proceedings

MDPI

Proceeding Paper

Digital Humanities and Artificial Intelligence: An Accelerationist Perspective of the Future †

Mariflora Caruso [1] and Alessandro Spadaro [2,*]

[1] DigiLab, Sapienza Università di Roma, Piazzale Aldo Moro 5, 00185 Rome, Italy; mariflora.caruso@uniroma1.it
[2] Scuola di Specializzazione in Beni Architettonici e del Paesaggio, Politecnico di Torino, Via Oddino Morgari, 36/b, 10125 Torino, Italy
* Correspondence: spadaroalessandro95@gmail.com; Tel.: +39-3315657090
† Presented at the Una Quantum 2022: Open Source Technologies for Cultural Heritage, Cultural Activities and Tourism, Rome, Italy, 15–16 December 2022.

Abstract: Data science, deep learning, artificial intelligence, and automation processes are becoming increasingly central in most research fields and promise significant developments in each of them. For some time now, their paradigms have also entered the field of digital humanities and archaeology. However, there is still a lack of ethical and disciplinary reflection among scholars and professionals about the current state of the art and the consequences it is already having, and especially the ones it could have in the future. This contribution aims to create a moment of reflection and proposals in this regard.

Keywords: digital humanities; artificial intelligence; automation

Citation: Caruso, M.; Spadaro, A. Digital Humanities and Artificial Intelligence: An Accelerationist Perspective of the Future. *Proceedings* **2024**, *96*, 10. https://doi.org/10.3390/proceedings2024096010

Academic Editors: Gabriele Ciccone and Giuseppe Guarino

Published: 14 March 2024

1. Introduction

This contribution aims to represent a humble reflection and analysis on the possibilities of technological developments in humanities and heritage for the immediate and near future, from an ethical and sociological perspective. The role and the philosophy of open and accessible data are the broader picture is considered as well. This article aims to provide insights mostly about the consequences that the use of these tools may have in the future, with a particular focus on the archaeological field. The theme of automation in human work is analyzed as a structural trend in the socioeconomic model in which we live; by doing so, a brief history of studies on this topic will be proposed. Possible scenarios, probable ones, and desirable ones are outlined with any related repercussions and implications, also considering the role of humanities disciplines in each of them. Finally, some indicative proposals are examined: we question what a new humanism idea really means and what role digital humanities, and heritage in general, can really play in it.

2. Automation of Labor as a Structural Trend

As a first step, it could be helpful to provide some considerations about what technological advances really mean in a broad sense. As a matter of fact, the latter is considered as a trend that is definitely structural and, therefore, somewhat inevitable within the larger socioeconomic system in which we live. In other words, it occurs regardless of the will of the individuals. This trend is a result of what is sometimes defined as technological "development" or "progress". It is clear that these technologies are invented and developed—intended to "serve" human beings by making their existence generally more "comfortable" and by relieving them of working fatigues. They also allow them to achieve results that were difficult to imagine in earlier eras before these developments occurred, following a hyperbolic and exponential curve (more development in a given period of time

accelerates the process and allows for greater developments in a shorter period of time, following an exponential pattern).

Scholars from various fields (mainly economists, but also scientists, philosophers, etc.) have been concerned with the issue of machines and automation since the beginning of the so-called industrial revolution in the 18th century. Certainly one of the most influential among them was Karl Marx. The German philosopher examined this topic in the firse book of his work Das Kapital, more precisely in the fourteenth chapter entitled Manufacturing and the Division of Labour, within Section IV, entitled The production of relative surplus value. Moreover, he wrote the so called Fragment on Machines within the Grundrisse der Kritik der politischen Ökonomie [1,2]. I am interested in briefly discussing these concepts because contemporary criticism still considers them largely valid. Naturally, they are considered in a non-dogmatic way and within their historical context which has deeply materially changed compared to 19th century industrial society. This chapter illustrates how the role of machines serves to produce more goods at a lower cost.

Since the limit of the working day is marked by biological reasons (one cannot spend all 24 h working, but eating and sleeping are necessary) as well as historical–cultural limits (liberal regimes granted the right to the workers' movement to shorten working days), the capitalist's interest consists of obtaining a greater productivity or a greater intensity of work from the same period of time, say an hour. In the simplest terms, the capitalist's profit margin, that is, the amount of money they pocket, is derived from the ratio between surplus value (the value extracted from labor) and the sum of variable and constant capital. Variable capital is the capital invested in salaries, that is, the number of employees and their respective salaries; constant capital is finally what is invested in machines and everything that is needed to make the factory work (the means of production). These relations can be represented by two expressions:

$$Rate\ of\ surplus - value = \frac{Surplus - value}{variable\ capital}$$

$$Rate\ of\ profit = \frac{surplus\ value}{constant\ capital + variable\ constant}$$

Now, from this, contradictions arise which consist in the tendency of the rate of profit to fall. First of all, since the capitalist cannot extract more work from each worker, it will be in their interest to prolong the time dedicated to working on the machines, i.e., the workday; secondly, with the same level of productivity and therefore, of goods produced. It would be in the capitalist's interest to have fewer outflows due to salaries, i.e., to expel workers from the production process and swell the reserve industrial army, i.e., unemployment. In other words, the introduction of machines that could shorten the workday is transformed into its exact opposite.

From this, it follows that variable capital represents an investment value for the capitalist not so much in itself, but in relation to variable capital, i.e., the wage earners. It is convenient for the capitalists to be as low as possible. However, to some extent, competition between the various capitalists (which ultimately generates the already mentioned phenomenon called by Marx the tendency of the rate of profit to fall) also favors investment in constant capital, in the instance that it is as performative and productive as possible at the lowest possible cost. Therefore, these mechanisms are inserted, in Marxist terms, into the economic structure, i.e., they materialize dialectically and cannot be avoided.

Philosophical and sociological speculation about Marxist theories of machines and labor have gone through the entire XX century, like in the case of the School of Frankfurt or Italian operaism. At this regard, I would like to mention the works by Emery and Cengia, and by Turchetto, the latter representing an expanded version of the entry "operaismo" intended for the Dictionnaire Marx contemporain, edited by J. Bidet and E. Kouvélakis [3,4]. Economists from different schools of thoughts have considered that, too; John Maynard Keynes himself, one of the main exponents of liberal economic theories, expressed his opin-

ion in his lecture given in Madrid in June 1930, Economic Possibilities for our Grandchildren. Within the decades since then, the phenomenon of so-called "technological unemployment" and the number of hours spent working in a worker's life would have gradually decreased due to these structural tendencies [5]. He imagined that his grandchildren would have had a three hour work day.

In more recent times, the theme of automation and the liberation of workers' time has come to be the center of an interdisciplinary but mainly philosophical current of thought called accelerationism. It originated from the experience within the University of Warwick of the CCRU (Cybernetic Culture Research Unit). This used to be a collective of experimental cultural theory which focused on cultural phenomena derived from technological developments [6]. From it, thinkers such as Sadie Plant, Nick Land, and Mark Fisher emerged, who in turn influenced a generation of scholars from different disciplines [7]. Among these scholars are Nick Srncek and Alex Williams—in some of their works, they highlighted how the rapid progress of automation, the growing surplus of the working population, and the continuous imposition of economic austerity policies would demand the rethinking of the function of work to prepare for future crises of capitalism. The latter, as we have already seen, is oriented towards accumulation and expels the surplus population from the production chain, producing unemployment. During cyclical periods of crisis, automatable jobs disappear permanently, and capital eliminates those jobs once and for all. In short, the two sociologists propose as a possible beneficial solution for globalized humanity to use the inevitable trend towards job automation for the end of wage labor and, therefore, to give up the dream of full employment in favor of full unemployment, in which each human being will have full availability of their own time. Among other things, they also emphasize how most major technological innovations come from the public finance sector and not the private sector: in fact, capitalist markets prefer short-term, low-risk investments, while contemporary venture capital tends towards creating immediate profits. Therefore, it is governments that provide the long-term resources that allow for the development and success of major innovations, invest in risky development projects that have a high probability of failure but that retain the potential to bring about profound changes. This opens up a post-capitalist imaginary and a post-scarcity economy [8,9].

All the mechanisms illustrated so far are at the base of the so-called phenomenon of "technological displacement" or "technological unemployment". These technological changes expel workers from job market providing "mechanical-muscle" machines or more efficient "mechanical-mind" processes (automation). It is becoming more and more relevant every passing day, even as this paper is being written. Every now and then it is possible to hear, for instance, about jobs displacements for journalists, graphics and janitors. Since this displacement has affected a great variety of work fields, among them, the humanities field may be taken into account as well.

3. Current Developments in Heritage and Archaeology

As global technological development and the socio-economic context especially has been exposed, some questions arise. What is the state of the art in the heritage and humanities field? What role could the machine have in a renewed process, and what the archaeologist user? What are the possible outcomes in present times and in the future?

To this purpose, I would like to propose two different case studies. In 2022 the Archaeological Park of Pompeii decided to purchase a robot from Boston Dynamics, model SPOT. As an article from the official Archaeological Park's website states, the experimental phase involved the robot along with the Leica BLK2FLY, the first flying laser scanner capable of autonomously conducting 3D scans, allowing the automation of routine inspection activities and the collection of data in a safe manner. SPOT has been equipped with two modes of functionality, with the Leica BLKARC and the Spot CAM+ sensor, respectively. In other words, the robot uses the same sensors to see and navigate in the world and to provide highly accurate 3D reconstructions of Pompeii's structures and architectures. The data can be used to monitor the conditions of its remains and to notice subtle changes and damages

in the walls and various ancient structures. These can be used, studied, and analyzed by users all over the world. The Archaeological Park's director, Zuchtriegel, also stated, "Technological advances in the world of robotics, in the form of artificial intelligence and autonomous systems, have produced solutions and innovations typically associated with the industrial and manufacturing world, but which until now had not found application within archaeological sites due to the heterogeneity of environmental conditions and the size of the site" [10].

The concepts of artificial intelligence and autonomous systems, linked to machine learning and deep learning, come in hand for the second case. This paper will now just consider some works from Eleonora Grilli which are related to a wider network of specialized researchers: more specifically, I would like to refer to works from Grilli and Remondino in 2019, and Pierdicca, Paolanti, Matrone and Martini in 2020 [11,12]. In her works, the use of 3D models for the documentation and analysis of cultural and archaeological heritage appears on the rise. The research team of the Bruno Kessler Foundation has been exploring reliable and efficient procedures for the automated classification of digital surveys and resulting 3D data, such as point clouds and polygonal models, using automated segmentation and classification methods. These methods have been applied and validated on various archaeological and architectural case studies. The proposed approaches are reliable and replicable and are effective for restoration and documentation purposes, providing metric information on damaged areas that are suitable for restoration.

The convergence of these tools with the Pompeii robot and the extreme consequences of the development of other digital tools such as PyArchinit or the Extended Matrix Project, whose developing projects are available online [13,14] might now be ideally imagined. This would potentially mean the total automation of an entire branch of archaeological discipline, specifically the technical surveying and analysis of ancient monuments. This could lead to a significant democratization of knowledge, but it could also mean the disappearance of skilled professionals from the workforce, especially in a socioeconomic environment that values extreme competitiveness and financial sustainability. Institutions, such as museums and archaeological parks, schools, and healthcare sectors, are increasingly subject to financial constraints and are becoming more like business companies, pursuing profitability rather than the delivery of essential services to the community. The same applies to universities and the professional job market, where the intervention of the private sector, subject to market laws, is encouraged. In such a context, a robot could potentially replace a skilled professional in archaeological services, potentially causing significant job displacement.

4. Possible, Probable, and Desirable Scenarios

4.1. Consequences

Once this type of reflection has been satisfactorily addressed, the next step would be to see how our field, that is, culture and the humanities, could be inserted in turn in a deeply disrupted future context: that is, to critically evaluate what possible future scenarios there may be, which are probable, and which are desirable.

To give a virtuous example, for this effort we are still aided by Alex Williams and Nick Srnicek in Issue 1 of the quarterly Menelique magazine [15]. The two sociologists address to the role of the labor and workers movement. Based on the trends we analyzed earlier, if the labor movement proves strong, it is likely that we will have more automation; conversely, if the movement is weak, we will have less automation.

In the first case, a strong labor movement is able to push for higher wages (particularly relative to stagnation of global productivity growth), but the increasing cost of labor means that automation would advance quickly in most parts of economic sectors as machines cost would become relatively cheaper compared to labor. For these reasons, as automation goes on and on, the workers, for the most part, would be shifted in different sectors. At the moment, the fastest-growing job sectors do not concern professions that require high levels of education. According to the two scholars, becoming highly skilled and well-

paid workers would be extremely unlikely. The sector that is growing the fastest, by far, is the healthcare sector. There is one main reason why this sector can be considered a huge magnet for workers displaced from other sectors. First, the demographic data of high-income economies point towards an ageing population. Fewer births but longer lives (usually with chronic disorders rather than infectious diseases) will gradually push our societies to take care of the elderly, increasingly forcing people to seek work in social and healthcare. This means that the demand for work in this sector is unlikely to decrease, especially if productivity remains low, skills remain exclusively human, and demographics tend to grow it. The final result would consist in the continuous elimination of "middle class" jobs and the ever-increasing polarization of the labor market as workers are pushed into lower-paying sectors. Furthermore, the highly educated generation that was promised safe and well-paying jobs would then be forced to seek less skilled jobs, putting less pressure on wages.

What happens instead if the labor movement remains weak? A completely different scenario looms ahead. In this case, we end up with stagnant wages, and with labor costs relatively cheaper compared to investments in new equipment. The consequences of all this are low levels of investment in businesses and, consequently, low levels of productivity growth. With no economic reason to invest in automation, companies cannot increase the productivity of the work process. Perhaps unexpectedly, with this scenario we should expect high levels of employment with companies trying to maximize the use of low-cost labor rather than investing in new technologies.

4.2. Cultural Studies Inspirations

Some samples from the cultural studies, such as the science fiction products, could help to imagine future different scenarios. It might be possible to imagine how our disciplines and professions could be configured in the future in the light of the complex considerations we have made so far.

Firstly, I would like to consider the fictional universe of Star Trek. As the character Captain Picard himself explains in a scene from the movie *Star Trek: First Contact*, in that society money has been abolished and the driving force in humans' existence does not rely on acquisition but in the improvement of the entirety of society and humanity. Individuals can dedicate themselves to culture and exploration for their own entire life; the character itself is described as an explorer devoted to so-called "xenoarchaeology"—the study of ancient alien cultures from different worlds. This might be a hint to imagine an archaeology that goes along with a renewed anthropology, becoming a fundamental discipline in the exploration of space. This might sound quite unrealistic, nevertheless it might be worth to mention the existence of the ISS Archaeological Project, which is led by Dr. Alice Gorman (Flinders University) and Dr. Justin Walsh (Chapman University) [16]. This could prove that developing new methods for the discipline of archaeology to enable future study of other remote, unusual, and/or dangerous contexts is definitely possible at present times.

A second case regards a dystopian futuristic setting—the film by Christian Rivers and produced by Peter Jackson, *Mortal Engines*, based on the novel of the same name by Philip Reeve. In this dystopian fiction, a fundamental role is played by the guild of historians: their archaeological knowledge propels many of the events in the plot for the various characters, because of an enormous need of recovering lost and forgotten technological knowledge, thanks to what sounds precisely as searching and discovers of material culture.

A last case is related to Ridley Scott's immense work in the Alien universe, through the prequel *Prometheus*. In this movie, the protagonists are the pair of archaeologists Elizabeth Shaw and Charlie Holloway in a not-so-catastrophic immediate future. Their work on the origins of humanity sets in motion the intertwining of the interplanetary story: this becomes the start of the Alien universe narrative. We found very interesting that the very nature of the discipline in this case intertwines with a science fiction theme.

5. Conclusions and Proposals

This contribution was meant to be nothing but a clear, albeit humble, perspective on the need to rethink the limits and horizons of the humanities, especially in order to better focus on the opportunities that may arise from the upcoming developments in digital automation.

We could imagine the extreme boundaries of the developments of all that we usually discuss in these contexts: digital applications, knowledge to be finally shared through open source, etc. We are already witnessing great debates in related fields about the exploit of AI mainstream tools such as ChatGPT or MidJourney [17–20]. Perhaps a further step would be to consider the extreme consequences of what was stated so far in regards to our disciplines, involving the entirety of society. In a context where time is enormously liberated, society would not only be enabled to access heritage and knowledge in a completely renewed way (and in this respect it would also be interesting to ask how the places of culture, starting from museums, would change, the role they would play, etc.), but would also be actively involved in the process of producing knowledge that has so far remained the exclusive preserve of professionals, with any distortions that may arise.

The main core of the accelerationist thought is indeed the necessity to gain back the power of rethinking the perspective of the future, which is not given once forever, by acting in the present: humanities have a lot of potential and duties in these terms.

This study proposes that a new humanism, endowed with the immense possibilities of technology that we have seen, still resides in the ability of the archaeologist or professional to transmit and communicate information and stories to the community in the most emotionally engaging way possible, in order that the latter is finally completely involved in the broader process of exercising the human heritage. In short, it may aim at touching the most noble chords of the human spirit in order to elevate it further, putting it in an even closer but harmonious connection with its heritage and past, a context where humanity's time is enormously liberated and knowledge is freely and democratically accessible to everyone. One of the most promising paths in this direction might be the reconnection of humanities disciplines to creativity, thanks to the tools that digital applications has already been providing for a long time; the work by Palermo, Spadaro in 2023 deals with the topic of the relationship between digital humanities and creativity [21].

Author Contributions: Conceptualization, A.S. and M.C.; methodology, A.S. and M.C.; validation A.S. and M.C.; formal analysis, A.S. and M.C..; investigation, A.S. and M.C.; writing—original draft preparation, A.S. and M.C.; writing—review and editing, A.S. and M.C.; visualization, A.S. and M.C.; supervision, A.S. and M.C. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Data Availability Statement: No new data were created.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Marx, K. *Das Kapital*; original edition by Hamburg; Otto Meissne: London, UK, 1867; pp. 236–258.
2. Marx, K. *Grundrisse: Foundations of the Critique of Political Economy*; Penguin Books: Harlow, UK, 1973; pp. 690–712.
3. Emery, N.; Cengia, A. *Automazione e Teoria Critica a Partire da Friedrich Pollock*; Mimesis: Milan, Italy, 2018.
4. Available online: https://sites.google.com/site/sentileranechecantano/schede/l-operaismo-italiano-e-il-suo-sessantotto-lungo-20-anni/g (accessed on 13 May 2023).
5. Pecchi, L.; Piga, G. *Revisiting Keynes: Economic Possibilities for Our Grandchildren*; MIT Pres: London, UK, 2010.
6. Available online: http://www.ccru.net/index.htm (accessed on 13 May 2023).
7. Fisher, M. *Capitalist Realism: Is There No Alternative?* Zero Books: Alresford, UK, 2009.
8. Williams, A.; Srnicek, N. *Inventing the Future: Postcapitalism and a World without Work*; Verso Books: London, UK, 2016.
9. Williams, A.; Srnicek, N. *Accelerate Manifesto: For an Accelerationist Politics*; Gato Negro Ediciones: Cuauhternoc, Mexico, 2017.
10. Available online: http://pompeiisites.org/en/comunicati/spot-a-quadruped-robot-at-the-service-of-archaeology-to-inspect-archaeological-areas-and-structures-in-safety/; (accessed on 13 May 2023).

11. Grilli, E.; Remondino, F. Classification of 3D Digital Heritage. *Remote Sens.* **2019**, *11*, 847. [CrossRef]
12. Pierdicca, R.; Paolanti, M.; Matrone, F.; Martini, M.; Morbidoni, C.; Malinverni, E.S.; Frontoni, E.; Lingua, A.M. Point Cloud Semantic Segmentation Using a Deep Learning Framework for Cultural Heritage. *Remote Sens.* **2020**, *12*, 1005. [CrossRef]
13. Available online: https://sites.google.com/site/pyarchinit/ (accessed on 13 May 2023).
14. Ferdani, D.; Demetrescu, E.; Cavalieri, M.; Pace, G.; Lenzi, S.; 3D Modelling and Visualization in Field Archaeology. From Survey to Interpretation of the Past Using Digital Technologies. *Groma Doc. Archaeol.* **2019**, *4*, 1–21. [CrossRef]
15. Available online: https://www.menelique.com/i-robot-ti-ruberanno-il-lavoro/ (accessed on 13 May 2023).
16. Available online: https://issarchaeology.org/ (accessed on 13 May 2023).
17. Radhakrishnan, M. Is Midjourney-Ai the New Anti-Hero of Architectural Imagery & Creativity? *Glob. Sci. J.* **2023**, *11*, 94–104. [CrossRef]
18. Jaruga-Rozdolska, A. Artificial intelligence as part of future practices in the architect's work: MidJourney generative tool as part of a process of creating an architectural form. *Architectus* **2022**, *3*, 95–104. [CrossRef]
19. Available online: https://www.valigiablu.it/chatgpt-intelligenza-artificiale-cosa-serve-rischi-umanita/?fbclid=IwAR39QPZyXCi2tVOvWg-FlWQj3Vs9crmXBFYYYTeC_sADzW_g0hs5VJPO60Q (accessed on 15 May 2023).
20. Available online: https://jacobinitalia.it/i-sistemi-gpt-sono-macchine-ideologiche/?fbclid=IwAR0MzuouhLjxm8EPRLDYBYDbJ8q_tw4vqP-I15THdAVUI5Jfs4bLzftKPBM (accessed on 15 May 2023).
21. Palermo, A.; Spadaro, A. Percorso tattile dell'Appia Antica. In *Atti del Convegno Una Quantum 2021 Nuove Tecnologie open source per la gestione dei beni, delle attività culturali e del turismo, Sala della Fortuna, Museo Nazionale Etrusco Villa Giulia, Roma, Italia (a cura di Paolo Rosati - Eloisa Casadei), 16–17 Dicembre 2021*; Edizioni Archeoares: Rome, Italy, 2022; pp. 95–106.