Research explores the games people play on credit applications

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As it stands, it's possible for you to play your bank and get approval for a loan that, maybe, you shouldn't be granted.

"When you fill out an application form, you can lie," said Mimi Chong, a fourth-year Statistical and Actuarial Sciences PhD student at Western.

"The purpose of my work is to catch liars."

Chong is anticipating the publication of a paper titled "Catching Liars: Big Data and Credit Card Fraud" this fall, in *Intelligent Data Analysis*. The paper, in which she proposes a method to safeguard against small lies costing banks big bucks, is the culmination of her doctoral work.

Little lies on an application form can turn into big bucks for you. But for the bank, it can mean a significant loss, if you default on your loan, she explained.

Imagine this scenario: You go into a bank to fill out an application for a car loan or mortgage. The application asks for a number of things, like your income, assets or current debt load, to determine whether or not you are eligible for the loan. You're not a terrible applicant on paper, but you make a smidge less than what the bank would consider adequate for a loan.

So you lie – nothing big – just enough to sneak under the bank's radar.

"A person may earn $5,000 a month and can lie and say it's $7,000 a month. The banks don't really verify everything," Chong said.

Matt Davison, Chong's supervisor, continued. "Banks don't really verify everything that's on your application form; there are lots of different fields and some things are easy to verify, like your income with your T4. Other things are harder to verify,"

For example, the value of assets presented as collateral on an application form is hard to pin down, Chong added, and even income, for some people, is hard to verify because they could have an undeclared source of income that isn't documented.

For the bank to check every variable, it would have to invest significant time and money.

So, in theory, you could have poor credit and no money but could claim your house is worth a great deal and put it up as collateral on your loan application. Banks don't necessarily spend time and money on sending out an appraiser to make sure you're not lying, and just like that, you've got your loan.

You're a risk to the bank, but as it stands, the bank doesn't know it.

This approach works only if the applicant doesn't lie too much, but just enough for the lie to be unsuspicious on an application, said Davison, who teaches in Applied Mathematics, Statistical and Actuarial Sciences and Business at Western.

"For people who are asking for a credit card, a mortgage or a loan, the same data is required (on an application). What the bank is doing right now, because they have a large amount of applicants, they build a model based on historical applicants. As long as they put a customer's information into the model, it automatically gives the results on whether the borrower is a good or bad customer," Chong continued.

The current model separates people by an imaginary axis into two groups. The 'good' group is comprised of customers predicted to repay their loan; the 'bad' group is seen as too high risk and likely to default on the loan.

Applicants near the middle of the axis, those who fall on the 'bad' side, would be the ones most likely to profit from small lies on their application, using them to bump themselves to the 'good' side.

"Right now, with the model the bank is using, they haven't really verified

all the information on the application. They don't do that because it's expensive to do. I'm showing that if they put some effort and money on verifying the characteristics of customers, they would increase their profit," Chong said.

"The model cannot detect small lies. If the borrowers are intelligent enough to lie in the correct way, they can actually escape the credit checks, cheat the system and get their money. I'm just telling the bank to update the model."

Chong's suggestion is for banks to hire independent auditors, as well as invest time and employee efforts to investigate application variables on which individuals could lie.

"Our model is a game model; it says the borrower and the lender are playing a game with each other, an adversarial game, and the borrower can sometimes make a very small lie to change the lender's behaviour," Davison said.

"The research is about applying this game theory aspect to the lending decision."

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