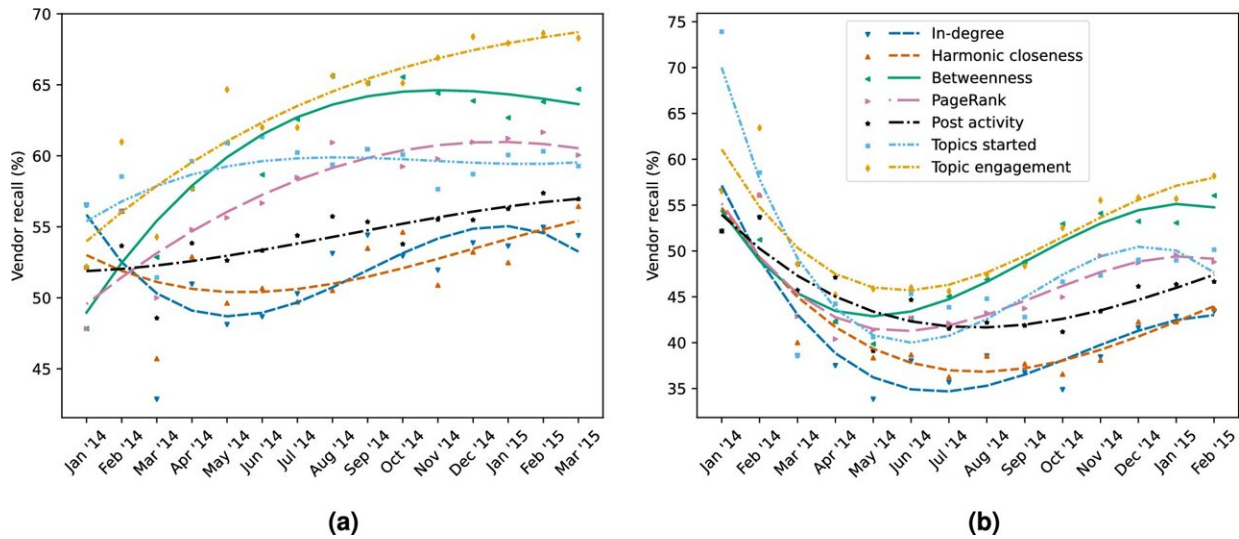


Researchers predict seller success on dark web markets

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Monthly vendor recall of top vendor percentile (top 0–20% vendors in terms of sales) among the top 20% of all users based on the network measures and activity indicators. Plots cover recall for both current and future success. Higher vendor recall indicates a greater portion of the top vendor percentile was found. (a) Current success. (b) Future success. Credit: *Scientific Reports* (2024). DOI: 10.1038/s41598-024-67115-5

Researchers from Leiden University have developed a method to predict which sellers will be successful in illegal online marketplaces. This could help the police track down big players on the dark web, the hidden part of the internet. Their results are [published](#) in *Scientific Reports*.

Drugs, weapons, hacked [personal data](#) and images of child abuse are widely traded in illegal online marketplaces. These websites, also known as cryptomarkets, are found on the dark web, so cannot be accessed with regular internet browsers or search engines.

Users are anonymous and transactions are made with cryptocurrencies such as bitcoin. Law enforcement agencies face the challenge of trawling through huge amounts of data to find the big players in this hidden digital environment.

Ph.D. candidate Hanjo Boekhout, Professor Frank Takes and Professor Arjan Blokland developed a method to predict which users will become successful sellers. In addition to the section of the market where things are sold, there is a forum section for discussions between users and sellers.

By analyzing communication patterns in this forum, the researchers managed to identify important players in the network. The research was conducted with data from Evolution, in 2014 one of the most popular data web markets.

Two factors proved to be good predictors of seller success: topic engagement and betweenness centrality. Topic engagement is how often others respond to forum topics started by a user. Betweenness centrality shows how often a user is a link between other users in the [communication network](#).

"Topic engagement proved to be a particularly strong predictor. Users with lots of responses to their forum topics often turned out to be successful sellers," says Boekhout. Betweenness centrality helped identify important players who were less active on the [forum](#). "Some sellers may not post as often, but when they do they connect different parts of the network," says Boekhout.

The method could help law enforcement agencies prioritize in their investigations. "These markets are so big that the police have to make choices," says Blokland. "Our method can help identify emerging [sellers](#) before they get really big."

The researchers hope their research will come to the attention of [law enforcement agencies](#). Police scientists will be able to continue to develop the method and try it out in investigations into other [dark web](#) markets.

More information: Hanjo D. Boekhout et al, Early warning signals for predicting cryptomarket vendor success using dark net forum networks, *Scientific Reports* (2024). [DOI: 10.1038/s41598-024-67115-5](https://doi.org/10.1038/s41598-024-67115-5)

Provided by Leiden University

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