Technology for technology-induced disease

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By Jim Hannah   November 10, 2015

Researchers at Wright State's Kno.e.sis center are developing computer technology to analyze social media posts to identify and reduce cyberbullying. The team includes, from left: Monireh Ebrahimi, Kathleen Wylds, Debra Steele-Johnson, Amit Sheth, Valerie Shalin, T.K. Prasad, Wenbo Wang, Lu Chen and Jack Dustin.

"You're so fat." "You look like a rat that has been put on crack." "Why are you wearing grandma clothes?" "What did you do to your hair, burn it?" "Guys hate you." "You're just a loser." "You don't even belong at this school."

Just words — but cruel, hurtful, violent and destructive. They are the latest weapons of choice for bullies, who have turned schoolyard confrontations into social media attacks that follow their victims wherever they go. Even adults can be the victims of a social media attack from workplace bullies.

A team of interdisciplinary researchers at Wright State University's Kno.e.sis center is developing sophisticated computer technology to analyze social media posts in an effort to identify and reduce such cyberbullying.

The project Context-Aware Harassment Detection on Social Media is funded by a highly competitive $925,104 research grant from the National Science Foundation to the Ohio Center of Excellence in Knowledge-enabled Computing (Kno.e.sis) at Wright State.

"I saw studies on the huge impact harassment in social media was having on young social media users," said Amit Sheth, the LexisNexis Ohio Eminent Scholar at Kno.e.sis and principle investigator on the project. "I thought we could direct our substantial research in social media analysis to this challenge."

Graduate student researchers Lu Chen and Wenbo Wang said the research team got the idea for the cyberbullying project three years ago during one of their walks with Sheth, who is their adviser. Their discussion veered to news accounts of a teen being driven to committing suicide after being bullied on social media.

School bullying has historically involved physical confrontation and intimidation during school. Victims can report such abuse to teachers and administrators and get some resolution. But bullying is increasingly taking place online, hidden from detection and impossible to escape.

When early investigation made it clear that it would take a variety of expertise in understanding and addressing the cyberbullying problem, Sheth brought in longtime collaborators Valerie Shalin, associate professor of psychology, and T.K. Prasad, professor of computer science and engineering. Both are Kno.e.sis faculty members and co-

principle investigators on the project.

Also working on the project are Debra Steele-Johnson, professor and chair of the Department of Psychology and an expert in workplace harassment, and Jack Dustin from Wright State's Center for Urban and Public Affairs. Also involved are teachers at Beavercreek High School, which will provide a critical testing ground for the technology that will be developed.

While the tragic experience and consequences of being bullied are well-known, the precise conditions that define offensive, intimidating behavior are not, said Shalin. This is in part because the circumstances and methods of conventional bullying, in a schoolyard for example, are difficult to record and subject to testing. Cyberbullying however provides a very detailed record to compare with more innocent behavior.

The research team quickly discovered that words alone do not define harassment. For example, profanity exchanged between two people doesn't necessarily constitute harassment, said Chen. And certain words exchanged between strangers or casual acquaintances could be harassing, but those same words might not be harassing when exchanged between friends or between a male and a female or between two females.

So the researchers began adding context, such as gender, age, location and relationship. Social media posts can be further analyzed for identifying specific targets of the posts and expressions of sentiment, emotion, intent, culture and attitude.

All these lead to the key innovation of the research — adding context to identify malicious intent and how the recipient reacts to the post.

"Adding context leads to understanding features/properties that characterize harassment in a far more insightful way by considering name calling, appearance and behavior with respect to factors such as power, familiarity and truth," Sheth said.

The researchers plan to devise an educational program for students that will identify harassment. Software would emit a "harassment alert" and capture the harassing messages. The messages would then be reported to the proper authorities.

If the techniques prove useful after testing, the software could be made available to the public.

The researchers are collaborating with teachers at Beavercreek High and plan to involve students who voluntarily turn over their conversations on Instagram and Snapchat in order to evaluate the technology developed by the research team before it can be disseminated more widely.

Joyce Dustin, a Beavercreek High health and physical education teacher involved with the project, said the school is excited to help support the research.

"The anguish that bullying victims feel makes focusing in the classroom difficult and adds a significant barrier to learning," said Dustin. "This tool being developed by Wright State University can be used by schools, parents, those being bullied or harassed to develop an action and prevention plan to improve their health and safety."

The research project is driven by an effort to reduce the abuse of technology under the cybersecurity program at the National Science Foundation.

"The topics that we're working on are of significant societal, human, economic significance," Sheth said. "I deliberately look for high-impact problems where there is access to real-world data and a partnership that will give us that domain knowledge."

The project is part of more than $7 million in new grants since August 2014 from National Science Foundation and National Institutes of Health won by Sheth as the sole or joint principal investigator for Wright State and its

collaborators. Wright State's component is about $4.5 million.

More information on the cyberbullying study is available at wiki.knoesis.org.