Circumscribere

From the Golem's Jewish myth to IBM's responsive Watson: where are we going?

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Abstract

Since data mining uses notions from areas such as cybernetics and artificial intelligence, it is worth evoking here ages-old fears elicited by the idea of automatons created to help humans, but which eventually turned against their creators. Examples might range from the Jewish myth of the Golem to the more famous Frankenstein, Hal from Stanley Kubrick's *2001: A Space Odyssey* (1968), and the more recent *Her*, by Spike Jonze (2013). In this discussion we pay special attention to the fact that in the 21st-century it seems to be less a matter of creating an individual cybernetic creature, than of the rise of social networks, which are alluded by many as collective intelligence. Such collective intelligence might involve, for instance, the responsive ability of IBM's Watson.

Keywords

Collective intelligence; Automatons; Social networks; Digital humanities

One might say that the digital humanities are currently expecting intensive collaboration between humanities scholars and specialists in information technology. The overall goal of such collaboration is to increase the effectiveness of computer-based tools specifically tailored to improve research in the humanities. But not only. Thus, for instance, Brett Bobley, director of the Digital Humanities Office, National Endowment for the Humanities – a US government development agency, stated: "The term [digital humanities] was coined to define research incorporating computational technology into studies in the humanities, but also the one that uses the humanities to study digital technology and its influence on society and culture."[1]

One among the resources developed is known as data mining, which helps researchers interact with the World Wide Web and large databases stored in machines. At Center Simão Mathias of Studies in History of Science (CESIMA) we have been working for many years in this line. We developed a large database comprising primary sources in and for history of science, and also a tool to improve indexing documents. Our preliminary results suggest that data mining is useful for the organization and indexing of documents in digital libraries, thus it opens new perspectives for research in history of science.

Since data mining uses notions from areas such as cybernetics and artificial intelligence, it is worth evoking here ages-old fears elicited by the idea of automatons created to help humans, but which eventually turned against their creators. So we can go from the Jewish myth of the Golem to the more famous Frankenstein, Hal from Stanley Kubrick's *2001: A Space Odyssey* (1968), and the more recent *Her*, by Spike Jonze (2013). In this discussion we will pay special attention to the fact that in the 21st-century it seems to be less a matter of creating an individual cybernetic creature, than of the rise of social networks, which are alluded by many as collective intelligence. Such collective intelligence might involve, for instance, the responsive ability of IBM's Watson.

In the 1960s, Gershom Scholem wrote a very interesting article entitled "Prague's Golem and Rehovot's Golem," in which he compared the myth of the Golem of the Jewish tradition and the development of the Golem I and Golem II new computers at Weizmann Institute, Rehovot, Israel. This comparison seems to make sense, because the mythic Golem points to the basic question underlying all attempts at constructing automatons: what can humans transfer to a heap of matter in the terms of intelligence? According to Scholem, "in final analysis, the Golem is but a reproduction of Adam, the first Man in person. God could create man from a heap of clay and invested it with a spark of life force and divine intelligence (that is, ultimately, the 'divine image' in the likeness of which man was created)."[2]

An interesting aspect of the mythic Golem is that the 'key to its operation' was a piece of paper inserted to its mouth, something quite similar to how data were loaded in the earliest computers. Thus in both the old and the new Golems there is an interesting game of letter sequencing, codes and automated functioning.

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[1] Apud Fabricio Marques, "The Reality Emerging from an Avalanche of Data," *Pesquisa Fapesp* 262 (December 2017) available at: http://revistapesquisa.fapesp.br/en/2017/12/05/the-reality-emerging-from-an-avalanche-of-data/ (access: 20 March 2018).

[2] Gershom Scholem, *O Golem, Benjamin, Buber e Outros Justos* (São Paulo: Perspectiva, 1994), 91.

Somehow we might see Yuval N. Harari's second book, *Homo Deus*, as an almost literal development of Scholem's idea: since the beginning of the 'Computer Age' we are distributing intelligence through clusters of matter containing silicon or equivalents (the digital networks).[3]

And something quite curious surprised us as of lately. Most contemporary thinkers, having in mind the old Golem myth, imagine a person-like creature eventually able to overcome humans and escape their control. The heir of this tradition is Kubrick's computer Hal (which name derives from "IBM") which becomes independent. Instead, a surprising reversal occurred, as what we are now confronting is a collective Golem, which comes to existence through our increasing network performance. Instead of having created an individual Golem, we found a way to extended ourselves into a dynamic network, which is nothing but the fruit of our presence in digital networks. The intelligence thus presented to us is not confined to any individual, and we do not interact with it as an individual – as in the film *Her*, e.g., in which users fall in love with operational systems.

Also fear was inverted. We do not longer fear a robot will overcome its creator, lose control and threaten us – the creature against its creator. The issue now is whether our individuality might survive the digital ocean, increasingly surrounded by sophisticated algorithms that accompany and interact with our presence in the networks.

Everywhere we look we find fear, clamors, people concerned with the end of privacy. Does our expansion across networks threaten our presence as individual human beings across the lands and seas of the planet?

Let us start our reflection by asking: of what does this collective intelligence precisely consist?

We might begin by that which is most essential for us humans: our health. IBM's Watson: a database processed online, which contains data from almost all humankind and provides diagnoses that might even extend into the genetic code. We prefer to see machines like IBM's Watson and the work being done with this kind of responsive machine as an intense data-organizing action, which a human brain with its characteristic creativity, emotion, and experience could not put together. For example, Watson is able to consider all the diagnostic possibilities for a given disease, and thus provide advice to physicians on measures to save lives. In other words, here we have a case of collaborative intelligence manifested in actions for life.

Watson involves a very useful interaction between man and machine, rather an autonomous mind. Watson is endowed with a set of skills far superior to those possible to one single human being. Here we would not like to recreate the myth of a robot able to mimic human beings. Yet, we believe that it is not difficult to see that cooperation between complex machines, such as IBM's Watson, and humans opens perspectives far superior to those available to each member of this pair alone. Similarly, some of the characteristics of the current tools and skills – once again citing Harari, or at least his description on how the use of tools and skilled differentiated the so-called *Homo sapiens* from their ancestors, or rather

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[3] Yuval N. Harari, *Homo Deus*: *A Brief History of Tomorrow* (London: Harvill Secker, 2015).

other humanoid races – might put as face to face to a new entity resulting from human beings and their digital extensions.

Let us cite a more 'down-to-earth' example. Or better, 'down-to-water'. An application for water consumption control was introduced in Israel. A system for control of water leaks was developed based on the strategy that blocks credit card use when the system detects an unusual purchasing pattern. Similarly, the system detects an unusual water use pattern (the leaks) in any part of the country producing instant alerts, which allow solving the problem in few hours. As a result, while countries around the world have a 30 to 40% loss of water from leaks, in Israel it is less than 10%, and in some cities even as low as 6%. The digital network becomes effective as a source of water. Here we have an incredible practical demonstration that the digital world has a lot to say on non-digital issues, in this case it becomes a source of water. Seth Siegel's *Let There Be Water* is a must-read book about water, and describes an interesting case of collective intelligence for the benefit of all.[4]

The innovative aspect here is the development of computer-based tools for automated management, analysis and visualization of large or small, generic or specific datasets in a definite library or information put together through social networks. Our challenge is to develop a conceptual and technological solution to manage and conduct certain inquiries in our digital library specialized in the history of science. That is what we are doing now at CESIMA DIGITAL library.

This project is aligned and integrated with international initiatives, such as the Digital History and Philosophy of Science Consortium (http://digitalhps.org/), originated in the perceived need for technical solutions and user-friendly computational infrastructures.

We are aware of some possible limitations. As Stephen Weldon points out, the sociological style of analysis, other than historical, attempts to cut individual and contingent factors that produced unusual data to see the larger generalized picture. That is why, he says, "the features that make historical work so powerful are not suited to today's digital environment."[5] For this reason, the more historians depend on digital tools; a tension arises between the historical picture and the information environment. The reason is that in the digital humanities, generation of datasets does not precede nor is it independent from actual research work.

Weldon further emphasizes that although the digital environment is not a neutral medium for the flow of information, it was intentionally built for specific purposes, which in turn shape how it is used. And, of course, there are limits to what information can do, depending on its own nature. That is, a binary coding of everything that makes it intrinsically reductionist, and can respond only as it was codified to do. As such, it imposes limits on historical work and its necessary sources, since historical methodology, by its very nature, tends to oppose the mechanistic digital environment. Stable resources studied by historians are idiosyncratic data, unique phenomena and unstructured information, which are impossibly difficult to put into a formal structure.

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[4] Seth Siegel, *Let There Be Water: Israel's Solution for a Water Starved-World* (New York: St. Martin's Press, 2015).
[5] Stephen P. Weldon, "Historians and Their Data," in *Crossing Oceans: Exchange of Products, Instruments and Procedures in the History of Chemistry and Related Sciences,* ed. Ana M. Alfonso-Goldfarb et al (Campinas: CLE/UNICAMP, 2015), 299-322.

The question asked here is very interesting: does the 'binary coding' nature of the present-day machines actually impose such limits? When Garry Kasparov lost a chess game to Deep Blue (a IBM machine) we began to realize that 'binary coding' might not be as limited as we imagined. We cannot predict Deep Blue's response at any point of the game. And we can go even further into those speculations and ask how much of our human intelligent performance is limited to the binary action of our brain is indeed a 'mechanistic' reduction.

While digital humanities have both advocates and critics, we prefer not like to take a stand in this controversy, but merely assert that we believe it consists of a set of initiatives to enhance cooperation among scientists using high developed technologies.

The 'Internet phenomenon' will probably go down in history as a milestone located in the mid-1990s, as was the release of the Gutenberg's Bible. Another landmark occurred somewhat later, around 2007, with the popularization of the use of smartphones, the emergence of Facebook and applications such as Whatsapp. This landmarkis known as 'neural network' or 'collaborative intelligence.' To elucidate how such intelligence works, one example is the one of a conference, for instance: the hall is full of people attending a lecture. But the same lecture might be simultaneously attended by tens of thousands of people through Internet, who can also interact with the lecturer and the in-person audience. We use application Waze, which allows drivers share the best routes, avoid traffic traps and estimate real-time the time driving will take. As in the case of the Israeli water leak system, use of algorithms in non-digital life, is a source of time. Or as Waze's developer Uri Levine stated on a visit to Brazil: "It gives us life."

These examples point to tasks performed with computers, involving storage and handling of large amounts of data and extensive calculations, which result in useful information for humans accessing applications.

Our new Golem is a giant network that self-expands across the planet as a living being. Yet, we believe that we will be able to preserve our individuality, even when we have a real collaborative and interactive presence in the net and society at large. Let us keep the old, but always dreaming of a more collective society.

To conclude, we would like to quote a comment made by Rosana Hermann on her book on Twitter: "In a reduced and dramatic setting, proper for the theme, Twitter is the last chance for human beings to succeed as a civilization. If we do not survive this incredible load of access, speed, and freedom, our incompetence to live on planet Earth will be proven."[6]

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[6] Rosana Herman, *Um Passarinho Me Contou: Relatos de uma Viciada em Twitter* (São Paulo: Panda Books, 2011), 150.