Engineers create system for combating manipulation of online product ratings

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As online shopping continues to grow in popularity around the globe, shoppers increasingly depend upon consumer-based rating systems that vendors like Amazon.com and eBay use to rate products and sellers. But those rating systems are easily manipulated, misleading many online shoppers and causing them to make purchases they otherwise may not.

To detect these unfair ratings, a team of engineers from the University of Rhode Island has developed several algorithms that can serve as a defense against collaborative, profit-driven manipulations of online rating systems.

"These reputation rating systems are used every day and they are highly valuable," said Yan Sun, assistant professor of computer engineering at URI. "Our algorithm is designed to improve the quality of the information in the rating systems to make them more reliable."

To demonstrate the value of online rating systems, Sun points to a recent survey that found that consumers are willing to pay at least 20 percent more for services that receive a 5-star rating than for the same service receiving a 4-star rating. Another survey concluded that eBay sellers with an established reputation could expect to earn 8 percent more revenue than new sellers marketing the same goods.

When a software error revealed the true identities of Amazon.com book reviewers in 2004, it turned out that a large proportion of reviews were written by the publishers, authors and competitors of the books being

reviewed. And a study in 2006 found that many [eBay](#) sellers artificially boost their reputations by buying and selling positive ratings.

Sun said that systems already exist that can detect obvious efforts to manipulate online ratings, but her algorithms have been designed to detect "smart attackers" who try to make subtle changes to a product's rating.

Sun, along with URI professors Steven Kay and Qing Yang and former doctoral student Yafei Yang, have merged several traditional [signal processing](#) techniques with their new algorithms into a novel integrated detection system that reduces rating bias by two-thirds.

"Most of the other detection models make assumptions about how attacks will be made on a rating system, but a hacker may not follow your assumed pattern. So in our system, it doesn't matter how the attack is carried out," said Sun. "We've also factored in how trustworthy the raters are."

To test their system, the URI team challenged computer scientists and hackers to attack a rating system protected by their detection program, offering a $1,000 cash prize to the one who influenced the ratings the greatest. They then used the 408 attack attempts and interviews with the participants to improve their system.

Sun and her colleagues are seeking interest from online businesses and others interested in licensing their system or collaborating on related projects. Interested parties should contact Sun at yansun@ele.uri.edu for technical questions and David Sadowski at dsadowski@mail.uri.edu for licensing questions.

While the manipulation of online rating systems may at first glance appear to be an unfair business practice, Sun isn't so sure. She compares

it to the traditional advertising of a new product, whereby a company pays for a positive message - an advertisement - to appear in a newspaper or television broadcast.

"Sellers that are just starting out have to build their reputation somehow, so I would consider it to be a healthy promotion if these new sellers rate themselves highly when they are just starting out. It's how sellers make the market interesting and attractive," she said. "However, it becomes unhealthy when sellers continue to input high ratings for their services after their customers have rated them lower. If the sellers rate themselves highly and their customers do too, there's no harm done. But if sellers rate themselves highly simply to counteract the lower ratings of their customers, that's when it becomes an inappropriate business practice that harms the market."

Source: University of Rhode Island (news : [web](web))