

Do you need a junk-food intervention?

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The UA team that recently published a major nationwide analysis of geography-based food preferences is now investigating public health implications.

When you tweet about your addiction to sweets or post images of triple-decker burgers, does that say something about your health? A UA team is exploring the connection.

What if your social media network—the actual interface, not your followers—could tip you off to a personal risk for developing a preventable medical condition, then help you figure out ways to improve

your lifestyle?

University of Arizona computer science and nutritional science researchers are working on that exact issue, determining ways to enhance artificial intelligence capabilities to predict certain chronic, yet preventable, health conditions based on a person's social media activity.

"It is very simple to tell people that there are risks associated with poor eating, but there is no reason for people to trust us or a robot," said Mihai Surdeanu, an associate professor in the School of Information: Science, Technology, and Arts.

Surdeanu acknowledged the challenge with early detection: Many people are ill-informed about their own risk and subsequently do not change their eating habits or level of physical activity.

The Centers for Disease Control and Prevention, in its 2014 report, noted that about 29.1 million Americans are living with diabetes, and 8.1 million of those people are estimated to be undiagnosed, resulting in more than \$245 billion in costs each year. The agency also reports that an estimated 86 million Americans who are at least 20 are at high risk of developing Type 2 diabetes.

Surdeanu and his collaborators found in an earlier study that the way people talk about food in social media carries an important predictive power. The team members believe social media presents a critical space for the future of preventative medicine.

"We could plan interventions through social media by carefully placing ads, or by connecting people with others," Surdeanu said. "This is a very exciting area in machine learning, which is about explaining to humans what machines know."

Surdeanu is a member of the UA team that recently completed an extensive analysis about how Twitter followers from different U.S. regions talk about food. The team released findings in mid-October, noting that Twitter followers often reference brisket in Texas, caviar in California, the tamale in Arizona and grits throughout the southern U.S. Such regional language cues proved to be strong predictors of a community's risk for diabetes.

The UA researchers presented their earlier findings and article, "Analyzing the Language of Food on Social Media," during the IEEE International Conference on Big Data 2014, which was held at the end of October in Washington, D.C. Media outlets across the country picked up on the story, with some even using U.S. maps to show each state's most-talked-about food.

Other team members are: Daniel Fried, a research assistant in the UA School of Information: Science, Technology, and Arts, who was the main author of the paper as an undergraduate student majoring in computer science and SISTA; Stephen Kobourov, a computer science professor; Melanie Hingle, an assistant professor of nutritional sciences; and Thienne Johnson, a research associate in computer science and also electrical and computer engineering.

In the earlier study, the team relied on CDC and National Institutes of Health data to evaluate national hot spots for the prevalence of people who are overweight and who have diabetes. Drilled down from 3.5 million tweets, the team evaluated 562,547 tweets, resulting in a model to predict who could have a higher risk for the illness.

In the second phase of the project, which is currently underway, the team is switching from evaluating the risk of communities to focusing on individuals. For now, the team is evaluating a group of individuals who have a prominent social media presence, including actors, comedians,

writers, athletes and chefs.

The team plans to gauge a person's level of activity based on the types of hashtags they use in their posts—for example, #laziness versus #cycling—and by further analyzing their social media presence through the analysis of additional text, images and videos. Relying on existing nationwide survey data associated with the prevalence of Type 2 diabetes, the team is developing a model that would then estimate a person's likelihood of developing the condition.

The team also is running a parallel analysis, recruiting hundreds of individuals to share information about their specific condition of health to determine the viability and potential impact of analyzing social media data.

The next step is figuring out interventions. The team will evaluate the effectiveness of ad placement, diet visualizations, and the use of quizzes and games.

"What is great about social media is that you have the ability to reach millions of people at once," Surdeanu said. "It's better than the small fraction of people who would actually get help by seeing a physician at a doctor's office."

The team also noted limitations with the study, acknowledging that [social media](#) habits do not present a full picture of a person's habits. Despite the limitations, the team believes the implications carry hefty impacts for public health, education, science, and social sites and mobile apps.

"This has been such an interesting project, exploring data to see how people are eating, what they are eating and how that changes over time," Fried said. "The project could help lower the rate of preventable diseases like diabetes.

"Maintaining a healthy lifestyle takes effort, and if it's possible to use this technology to make people aware of risk factors in their own lives as well as the alternative options they have available, it should make it easier for people to make healthier choices."

Like Fried, Surdeanu is intrinsically motivated to continue the research because he wants to see positive change in public health.

"We are not talking about redoing the health-care system," Surdeanu said. "Even if we see people make improvements with a tiny bit more physical activity and diet, that helps."

More information: "Analyzing the Language of Food on Social Media" is available online: arxiv.org/pdf/1409.2195v2.pdf

2014 National Diabetes Statistics Report:
[www.cdc.gov/diabetes/data/stat ... tatisticsReport.html](http://www.cdc.gov/diabetes/data/stat...tatisticsReport.html)

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