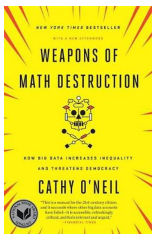
Weapons of Math Destruction, Crown, New York, 2016 (272 p.) by *Cathy O'Neil*





Cathy O'Neil

Cathy O'Neil has a PhD in mathematics from Harvard and has been active in the Occupy Wallstreet movement defending social and economic justice. The latter is very present in this book where she is fiercely denouncing the impact of algorithms that make use of massively harvested big data and that make automatic decisions having a disastrous effect on people. They are often started with good intentions, but in many cases they had nasty feedback loops that amplified social injustice that they wanted to diminish.

So in successive chapters she goes through several of such automated procedures to illustrate this unjustness. Of course these algorithms causing the problems are based on models that use mathematics, but there is little mathematics in this book. At most there is some statistics mentioned. Models are based on averages over a large set, but they cannot be applied to individuals or to smaller subsets. Or the models may confuse correlation with causality. It is applied to American society where racism and general negative preoccupation against Hispanics or African Americans is amplified by these systems.



Examples are admission to higher education or advertisements for predatory for-profit colleges that make a lot of money. Advertisement is often targeting the most vulnerable and poor community making people believe they are making a step up the social ladder. The richer class is spammed with advertisements for things they do not need. Justice makes use of data obtained about neighbourhoods so that people are harassed by police, not because they behave badly, but because they happen to live in a poor neighbourhood, and criminals are punished harder because of their environment. Also job applications may depend on data obtained from Facebook or Amazon or YouTube clicks. Workers or teachers are evaluated or have to follow an automatically generated schedule based on data collected from external sources, not taking into account what is humanly possible. If they are fired but become very successful in a competitive company, the algorithms are not adapted. Obtaining a loan or credit from a bank is race and environment depending. Even insurance that is fundamentally based on a solidarity principle does not work well in practice, but it can force people to pay fees beyond their abilities and these insurance companies make profits beyond imagination. One chapter is also dealing with the influence of social media on politics and voting behaviour. We know all too well what happened with elections in the US and elsewhere after the book was published.

The book was a big success. The author gave a TED talk that you can still find online and her book won the Euler Book Prize issued by the MAA in 2019. She is also the founder of ORCAA (O'Neil Risk Consulting & Algorithmic Auditing), a consulting company to remedy what she is denouncing in this book. It came out at a time when there was a growing awareness of the undemocratic and almost unlimited power of the the big companies with global impact that became giants based on their massive collection of data about our behaviour and sometimes private data, and when this is prohibited by law, they use data that people provide willingly in exchange for easy access to some Internet facilities. Privacy has become a growing issue and we have the GDPR rules, we have seen the European Commission call CEO Mark Zuckerberg to account for the unlawful use of information about Facebook users. The superior behaviour of Zuckerberg reflected his untouchable status. We have seen Cambridge Analytica that was bankrupted after a major data breach in 2018, but they immediately had a restart under a new name.

In this book O'Neil is repeating herself over and over, so I do not think it is a well written book, but it is well documented. It is strongly oriented towards the US society, and several particular companies using these bad algorihms that she mentioned are generally unknown to European readers. However the warning finger she points at the problems is important and generally applicable, and it is as important as it was in 2016 when she published her book. If you do not want to read all the details and the repetitions in the book, it may be less waste of time to watch het TED talk.

Adhemar Bultheel