

# Finding a needle in the ocean: Professor shares perspective on bringing a systematic approach to big data

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The University of Delaware's Xiang-Gen Xiao believes new mathematical tools are needed to deal with big data. Credit: Ambre Alexander Payne/University of Delaware

Big data is being used in a broad range of applications from targeting customers and improving sports performance to operating self-driving cars and decoding DNA.

But what exactly is [big data](#)?

"Although big data has become a hot topic during the past few years, its meaning is not really clear," says the University of Delaware's Xiang-Gen Xiao.

Xiao, the Charles Black Evans Professor in UD's Department of Electrical and Computer Engineering, recently shared his thoughts on the topic in a brief "Perspectives" paper published in the January 2017 issue of *IEEE Signal Processing Magazine*.

Xiao's main goal in writing the [piece](#), "Small Data, Mid Data, and Big Data Versus Algebra, Analysis, and Topology," was to draw attention to the need for new mathematical tools to deal with big data.

"Computers have enabled us to collect and process tremendous amounts of data, but there is still no systematic science to deal with it," Xia says. "People are using existing mathematical methods, but for big data problems, we need something different and what we need will vary with the application. Big data is about more than just numbers."

Xia hopes to spark conversation among the scientific communities that are working in this area, including mathematics, [signal processing](#), and computer science.

In the paper, he points out that big data wasn't created when it was named.

"Big data has existed for a long time, as massive groups of fish move in the ocean, massive groups of birds fly in the sky, and/or a massive number of people on the ground travel around the world," he writes.

"Today, massive bits are transmitted through both wired and wireless channels called the internet. The key is how to get some indices, trends, or patterns from these [massive data](#) and/or how to find a needle in the ocean."

**More information:** Xiang-Gen Xiao, Small Data, Mid Data, and Big Data Versus Algebra, Analysis, and Topology [Perspectives], *IEEE Signal Processing Magazine* (2017). [DOI: 10.1109/MSP.2016.2607319](#)

Provided by University of Delaware

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