A not-quite-random walk demystifies the algorithm

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Looking at the world through the lens of an algorithm illuminates some aspects but obscures others, says Malte Ziewitz, assistant professor of science and technology studies. Credit: Cornell University

The algorithm is having a cultural moment. Originally a math and computer science term, algorithms are now used to account for everything from military drone strikes and financial market forecasts to Google search results.

"People outside of computer science and math have come to describe these and other phenomena as 'algorithmic,' ascribing complex matters to a single, somehow magical entity that has developed a life of its own," says Malte Ziewitz, assistant professor of science and technology studies and a Mills Family Faculty Fellow.

But what's actually going on when we talk about, make sense of and rationalize the workings of computational technologies that seem so mysterious and inscrutable? And how could this be studied?

A not-quite-random walk around Oxford, England, offered Ziewitz some surprising answers.

He gave himself the task of exploring Oxford, where he was a scholar, with the help of an algorithm. The resulting stroll, and the insights that sprang from it, form the basis of his paper published Nov. 10 in *Big Data & Society*.

"This paper is not so much concerned with what algorithms actually are, but with what kind of work our reasoning with algorithms does," Ziewitz wrote.

In layman's terms, an algorithm is a step-by-step procedure for calculating the answer to a problem from a given set of inputs, Ziewitz says. Algorithms at the heart of Google's search engines, for example, take a search term, sort through web pages, calculate their relevance to the term and pick the top 10 pages.

Algorithms can also be simple. To structure their walk, Ziewitz and a friend wrote this one on a sheet of paper: "At any junction, take the least familiar road. Take turns assessing familiarity. If all roads are equally familiar, go straight."

They could have created any number of instructions, such as "take every third left." But that would not have solved the problem they decided to tackle – a crucial requirement for algorithmic processing. "The key here is that you have to define the problem before your code can make any sense," Ziewitz said.

Off they went, consulting their sheet of paper as they went along. They walked down a busy road with buses, taxis and pedestrians. But only 60 feet from their starting point, their walk came to a halt, at a narrow alleyway.

Was it a road?

They realized they not only had to come up with a definition of "a road" but also test it in a specific situation. They decided to define a road as being wide enough on which to walk a bike, then added that line of code to their algorithm.

Looking at the world through the lens of an algorithm illuminates some aspects but obscures others, Ziewitz said. "Rather than looking at the beauty of the architecture or at other people, we were mostly focused on the road and the junctions," he said. "We tend to forget that a search for a certain term allows us to see those top 10 results but not a lot of other things."

Moving along, they found themselves at a Y-junction with two unfamiliar roads – so they added another line of code: "When all else fails, flip a coin."

"There was constant tinkering," Ziewitz said. "We had to not only redefine the rules but also redefine the world in terms of the algorithm."

That lesson applies to the idea of "relevant" search results, he said.

"What is 'relevant"? Is it something of general public interest? It is something specific? Is it representative of diversity? It depends, and it's in the application of the decision rules that 'relevance' comes to mean a certain thing."

Eventually they found themselves on a paved lane that led to a parking lot. From a nearby building, a security guard shouted, "Excuse me! What are you doing here? This is private property."

They exited, quickly finding an adjacent road.

The incident highlighted another finding: It's tough to design an algorithm that will account for all possibilities. "Were we in Ithaca, you wouldn't want to be led down a gorge," Ziewitz said.

Part of his goal in writing the paper was to highlight a key challenge of the moment: how to deal with the fact that a term from computer and mathematics is all of a sudden being used across the humanities, social sciences and popular culture, Ziewitz said.

"What kind of work does the term 'algorithm' do in our reasoning?" he said. "How can we get at that? Put ourselves into a situation where we reason with the common-sense understanding of the term 'algorithm' and see what happens."

More information: Malte Ziewitz. A not quite random walk: Experimenting with the ethnomethods of the algorithm, *Big Data & Society* (2017). DOI: 10.1177/2053951717738105

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