

Google searches hold key to future market crashes

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A team of researchers from Warwick Business School and Boston University have developed a method to automatically identify topics that people search for on Google before subsequent stock market falls.

Applied to data between 2004 and 2012, the method shows that increases in searches for business and politics preceded falls in the [stock market](#). The study, 'Quantifying the semantics of search behavior before stock market moves,' was published in the *Proceedings of the National Academy of Sciences*.

The researchers suggest that this method could be applied to help identify warning signs in search data before a range of real world events.

"Search engines, such as Google, record almost everything we search for," said Chester Curme, Research Fellow at Warwick Business School and lead author of the study. "Records of these search queries allow us to learn about how people gather information online before making decisions in the real world. So there's potential to use these search data to anticipate what large groups of people may do.

"However, the number of possible things people could search for is huge. So an important challenge is to identify what types of words may be relevant to behaviours of interest."

In previous studies, Curme and his colleagues, Tobias Preis and Suzy Moat of Warwick Business School, and H. Eugene Stanley of Boston

University, have demonstrated that usage data from Google and Wikipedia may contain early warning signs of stock market moves. However, these findings relied on the researchers choosing an appropriate set of keywords, in particular those related to finance.

In order to enable algorithms to automatically identify patterns in search activity that might be related to subsequent real world behaviour, the team quantified the meaning of every single word on Wikipedia. This allowed the researchers to categorize words into topics, so that a "business" topic may contain words such as "business", "management", and "bank". The algorithm identified a broad selection of topics, ranging from food to architecture to cricket.

The team then used Google Trends to see how often each week thousands of these words were searched for by Internet users in the United States between 2004 and 2012. By using these search activity datasets in a simple trading strategy for the S&P 500, they found that changes in how often users searched for terms relating to business and politics could be connected to subsequent stock market moves.

"By mining these datasets, we were able to identify a historic link between rises in searches for terms for both business and politics, and a subsequent fall in stock market prices," said Suzy Moat, Assistant Professor of Behavioural Science at Warwick Business School.

"No other topic was linked to returns that were significantly higher than those generated by randomly buying and selling. The finding that political terms were of use in our trading strategies, as well as more obvious financial terms, provides evidence that valuable information may be contained in search engine data for keywords with less obvious semantic connections to events of interest. Our method provides a new approach for identifying such keywords."

Moat continued, "Our results are in line with the hypothesis that increases in searches relating to both politics and business could be a sign of concern about the state of the economy, which may lead to decreased confidence in the value of stocks, resulting in transactions at lower prices."

"Our results provide evidence of a relationship between the search behaviour of Google users and stock market movements," said Tobias Preis, Associate Professor of Behavioural Science and Finance at Warwick Business School. "However, our analysis found that the strength of this relationship, using this very simple weekly trading strategy, has diminished in recent years. This potentially reflects the increasing incorporation of Internet data into automated trading strategies, and highlights that more advanced strategies are now needed to fully exploit online data in financial trading."

"We believe that follow-up analyses incorporating data at a finer time granularity, or using other types of online data, could shed light on how the relationships we uncover have evolved in time," said Curme.

Curme added, "While our investigation used stock market movements as a case study, these methods could in principle be applied to create predictive models for a wide range of other events."

Provided by University of Warwick

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