Algorithms Are Human

"All Models Are Wrong; Some Are Useful." - George Box

An algorithm is basically a flow chart. According to the Merriam-Webster dictionary online, an algorithm is "a step-by-step procedure for solving a problem or accomplishing some end." Basically, models are algorithms. Wikipedia offers lots of details: https://en.wikipedia.org/wiki/Algorithm

Thus, the question becomes in what ways this or that model and its predictions can be useful, and conversely, harmful. I believe that the success of models and computer software in analyzing and predicting events and processes in the physical sciences has created a widespread feeling that any number that comes out of an algorithm is always scientifically accurate. But while a numerical score or rating may look scientific, people are just not as consistent as physics and chemistry. **Numbers interpreted without complete understanding of their context are meaningless or misleading.**

Models and algorithms are vulnerable to analytical bias in ways described by researchers such as Cathy O'Neil in her book, "Weapons of Math Destruction." **She identifies 3 key ingredients of this kind of WMD: Opacity, Scale and Damage.** For example, if the model software used to generate a number is 'proprietary information' or a 'trade secret,' it's opaque, and the logic cannot be openly examined or verified and probably won't be corrected even if someone (probably not the algorithm's designer) notices it's inaccurate. A number or rating that's used in ways that affect people's health and well-being may be applied to large populations. And when such opaque numbers are used in ways that reduce the health and well-being of the people they are applied to, there will be damage.

Specifically, O'Neil reports a common tendency to predict the past rather than the future, to repeat implicit human biases unnoticed in the input data. **Often, what modelers want to predict can't be calculated or determined directly, so proxies that seem to be correlated with the desired output are substituted since there is data available about the proxies.** But using poorly selected proxies risks ending up with self-fulfilling prophecies.

One of her case studies is the Level of Service Inventory – Revised (LSI-R) algorithm, where input data is substantially influenced by law enforcement bias. In that case, the proxies include data about prior arrests, convictions and similar information. But those proxy data are biased by standard law enforcement practices. Cops rarely stop and frisk on Wall Street, so middle-class and white people are as a class less likely to encounter law enforcement and less likely to be stopped, frisked, arrested, etc., even though drug use is about the same among all races, and the monetary value of white collar crime far exceeds the monetary value of burglaries and shoplifting. Thus, LSI-R results have been found to be racially biased. Brian Christian confirms this, citing research reported by ProPublica in 2016: https://www.propublica.org/article/bias-in-criminal-risk-scores-is-mathematically-inevitable-researchers-say

In 2003 I went on a ride-along with a city cop when I took the DA's Citizens Academy. The first thing he said was that we were 'going where the bad boys are.' So we did not go to the Fab 40s but rather to Oak Park.

We have all heard about 'broken-windows policing,' however, O'Neil cites the original article which turns out to say things which I found quite edifying and are rather different than the popular conception: https://www.theatlantic.com/magazine/archive/1982/03/broken-windows/304465/

As O'Neil also notes, too often legal protections for "proprietary information" cover up algorithms that lack feedback and re/calibration. **Software code and documentation for models used for public purposes should be transparent and publicly available.**

References

How To Lie With Statistics
Darrell Huff leads lay readers through the critical thinking needed to debunk various numerical scams, and ends the book with 5 key questions anyone can use:
1. Who Says So?
2. How Does He Know?
3. What's Missing?
4. Did Somebody Change the Subject?
5. Does It Make Sense?
https://wwnorton.com/books/9780393310726

Broken Windows: The police and neighborhood safety, by George L. Kelling and James Q. Wilson. Atlantic Monthly, March 1982

Weapons of Math Destruction
Cathy O'Neil
https://www.penguinrandomhouse.com/books/241363/weapons-of-math-destruction-by-cathy-oneil/

Automating Inequality: How High-tech Tools Profile, Police, and Punish the Poor
Virginia Eubanks describes ways that opaque algorithms are used by various bureaucratic institutions to manage people who belong to various demographic groups. Hapless individuals may be denied various benefits, or costs inflicted on them, with no realistic means of appeal.
https://us.macmillan.com/books/9781250074317

The Alignment Problem: Machine Learning and Human Values
Brian Christian covers much of the same ground as O'Neil, with information that's more technical and recent. It turns out that digging into the incorrect predictions of AI can lead to better understanding of human foibles and psychology.
https://wwnorton.com/books/9780393635829

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