

BIG DATA AND ARTIFICIAL INTELLIGENCE:
ETHICAL AND SOCIETAL IMPLICATIONS

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THIS CONTRIBUTION IS BASED ON A SERIES OF INTERVIEWS CONDUCTED WITH HIGH PROFILE EXPERTS FROM INDUSTRY, ACADEME, AND THE EUROPEAN COMMISSION. THE QUOTATIONS FEATURE KEY STATEMENTS FROM THE INTERVIEWEES.

Artificial Intelligence (AI) seems the defining technology of our time. The Big Data revolution and the rise of computing power has made recent AI advances possible.

It is now possible to analyze massive amounts of data at scale and in real time.

Data as a new economic asset

Data has value only if it can be analyzed and if certain insights can be derived from it. Therefore, data has now become a new economic asset. Companies with big data pools have the potential to gain great economic power. The use of big data technologies initially began in marketing. Currently one stage in the life cycle of an emerging science, marketing is a low-risk – and, yes, it is also lucrative. Now, technology is moving beyond increasing the odds of making a sale, to being used in areas that involve higher-stakes decisions, such as medical diagnoses, loan approvals, hiring and crime prevention. An example of this are so-called ‘Digital Biomarkers’, i.e. the application of mobile and sensor technology to monitor symptoms, disease progression and treatment response. By applying ‘Digital Biomarkers’, data is used to create a longitudinal real-world profile that, in case of complex syndromes, such as Multiple Sclerosis and Parkinson’s Disease, may help researchers to identify signals and changes in symptoms or general living factors, which may have several potential benefits (Zicari, 2018).

Understanding Decisions made by AI

But what if the decision made using an AI-driven algorithm harmed somebody, and you could not explain how the decision was made?

At present, we do not really understand how advanced AI-techniques, such as those used in Deep Learning, really works. It can be extremely difficult to understand which features of the data the machine used, as well as how they were weighted, to contribute to the outcome. This is due to the technical complexity of such advanced neural networks, which need huge amounts of data to learn properly. It is a trial and error. This poses ethical implications.

New ethical and legal questions

Let`s consider an autonomous car that relies entirely on an algorithm that had taught itself to drive by watching a human do it. What if one day the car

crashed into a tree, or even worse killed a pedestrian?

“If the learning took place before the car was delivered to the customer, the car’s manufacturer would be liable, just as with any other machinery.

The more interesting problem is if the car learned from its driver. Did the driver set a bad example, or did the car not learn properly?

And in many cases we also don’t know what humans do: for example, we know how to drive a car, but we don’t know how to program a car to drive itself. But with machine learning the car can learn to drive by watching video of humans drive.” - Pedro Domingos, University of Washington (Zicari, 2018d).

Some AI applications may raise ethical and legal questions related to potentially biased decision-making. If the data are skewed and/or the design of the system contains a bias, then the decisions recommended by such systems may be discriminatory against certain categories or groups.

“When AIs learn by themselves, how do we keep them from going astray? Fixed rules of ethics are too rigid and fail easily. But if we just let machines learn ethics by observing and emulating us, they will learn to do lots of unethical things. So maybe AI will force us to confront what we really mean by ethics before we can decide how we want AIs to be ethical.” - Pedro Domingos, University of Washington (Zicari, 2018d).

Trust and Explainable AI

“Citizens and businesses alike need to be able to trust the technology they interact with. In order to increase transparency and minimise the risk of bias, AI systems should be developed and deployed in a manner that allows humans to understand the basis of their actions. Explainable AI is an essential factor in the process of strengthening people’s trust in such systems.” - Roberto Viola, European Commission (Zicari, 2018a).

This is a directive for policy makers. But is it really possible to implement it? And if so, then how? Ethical issues need be core considerations during the design phase of an AI project. (Zicari, no year).

Testing and Validating AI

“Robust [standardized?] procedures for testing and validating AIs would be a pragmatic solution, even if we don’t understand fully the heuristics. Perhaps, by extensive testing with actual or synthetic data sets and extreme scenari-

os, an AI could be validated for its intended purpose, including likely paths of future learning?” - Bryn Roberts, Roche Pharmaceutical Research & Early Development (Zicari, 2018b).

Human Motivations, Intentions, and Data

The overall human motivation is the key to create a ‘safe’ AI.

“Good data reflects reality and thus can help us gain insights into how the world works. That does not make such discovery ethical, even though the discover is correct. Good intentions point towards an ethical use of data, which helps protect us against unethical data uses, but does not prevent false big data analysis. We need both, albeit for different reasons.” - Viktor Mayer-Schönberger, Oxford University (Zicari, 2018e).

“I’m not worried about robots deciding to kill people, I’m worried about politicians deciding robots should kill people.” - Oren Etzioni, CEO at the Allen Institute for Artificial Intelligence (Zicari, 2016b).

Regulatory Frameworks and AI

“While self-regulation can be a first stage in applying an ethical approach, public authorities must ensure that the regulatory framework that applies to AI technologies is fit for purpose and in line with our values and fundamental rights.” -- Roberto Viola, European Commission (Zicari, 2018a).

There is an intrinsic tension between innovation and regulation. Regulations are normally meant to protect citizens, but some of these are no longer fitting to the modern capabilities of technology and instead drive cost and slow innovation down (Zicari, 2018c).

Stakeholders

Data, AI and intelligent systems are becoming sophisticated tools in the hands of a variety of stakeholders, including political leaders.

Are computer system designers (i.e. software developers, software engineers, data scientists, data engineers, etc.), the ones who will decide what the impact of these technologies are and whether these technologies are to replace or augment humans in society?

In my personal opinion, it is mandatory that the designers of AI systems (and their managers too) be part of the overall discussion on the ethical and societal implications of AI, so as not to leave this discussion (and possible regula-

tions) entirely in the hands of policy makers, politicians, lawyers and philosophers.

AI vision for the future

“Citizens and professionals [...] should become aware of what AI is and what we can do with it. How can I use AI to do my job better, to find the things I need, to build a better society? Just like driving a car does not require knowing how the engine works, but it does require knowing how to use the steering wheel and pedals, everyone needs to know how to control an AI system, and to have AIs that work for them and not for others, just like they have cars and TVs that work for them.” – Pedro Domingos, University of Washington (Zicari, 2018d).

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