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Google Uses Searches to Track Flu's Spread

By MIGUEL HELFT
Published: November 11, 2008

SAN FRANCISCO — There is a new common symptom of [the flu](#), in addition to the usual aches, coughs, fevers and sore throats. Turns out a lot of ailing Americans enter phrases like “[flu symptoms](#)” into [Google](#) and other search engines before they call their doctors.

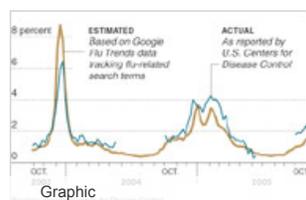
That simple act, multiplied across millions of keyboards in homes around the country, has given rise to a new early warning system for fast-spreading flu outbreaks, called Google Flu Trends.

Tests of the new Web tool from Google.org, the company's philanthropic unit, suggest that it may be able to detect regional outbreaks of the flu a week to 10 days before they are reported by the [Centers for Disease Control and Prevention](#).

In early February, for example, the C.D.C. reported that the flu cases had recently spiked in the mid-Atlantic states. But Google says its search data show a spike in queries about flu symptoms two weeks before that report was released. Its [new service](#) at [google.org/flutrends](#) analyzes those searches as they come in, creating graphs and maps of the country that, ideally, will show where the flu is spreading.

The C.D.C. reports are slower because they rely on data collected and compiled from thousands of health care providers, labs and other sources. Some public health

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Using Google to Monitor the Flu

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experts say the Google data could help accelerate the response of doctors, [hospitals](#) and public health officials to a nasty flu season, reducing the spread of the disease and, potentially, saving lives.

“The earlier the warning, the earlier prevention and control measures can be put in

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place, and this could prevent cases of influenza,” said Dr. Lyn Finelli, lead for surveillance at the influenza division of the C.D.C. From 5 to 20 percent of the nation’s population contracts the flu each year, she said, leading to roughly 36,000 deaths on average.

The service covers only the United States, but Google is hoping to eventually use the same technique to help track influenza and other diseases worldwide.

“From a technological perspective, it is the beginning,” said [Eric E. Schmidt](#), Google’s chief executive.

The premise behind Google Flu Trends — what appears to be a fruitful marriage of mob behavior and medicine — has been validated by an unrelated study indicating that the data collected by [Yahoo](#), Google’s main rival in Internet search, can also help with early detection of the flu.

“In theory, we could use this stream of information to learn about other disease trends as well,” said Dr. Philip M. Polgreen, assistant professor of medicine and epidemiology at the [University of Iowa](#) and an author of the study based on Yahoo’s data.

Still, some public health officials note that many health departments already use other approaches, like gathering data from visits to emergency rooms, to keeping daily tabs on disease trends in their communities.

“We don’t have any evidence that this is more timely than our emergency room data,” said Dr. Farzad Mostashari, assistant commissioner of the Department of Health and Mental Hygiene in New York City.

If Google provided health officials with details of the system’s workings so that it could be validated scientifically, the data could serve as an additional, free way to detect influenza, said Dr. Mostashari, who is also chairman of the International Society for Disease Surveillance.

A paper on the methodology of Google Flu Trends is expected to be published in the journal Nature.

Researchers have long said that the material published on the Web amounts to a form of “collective intelligence” that can be used to spot trends and make predictions.

But the data collected by search engines is particularly powerful, because the keywords and phrases that people type into them represent their most immediate intentions. People may search for “Kauai hotel” when they are planning a vacation and for “foreclosure” when they have trouble with their mortgage. Those queries express the world’s collective desires and needs, its wants and likes.

Internal research at Yahoo suggests that increases in searches for certain terms can help forecast what technology products will be hits, for instance. Yahoo has begun using search traffic to help it decide what material to feature on its site.

Two years ago, Google began opening its search data trove through Google Trends, a tool that allows anyone to track the relative popularity of search terms. Google also offers more sophisticated search traffic tools that marketers can use to fine-tune ad campaigns. And internally, the company has tested the use of search data to reach conclusions about economic, marketing and entertainment trends.

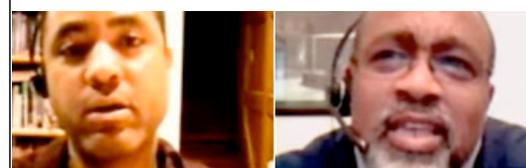
“Most forecasting is basically trend extrapolation,” said Hal Varian, Google’s chief

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economist. "This works remarkably well, but tends to miss turning points, times when the data changes direction. Our hope is that Google data might help with this problem."

Prabhakar Raghavan, who is in charge of Yahoo Labs and the company's search strategy, also said search data could be valuable for forecasters and scientists, but privacy concerns had generally stopped it from sharing it with outside academics.

Google Flu Trends avoids privacy pitfalls by relying only on aggregated data that cannot be traced to individual searchers. To develop the service, Google's engineers devised a basket of keywords and phrases related to the flu, including thermometer, flu symptoms, [muscle aches](#), chest [congestion](#) and many others.

Google then dug into its database, extracted five years of data on those queries and mapped it onto the C.D.C.'s reports of influenzalike illness. Google found a strong correlation between its data and the reports from the agency, which advised it on the development of the new service.

"We know it matches very, very well in the way flu developed in the last year," said Dr. Larry Brilliant, executive director of Google.org. Dr. Finelli of the C.D.C. and Dr. Brilliant both cautioned that the data needed to be monitored to ensure that the correlation with flu activity remained valid.

Google also says it believes the tool may help people take precautions if a disease is in their area.

Others have tried to use information collected from Internet users for public health purposes. A Web site called [whoissick.org](#), for instance, invites people to report what ails them and superimposes the results on a map. But the site has received relatively little traffic.

HealthMap, a project affiliated with the Children's Hospital Boston, scours the Web for articles, blog posts and newsletters to create a map that tracks emerging [infectious diseases](#) around the world. It is backed by Google.org, which counts the detection and prevention of diseases as one of its main philanthropic objectives.

But Google Flu Trends appears to be the first public project that uses the powerful database of a search engine to track a disease.

"This seems like a really clever way of using data that is created unintentionally by the users of Google to see patterns in the world that would otherwise be invisible," said Thomas W. Malone, a professor at the Sloan School of Management at [M.I.T.](#) "I think we are just scratching the surface of what's possible with collective intelligence."

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A version of this article appeared in print on November 12, 2008, on page A1 of the New York edition.

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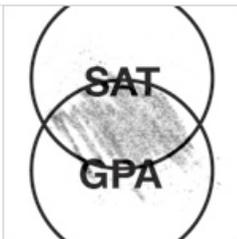
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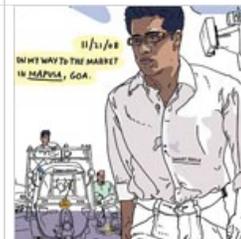
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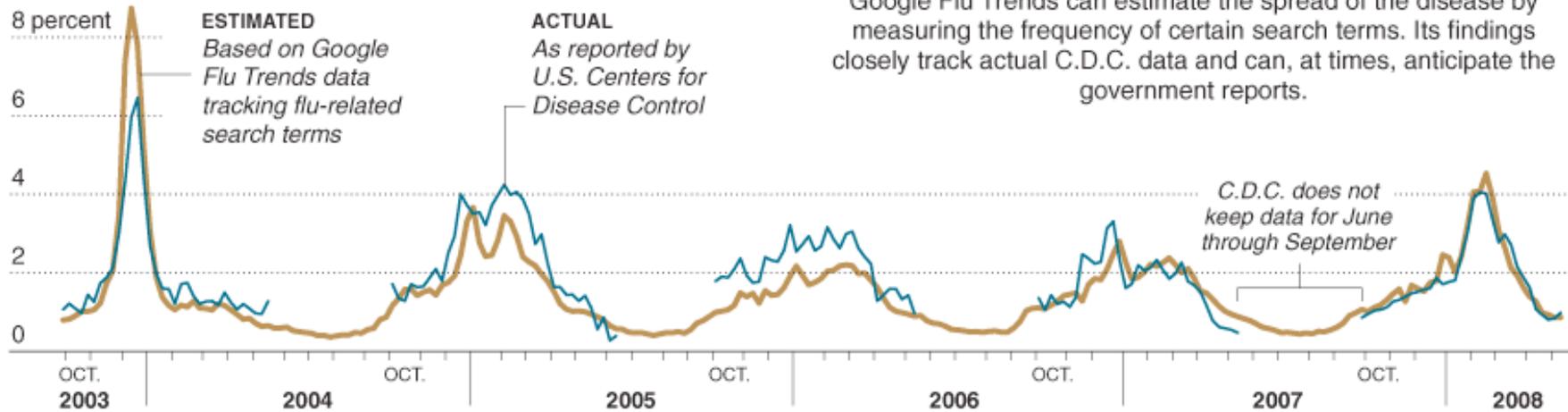
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Google Flu Trends can estimate the spread of the disease by measuring the frequency of certain search terms. Its findings closely track actual C.D.C. data and can, at times, anticipate the government reports.

Sources: Google; Centers for Disease Control

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