Research uses big data to track and treat drug abuse

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The underground culture of hardcore drug abuse is dynamic and evolves rapidly. Street names for drugs, hot spots where users go for their fix, and new, dangerous strains laced with different substances change

frequently and regularly.

For nonprofits aiming to help users overcome their addiction, getting real-time, actionable information on this fast-changing landscape can be difficult.

Assistant Professor Hai Phan, of the informatics department within NJIT's Ying Wu College of Computing, believes that big data and machine learning could provide the answer. This would help treatment centers and counselors reach and hopefully treat drug users in their time of critical need.

Phan and team have created a community-focused drug abuse monitoring and support system—DrugTracker—which takes advantage of social media posts and geospatial data in near-real time.

DrugTracker monitors online platforms such as Twitter and Reddit and combines them with geospatial information to learn where users are obtaining drugs and quickly detect trends or changes in the landscape.

Using DrugTracker, organizations would be able to:

- Detect drug abuse risk behaviors mentioned on social media.
- Analyze drug abuse risk behaviors by querying consolidated and live datasets with keywords.
- Examine results and data through a web-based user interface that includes heat maps and statistical charts.

Phan is collaborating with Prevention Links, a nonprofit organization in Roselle, N.J., on the project.

"We hope to identify from social media information on who is being impacted, what drugs are being misused and use the data to educate and

better utilize our resource distribution," said Morgan Thompson, chief executive officer of Prevention Links.

Phan said it was the opportunity to use data science to address a societal problem that attracted him to the project. "The number of deaths from drug abuse is higher than murder. It's a big problem."

According to the Center for Disease Control and Prevention, opioid drugs were involved in more than 42,000 deaths in 2016 nationwide. And the number of heroin-related deaths surpassed the number of firearm homicides in 2015.

Phan said many nonprofits use data to inform their programs, but in many cases the data collected is too old to have an impact.

"Often times data is collected annually, which is way too slow. In our research we found that by using online social media, we can detect the distribution of drug abuse in near-real time. The question is whether we can use online social media as an early warning system," Phan said.

Phan believes DrugTracker will help local communities and organizations locate drug [abuse](link) hot spots and reach online users in need.

"Having real-time data is key because it allows us to allocate resources in a way that is most effective," Thompson said. "For example, some of our programs involve on-call responses to the scene of an overdose. It is helpful to know when and where most overdoses are happening to ensure we have adequate recovery specialists on call to respond during peak times."

Phan said that DrugTracker is still a work in progress and his team is continually modifying its algorithms to capture [relevant data](link) and filter noise or unhelpful data from the system. Currently, DrugTracker is

monitoring social media posts in Union County and captures a few hundred relevant postings a day.

A paper on Phan's research, which includes his collaboration with partners at the University of Oregon and the City University of New York, Staten Island, will be presented next month at MedInfo 2019 in Lyon, France.

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