political dimension of the term "platform", which I will certainly not reveal in this review, hoping in this way to further intrigue readers reading this book and the dynamics related to digital work.

References

Aytes, A. (2012) *Return of the Crowds: Mechanical Turk and Neoliberal States of Exception*, in T. Scholz (ed.), *Digital Labor: The Internet as Playground and Factory*, New York, Routledge, pp. 79-97.

Crawford, K. (2021) *Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence*, New Haven and London, Yale University Press.

Gray, M.L. and Suri, S. (2019) *Ghost Work: How to Stop Silicon Valley from Building a New Global Underclass*, Boston, Houghton Mifflin Harcourt.

van Dijck, J., Poell, T. and de Waal, M. (2018), *The Platform Society: Public Values in a Connective World*, Oxford, Oxford University Press.

Zuboff, S. (2019) *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*, New York, Public Affairs.

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Kate Crawford
Atlas of AI, New Haven and London, Yale University Press, 2021, pp. 327

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Artificial intelligence (AI) is an unknown territory. It is what Renaissance cartographers would have called *terra incognita*: a Latin expression signifying unknown lands that have been barely explored. And what is more mysterious and undocumented these days than AI? The concept of AI evokes a multitude of diverse non-biological intelligences capable of learning independently, thinking in a rudimentary manner and acting without being supervised, in a variety of urban spaces and domains, ranging from cheap restaurants to the highest levels of governance (Cugurullo 2021). Somehow paradoxically AI is everywhere, and yet its geography and politics remain largely uncharted.

It is precisely in this context, rich in cartographic and epistemological challenges, that Kate Crawford's work, researcher at Microsoft Research and chair of AI and Justice at Paris École Normale Supérieure, is situated. Over years of empirical research, she has extensively explored what AI is made of, where AI is coming from, what it is impacting on and how. The results of her studies are now culminating in a fascinating book: an atlas of

artificially intelligent technologies, which is simultaneously science and art, a geographical inquiry and a political intervention.

Crawford's *Atlas of AI* is an unusual atlas, since the author adopts a prominent narrative approach and, rather than a mere collection of maps and analyses, the book offers a collection of stories. Crawford is a gifted storyteller, and her tales of AI are divided on the basis of six main themes that form the core chapters of the book: *Earth*, *Labor*, *Data*, *Classification*, *Affect* and *State*. In the first part of the book, *Earth*, the author takes us on a journey to Nevada where AI, as a material product, is made. AI is presented as an *extractive technology* whose creation requires many minerals and metals and whose life depends upon electrical energy. The line of inquiry is here very much in sync with the work of economic geologists and critical geographers who have unpacked the supply chains of the critical materials that are behind the provision of smart tech (Zhou et al. 2021). Not only is Crawford's critique sharp. Her voice speaks the language of multiple disciplines, and a key strength of this book is in the solid bridges that it creates to connect diverse fields of research which together can fully illuminate the nature of AI.

The second part of the book, *Labor*, convincingly shows the human aspects of AI, stressing that the industry of AI would not be possible without the physical and mental exertion of thousands of human beings. To explore this critical aspect, the journey continues in the US where Crawford lets us enter an Amazon's fulfilment center in New Jersey. The space is gigantic and the labor dynamics that we witness are a Marxian nightmare: those very humans who are working hard to create robotic technologies are themselves being treated like robots.

The third and fourth parts, *Data* and *Classification*, are deeply interconnected, since they deal with the production of the digital information that AIs are fed with, and how artificially intelligent entities categorize and metabolize these flows of information. Data is everything. It is everything in the sense that it is the most important resource for any company wishing to create and train an intelligent machine. Data is also everything because every piece of both the digital and physical world contains some form of information that AI companies can extract and then feed their machines with. Crawford exposes and denounces the culture of data extraction which seems to know no limit despite its many flaws in terms of privacy and ethics. Singing from the same hymnbook of critical data scholars like Kitchin (2022), she shows how data is not neutral and its metabolization inside AI tech reproduces power relations and biases. The datasets employed by AI contain human-made worldviews which often amplify social inequality under the banners of rationality and scientific objectivity.

The same leitmotif continues throughout the penultimate part of the book, *Affect*, which deals with one of the most controversial topics in AI research: emotions. Here the author, taking a stand unlike that of some

STS scholars (see Hillersdal et al. 2020), equates *affect* with *emotion* and asks the following critical question: can artificial intelligences recognize our emotions and then predict our behavior? In the AI industry, the answer to such questions would be an obvious *yes*, but Crawford does not take the mainstream discourses surrounding AI as articles of faith. Instead, she traces back and critically unpacks the roots of contemporary facial recognition systems, stressing for instance that many datasets are built upon the work of actors who are simulating emotions. Her conclusion is that what the AI is commonly learning from are thus faked emotions whose impact is however very real. AI hiring companies use these flawed systems to evaluate people's suitability for a job, and police officers rely on predictive systems to identify potential suspects. AI is becoming the lens through which society and its future are observed, but this lens is often cracked and even a tiny crack on the surface can generate a huge distortion.

In the final parts of the book, via two interconnected chapters, *State* and *Conclusion*, Crawford digs deep into questions of politics and power. These final chapters are in the tradition of Science and Technology Studies. The work of STS scholars such as Winner (1978) is employed to portray AI as an instrument of power which, far from being politically neutral, is frequently designed to punish rather than to support. This is because, as Crawford explains, most AI systems go back to military systems, which is a point that resonates with Suchman's (2020) recent studies. Their original logic was to find and eliminate threats, and now the same punitive logic is filtering down to schools, workplaces, hospitals and police stations. It is leaving the battlefield to enter our everyday life.

By reading *Atlas of AI*, the picture that emerges is that of a technology that, to paraphrase Winner (1978), has got out of control: an autonomous technology. Essentially, this has happened for two reasons. First, because while in the beginning AI technologies were instruments in the hands of the state, intentionally crafted for military purposes, they are now being increasingly privatized. States do not control AI anymore. The governance of AI is a complex mix of private and public forces and interests, which mirrors the classic neoliberal implementation of smart tech (Karvonen et al. 2019). Second, because we scarcely understand AI and its capabilities, and we will never be able to fully control what we do not fully understand.

Atlas of AI is the perfect medium to begin to understand AI. Crawford wisely avoids any form of jargon and her message comes across clear and loud. The book also contains a wide array of notes and references which the more experienced readers will find very useful to go deeper into the several themes that Crawford's atlas illustrates, but also to find new directions for future research. There are many more uncharted lands that await AI researchers, including emerging human-machine relations, thorny ethical dilemmas and questions of governance at a time when autonomous technologies are making decisions about our life (Stilgoe 2018). There is a

sense of urgency that social scientists in particular cannot help but feel. The reason is that AI is not simply *terra incognita*. It can also be *finis terrae*: the end of the world. The radicality of AI tech is such that it might cause the end of cities and societies as we know them (Cugurullo 2021). It is time to be brave, face our deepest fears and explore the unknown. We already have an excellent guide book and it is *Atlas of AI*.

References

Cugurullo, F. (2021) *Frankenstein Urbanism: Eco, Smart and Autonomous Cities, Artificial Intelligence and the End of the City*, Oxon and New York, Routledge.

Hillersdal, L., Jespersen, A.P., Oxlund, B. and Bruun, B. (2020) *Affect and effect in interdisciplinary research collaboration*, in "Science & Technology Studies", 33 (2), pp. 66-82.

Karvonen, A., Cugurullo, F. and Caprotti, F. (eds.) (2019) *Inside Smart Cities: Place, Politics and Urban Innovation*, London and New York, Routledge.

Kitchin, R. (2022) *The Data Revolution: A Critical Analysis of Big Data, Open Data and Data Infrastructures*, London, Sage.

Stilgoe, J. (2018) *Machine learning, social learning and the governance of self-driving cars*, in "Social Studies of Science", 48 (1), pp. 25-56.

Suchman, L. (2020) *Algorithmic warfare and the reinvention of accuracy*, in "Critical Studies on Security", 8 (2), pp. 175-187.

Winner, L. (1978) *Autonomous Technology*, Cambridge, MA, the MIT Press.

Zhou, L., Fan, H. and Ulrich, T. (2021) *Editorial for Special Issue "Critical Metals in Hydrothermal Ores: Resources, Recovery, and Challenges"*, in "Minerals", 11 (2), p. 299.

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