligence) that manages to compose like Bach, Chopin, Rachmaninov, Stravinsky, that is, the computer detects and follows the rules of composition or algorithms of these composers, to the point that listeners confused Bach and EMI during an experiment which confronted their compositions at the University of Oregon. EMI follows three fundamental rules: (1) deconstruction (analyse and separate into parts); (2) signatures (commonality – retain that which bring style); (3) compatibility (recombination – recombine in new works (COPE, 1982).

The listeners who took part in the experiment say they felt the same emotion when listening to both the original and artificial compositions (HARARI, 2016). The machine is, therefore, capable of arousing emotion, but imitates the composer's style. This is confirmed by Bernard Ourghanlian (apud CHAILLOT, 2015), technical and security director at Microsoft in France:

The computer learns from data, so its learning is based on existing works. Even though it learns, it is inspired to a reaction. It is able to film predictive content in an intelligible way, it can manage content in huge environments that exceed three dimensions, where the human being gets lost. But it doesn't invent anything.

And any performance the computer may invent will be dull, writes Manenti (2016):

From February to March 2015, the musical 'Beyond the Fence' was performed in London, the first to be created entirely by a computer. From music to lyrics and script, everything came out of a Cambridge University computer that sifted through hundreds of successful plays... and created a show which was 'faded, harmless and pleasant like a hot drink', according to *The Guardian*.

Music experts also reject the invention of the EMI-derived computer program Emily Howel. They accuse the computer of having chosen in the work of Chopin and Mozart, for example, excerpts that it shuffled to present its invention and of frequently repeating the same themes (COPE, 2012).

However, the creator of EMI, David Cope, also invented the computer ANNIE, which is no longer based on predetermined rules, but composes according to data introduced from the outside world (HARARI, 2016; COPE, 2017). In other words, the computer acts like all human composers, who are also inspired by the creations of their predecessors (SZKLARZ, 2016).

Listening to authors from the past or contemporaries, which results in a vast musical memory for human beings and for the robot an incalculable number of algorithms, would it produce "the leap, the insight, the genius throw of the dice that breaks a paradigm and establishes a new form?" (BOSCO, 2017).

I would say no, neither for the composer, nor for the robot. Even if it does make a great leap, the robot will lack a dimension experienced only by the human being, defined and commented on by Proust's narrator when he spoke of talent. A text will be read to the extent it plays

The public's instinctive life [...] To reach instinctive life, the artist must suppress any external noise and position him or herself in order to listen to life, but in an extremely attentive way as if he or she were listening to a speaking god. Instinct speaks and announces, and, like an oracle, demands to be listened to. Talent consists of having the necessary disposition to, exercising the drive of listening in a very tuned way, perceive the message. It is not, therefore, about style or opposition to a previous school, but rather a very keen capacity to understand a message launched 'à la cantonade' that the writer captures (WILLEMART, 2016, p. 41-42).

Even though the Google robot can deduce the aspirations and desires of those who write messages, read blogs and buy products over the Internet, even if it manages to gather information on the needs of various Internet users, it will never know how to capture the unconscious or unspoken dimension of a

community's wishes. The artist's genius touch, on the contrary, which allows him or her to be moved by the invocatory drive, with a subtle sensitivity, will in some way listen or capture the calls of the community and will be able to respond, even without explicitly recognizing the unconscious dimension.

LITERARY ART

The Asian subsidiary of Microsoft has been working to develop and perfect a form of AI able to write poems corresponding to an image presented to it.

Researchers Bei Liu and Jianlong Fu of Microsoft Research Asia, together with their colleagues, presented the results of their experiments on artificial intelligence, which can control automatic poetic creation, at the 2018 conference of the Association for Multimedia Computing Machinery in Seoul, South Korea.

To put it simply, this is the generation of poetic language in response to the information presented in the form of an image. The challenge is twofold: first, artificial intelligence must be able to 'see' the image. The research in this area is already well advanced, so that the machines can describe the visual elements and thus facilitate their indexing and search.

The machine then must cross a gap: compose a text that is not descriptive or merely descriptive but rather poetic. Making it poetic from a suggestion of themes, from the prospecting triggered by an image, is a complex activity, but it is viable for the current artificial intelligence resources.

Faced with these difficulties, the researchers allowed the machine to create the poem in free verse, to avoid many restrictions such as metre and rhyme. [...] It is important to emphasize that we have not defined what poetry is, said Bei Liu. 'We tried to make the machine learn both poems and non-poetic texts, so that we could distinguish whether the generated sentences corresponded to a poetic style or not,' he said.

The results are encouraging but still a long way from what a human being can create, of course. But Bei Liu has a favourite text, corresponding to the image:



The sun is shining
The wind moves bare trees
You dance

The aim of this research is not to replace poets, the team clarifies, but to be able, in the long run, to take advantage of the contributions of artificial intelligence and to enable AI to take charge of the redundant tasks of creative professions (OURY, 2018, p. 1).

The creators recognized that the poem was poor, a finding that reinforces the argument of the Proustian narrator. To date, no robot has been able to create musical or literary works in the human dimension. Without a subconscious or invocatory drive, the robot cannot respond to the community's desires by creating something original. In general terms, this is the lack of subjectivity of the machine.

In the second part of the article, I would like to reinforce the Proustian argument interpreted in the light of Lacanian theory and show what seems obvious to most geneticists, how complex literary creation is, and the difficulties that the machine encounters, taking as an example Flaubert's short story, *Hérodias*.

There are three obstacles to overcome:

A. The first obstacle: the complexity of words

Without knowing what Flaubert's style is, the robot could try to learn this style in three ways: going through what gave rise to the manuscripts, following the writer's steps, such as readings, travel and other experiences; reading all the manuscripts, just as the genetic critic does; or focusing only on the author's published texts.

A.1 In the first case, it should read the Bible and the books on the Orient consulted by Flaubert. But many books are even today only accessible in libraries and are not in the Cloud. Data storage would be incomplete.

A.2 If it goes through the manuscripts, the robot will use machine learning, a method called deep learning.³ The engineer loads the robot with all the information in the first stage, and in the second stage, the robot traces the trajectories between the published text and the information accumulated in the manuscript, trying to find relations, according to possibilities of artificial intelligence, such as similarity of forms, and, in a much more limited way, relations on the semantic axis, and to then determine what engineers, robot builders, call a curve (LE CUN, 2019). This curve links the final points of learning, that is, the words or passages that will no longer change during writing, points that manuscript scholars call invariants. The increase in the number of invariants can easily be seen in the folios at the beginning of the attached Flaubert story.

The set of points will define the author's style.⁴ From there, the machine works alone until it is able to design a model or articulate rules to compose a short story in the manner of Flaubert, following the steps in Point 1.3. The greatest difficulty is not only to determine the sentences underlying or represented in the published text⁵ but above all the articulation with the variants in the manuscripts.

³ Deep learning techniques are a class of machine learning algorithms that make it possible to:

1. Use different layers of non-linear processing unit to extract and transform characteristics; each layer inserts the previous one; algorithms may be supervised or not, and their applications include model recognition and statistical classification.
2. Working with learning with multiple levels of detail or data representation; in different layers we move from low-level parameters to higher-level parameters, where different levels correspond to different levels of data abstraction. These architectures allow the data to be "significant" giving it the form of images, sounds or texts. Deep learning uses hidden layers of artificial neural networks, the "restricted Boltzmann machines", and complex series of calculations of proposals. Deep learning algorithms are opposed to shallow learning algorithms due to the number of transformations made in the data between the input and output layer, where a transformation corresponds to a processing unit defined by weights and thresholds. Most modern deep learning models are based on artificial neural networks, specifically, convolutional neural networks (CNN) although they can also include proposed formulas or latent variables organized in layers in deep generating models such as nodes in deep belief networks and deep Boltzmann machines (APRENDIZAGEM PROFUNDA, Wikipedia, 2020). The operation that calculates the millions of number 1 neurons that detect the vertical lines, is a "convolution" (LE CUN, 2019, p. 200).

⁴ Crossing out will consist for the writer not in finding the right curve or the right line of the story, which will only exist at the end, but in defining each point, which in the drafts will offer a number of clues. Going through all the points is the method, or rather, the art, of the scribe who will know how to connect them, often unknown to the writer; the fewer points left out, the fewer crossings out there are, the more the style will assert itself. The more points not found or lost, the more crossings out and manuscripts there will be.

⁵ I analyzed a sentence of the published text which represents or implies a series of sequences of the manuscript (WILLEMART, 1993).



Source: Research files.

Image 1 – Flaubert’s handwritten folio from the short story *Hérodias*, part 1



Source: Research files.

Image 2 – Flaubert’s handwritten folio from the short story *Hérodias*, part 2



Source: Research files.

Image 3 – Flaubert’s handwritten folio from the short story *Hérodias*, part 3



Source: Research files.

Image 4 – Flaubert’s handwritten folio from the short story *Hérodias*, part 4

A.3 Working only with the data from the published story and with the help of ‘feature extraction’⁶ which detects only the forms, the machine captures the essential characteristics of the published text or its style, which differentiates it from texts of other authors such as Stendhal, Balzac or Hugo, a complicated step due to the large number of objects or words and the complexity of the syntax. Then, armed with the set of qualities of Flaubert’s style, the machine might not construct an algorithm but rather deduce Flaubert’s algorithms, that is, the steps that the author Flaubert took to reach his style. As an algorithm means a finite sequence of executable actions that aim to obtain a solution to a certain type of problem, the manuscript of the short story *Hérodias* would be of great value because it shows the enormous difficulties in writing the story. But, ignoring the manuscript, would the robot be able to discover the steps that led to the final version of the story?

This is not a matter of understanding the logic that supports the text since the machine does not reason, but, helped by its immense potential for calculations, it defines Flaubert’s multiple choices after each sentence, paragraph and chapter. If it considers words and expressions only as objects, that is, as a univocal unit of meaning, the machine acts like the robot that gathers the characteristics of a knife that distinguish it from a spoon. However, here, it is not just a matter of making an object but rather of inventing a text in which each word may have several meanings.

The published text has the advantage over the manuscript, which is full of doubts and hesitations, of being constituted by a series of logical conclusions which are articulated and recognized by the author. In theory, it would be enough to understand the logic of the published text to imitate Flaubert’s style. Would the robot be able to reproduce a similar text thanks to the successive layers that allow it to retroact as it reads the text and finds the story’s algorithms?⁷

That is, as it progresses in its reading, the robot should reread what was written after each addition and proceed in the same way that it acts when I write on the iPad. If I type ‘ja’, for example, the immediately appears ‘jar’ or ‘jam’, if I add ‘p’, ‘Jap’, ‘Japan’ or ‘Japanese’ appears. The Google robot that knows all the words that start with ‘ja’, chooses some that I use normally. If I write a whole word such as ‘happy’, Google remembers the previous messages and suggests ‘birthday’ followed by ‘to you’. This is how the successive layer method works, which retroact to define the right word from one or more letters, the first step in recognizing or suggesting an entire word. Imagine the number calculations required for a sentence, paragraph or chapter! To imitate the style of the tale, the robot should survey the context of each of the 9580 words in the story.

I doubt whether it will work, because even if the ‘polynomial or the curve connecting the learning points is correct, the robot will not understand why. It would seem like a student who ‘memorizes multiplication tables without understanding how to multiply’ (LE CUN, 2019, p. 156).

B. *The second obstacle: Flaubert’s innovative syntax*

Assuming the machine maps the 9580 words of the story, it would not be able to attain the particular syntax of Flaubert, which defines his style. Throughout the composition, the writer will continually seek out the author (see the circle of writing, in Willemart, 2014) and manages to initially find him in some passages and not in others. *Madame Bovary*, his first novel, still has phrases that mimic the style of his predecessors, according to Proust (1971). While writing, Flaubert gradually builds his style through the network of characters, the memories attached to the episodes, the folios written about the subject, using his own syntax, the last bastion of writing, according to Mallarmé.

⁶ Feature extraction detects the presence of distinctive motifs in the input image and outputs it to a trained classifier (LE CUN, 2019).

⁷ The successive layers are a trained version of feature extraction. This is the decisive advantage of multilayer networks: they automatically learn to suitably represent the signal (LE CUN, 2019, p. 184).

How can we define Flaubert's style? That is, what are the algorithms that the writer gradually forged and which the robot should find? Responding to a critic of the period, who despised the author of *Hérodiade*, Proust describes Flaubert's new style not by the arrangement of words in context and in the sentence, but rather

Through his entirely new and personal use of the definite past, the indefinite past, certain pronouns and prepositions, he renewed our view of things almost as much as Kant, with his Categories, the theories of Knowledge and Reality in the outside world (PROUST, 1971, p. 586).

Proust thus defines several of the algorithms followed by Flaubert. I fail to see how a robot can imitate the complexity of this style unless, using the mechanisms of Pope's ANNIE computer, he mixes certain phrases that use the imperfect and the perfect, others with prepositions in his narrative.

C) *The third obstacle: the difficulty of listening*

We know that the author is, above all, a scriptor, at the service of the language and the social structures from which he or she emerges and is partly an 'instrument', that is, in a position of an object, submissive to the language, he or she does not completely dominate their own writing. There is no single and definitive interpretation of a literary text, and each person will find a suitable interpretation with their own approach and time. The robot will therefore not be able to handle all the layers of text interpretation and will probably see only the logic included by its inventor, the engineer, as much as the photographer 'completes some of the programmed virtualities' (FLUSSER, 1986, p. 83) in his or her camera and not that which he or she wished. The computer will have trouble to include the poetic sense, that is, the metaphorical sense of the text. I shall now give several examples.

The computer will not be able to relate 'the parasol with tassels', which appears right from the plan, in Folio 708 to Folio 722 v°, an emblem that defined the coin minted under Agrippa I, enemy of Antipas despite being the brother of Hérodiade, with the parasol held by Salomé in the first part of the published story. The parasol would go unnoticed and would be considered an insignificant object in the hands of Hérodiade's daughter and would not symbolize the desire of Antipas and Hérodiade to obtain royalty. The density of the word *parasol* would disappear in a linear narration and prevent the announcement of the coming of Caligula, as emperor, and of his friend, Agrippa I, as king of Jerusalem,⁸ as well as 'the exile of the couple Antipas and Hérodiade to Spain, where they ended their life completely forgotten' (BIASI, 1988, p. 747).

In a linear robotic narration, the metaphorical effect of the last part of the sentence at the beginning of the story would also disappear. The citadel, which in Folio 729v° occupied 'the strongest military position in Palestine', loses its superiority in the published text because, the 'towers that were like fleurons in this crown of stones suspended above the abyss' (FLAUBERT, 2019, p. 987) became a metaphor for Antipas' uncertain royalty.

⁸ The time of History approached by fiction rereads the narrative in another way and invites the reader to negate the claim of Hérodiade, caught in her own trap. Each appearance of Salomé, marked by the tetrarch's gaze, symbolizes the loss of power of the couple who aspire to royalty. Antipas' dance and crazy promise indicate the end of the ambitions of she who wanted to match the great Mariana. Power hardly tolerates dependence on sexual enjoyment. This is a familiar and common lesson in history, taken up through the intrigue of Hérodiade and Iakobanann. The tassels disseminated in the manuscript under Salomé's parasol touch the death knell of vain hope. The marked repetition of the signifier of Salomé in each chapter insists on the negation of what has just been written and restores the reader, without their knowledge, to the future reality. John the Baptist had also prophesied, from the bottom of his ditch, the fall of Hérodiade and Antipas: "The punishment has already descended on your incest. God punishes you with the sterility of the mules./.../ (and to Hérodiade) The Lord will tear off your earrings, your purple clothing, your linen veils, etc.", but this discourse was religious and not political as was the announcement of Agrippa's kingdom. The writer Flaubert, who apparently repeats the religious discourse of the Bible, overlooks a "lay" discourse, that of the occupant (WILLEMART, 1993).

Could the robot deduce that the phrase 'Iaokanann, the same that the Latins call Saint John the Baptist' (FLAUBERT, 2019, p. 1011) implies the appearance of John the Baptist on four occasions, which shows the hallucination syndrome in Antipas and his obsession with John the Baptist? While in Folio 755, we read:

But will they come? Suddenly, a dull and distant noise like a voice coming from the depths of the earth makes him shudder. <He goes pale>. he turns around, looks, goes <very /illegible./ in front of the terrace - nothing. Is it probably an illusion? << he resumes his reflections - then he thought so much that suddenly, he sees, there, in front of him in a hallucination, a man with camel skin, <under> palm trees river the crowd on the bank of a river baptizing a crowd was is afraid (WILLEMART, 1984, p. 56).

In the published text, only two lines were left: 'Suddenly, a distant voice, as if coming from the depths of the earth, made the tetrarch turn pale. He leaned over to listen, it had finished' (FLAUBERT, 2019, p. 1003).

The word 'hallucination' is gone. To describe Antipas with a certain strangeness by giving him hallucinations, would evoke the new distinctions of medical-psychological science at the end of the 19th century, hardly congruent with the world of Antiquity. Perhaps this is why Flaubert preferred to give him visions in which Antipas seems lost at the end of the first chapter (WILLEMART, 1993), but the robot would not suspect this density of the word 'vision' that links the first century to the scientific discoveries of the time of Flaubert.

A last caveat: the French Senate report in November 2019 on the limitations of artificial intelligence reinforces the difficulties of a robot to compose a melody, a short story or a poetry.

SUMMARY

Throughout the article, I briefly covered the various trends in artificial intelligence research in different parts of the world: at Sony's Spotify Technology and Creator Research Laboratory in Paris, at the Musicology Department at the University of California, headed by David Cope, at Microsoft in France, at the University of Cambridge, at Microsoft Research and at the Facebook Research Department, directed by Yann Le Cun.

From the data collected, I raised arguments in favour and against the hypothesis that a robot could imitate a work of art with characteristics of the artist's own creation. In a second moment, I pointed out the difficulties that a robot would have to imitate the style of a writer due to the complexity of the words revealed by the manuscripts, the often innovative syntax and the difficulty of listening to the community.

I conclude that, to date, no robot can create musical or literary works in the human dimension. Without an unconscious or invocative drive, the robot does not reach the subjective complexity of creation nor can it respond to the wishes of the community. With this essay, I hope to have convinced my reader that a robot has little chance of matching any writer, despite its immense potential for calculations and its power of memory.

APPENDIX 1⁹

Senate of France. Robots tomorrow: towards a transformation of service jobs.

⁹ Available at: <https://bit.ly/3rWSVBH>.

Information Report 162 (2019-2020) by Marie Mercier and René-Paul Savary, made on behalf of the Senate Delegation for Forecasting, presented on November 28, 2019.

Marie Mercier, rapporteur. What is intelligence? We define it as a reasoning skill. However, AI is able to do calculations very quickly, but not to reason with its own reasoning. AI will not make zero failures and will not be able to see its own limits but holds surprises. We thought for 30 years that robots would replace surgeons. That is not the case today. Paradoxically, medical specialists are more threatened than general practitioners by AI's intrusion into health. The work we do at the Forecasting Delegation aims to examine the impact of AI on service work. Will reception robots replace reception workers? Or are we going to move towards collaborative work between men and machines?

Christine Lavarde. - We see today that French growth is reaching its maximum because we are at the maximum capacity to mobilize our productive apparatus: it seems that the people employed today simply cannot continue in the same way. However, it will take great skills to explore deep learning because we have to understand that AI is more powerful than we are. Is this possible?

Laurent Alexandre. - I'm afraid not. The gaps will explode because the potential of each of them is very different. A study that evaluated the US 'No Child Left Behind' programme showed a reduction in educational gaps when specific investments were made for the most disadvantaged, but the study proved to be false, and those responsible for it have been prosecuted by the courts. The duplication of PCs does not give good results because it is very marginal. AI can replace qualified people, but it consumes more and more brains. Brains are scarce. We will have a shortage of smart workers in 20 years' time. AI does not replace the brain but rather complements human intelligence. The researcher Serge Abiteboul tells us that 'being a data scientist requires a lot of available brains'.

Laurent Alexandre. - In my lectures, I am often asked what to teach children. I answer: humanities, history, philosophy, general culture. Learning to code is pointless.

Axel Dyèvre, Associate Director of CEIS. The word 'intelligence' in the term 'artificial intelligence' is an abuse of language, a seductive expression to seek research credits in the 1950s. Luc Julia, the inventor of the voice assistant Siri, stated in a book that artificial intelligence did not exist. When it comes to defence, the areas of the usage of AI differ from country to country. Americans use AI to increase the soldier's skills with an offensive doctrine. The Chinese are trying to increase their weapons system with a logic of defensive prohibition. The Russians use AI as a force multiplier. The Israelis use AI to speed up reaction times. AI is a multiplier of human intelligence capabilities but not a substitute for it. We should not be fooled by advances in software. It is the computational capabilities, the machines, the hardware, that allowed the software to record such an important performance. AI has become very efficient, but it also has its own limitations: the computer cannot anticipate the unpredictable.

Jean-François Mayet. - It is not the most robotic countries that have the most unemployment. Machine intelligence is not a social intelligence: it is based only on the ability to quickly store and process huge amounts of information. Robots also have great strength: they do not deceive themselves...

APPENDIX 2

That a computer, Deep Blue, was able to beat Gary Kasparov in chess in 1997 was the apotheosis and the end of the ambitions of this research program. Artificial intelligence has failed against the infinite diversity of contexts. Making the machine 'smart' is useless if its reasoning cannot be adapted to every situation. That is, most real-life situations are not 'coded', as are the rules for moving chess pieces (Caron, 2015).

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