

Protecting older adults against financial exploitation

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SUMMARY

Elder financial exploitation is a growing public health crisis, with 2.7 percent to 6.6 percent of older people financially exploited every year. To address this, Professor Muckley and his team developed a new 'alert model', showing how global financial institutions can use artificial intelligence to better protect their older clients.

The alert model's success lies in its ability to remove much of the distraction created by false alarms. Reducing false alarms by 57%, it enables skilled analysts to focus on the real problem cases. The alert model also identifies new cases of elder financial abuse that are overlooked by analysts. Crucially, this work is now helping to protect millions of older people against financial crime.

"... persuasive evidence of how artificial intelligence can be used to counteract fraud and protect elderly customers."

Sean Smith, Partner in Risk Advisory at Deloitte

RESEARCH DESCRIPTION

Using data about people's accounts at a major financial institution, Professor Muckley and his team have detected, predicted and prevented instances of elder financial abuse (where older people are deprived of their funds or assets).

Over the course of the 30-month research project, Professor Muckley and his team examined 5 million older customers' accounts (for a total of around 500 million transactions). Older customers are classified as individuals of more than 70 years of age.

In collaboration with analysts at the host financial institution, the team identified various risk factors of elder financial abuse, like volatility of payment amounts and whether the client has granted someone Power of Attorney. The team then used machine learning methods to fine-tune alert models and to design a new alert model which can better predict instances of abuse.

The key research insight is that every-day data, which all financial institutions have available, can inform alert models and mitigate financial crime. Data regarding a client's traits



(like age, gender, and net worth) and account activity, combined with artificial intelligence (AI), is enough to better protect older individuals against financial crime.

The research was conducted at a globally important financial institution, with more than 7 trillion USD in assets under management, adding weight to the findings.

RESEARCH TEAM, COLLABORATORS AND FUNDING

Research team

- Cal Muckley, Principal Investigator
- Gaurav Kumar, Post-doctoral Researcher
- Linh Pham, Researcher
- Darragh Ryan, Researcher

Funding

- Co-funded by Enterprise Ireland and the European Regional Development Fund
- Financial support also received from Science Foundation Ireland
- UCD College of Business Operational Risk Programme

RESEARCH IMPACT

Professor Muckley and his team have provided the first published high-performance alert model to mitigate elder financial exploitation. The alert model responds to a Security and Exchange Commission White Paper, which suggests that AI can potentially 'detect, prevent, and even predict the risks of elder financial exploitation'. The white paper's author, Stephen Deane, has indicated that he has read Professor Muckley's paper 'with great interest'. The team's work is featured in the *Wall Street Journal*, licensed to a globally important financial institution, and published in the *European Journal of Finance*.

Economic impact

Over the course of about two and a half years, the host institution's own fraud-detection system generated 19,395 alerts based on suspicious activity – although human analysts afterward deemed only 74 of the incidents were truly suspicious. By contrast, Professor Muckley's model independently generated 8,340 alerts, showing a reduction in false positives by 57 percent. It also identified 66 of those 74 suspicious activities, as well as three additional fraudulent cases initially missed by the analysts.

The model therefore markedly reduced the cost of fraud detection and identified new instances of financial abuse. The host institution can now better comply with the US Bank Secrecy and Elder Abuse Prevention and Prosecution Acts, and abide by the rules of the Financial Industry Regulatory Authority. The host institution currently implements the alert model on a weekly basis.

As the work is widely disseminated, it can likewise benefit other institutions around the world. In 2019, the model was presented to high-ranking personnel at Bank of Ireland, Citi and Deloitte, to regulators at the Central Bank of Ireland, and at conferences. Sean Smith, Partner in Risk Advisory

at Deloitte, for instance, has indicated that the research results are 'very timely' and that they comprise 'persuasive evidence of how artificial intelligence can be used to counteract fraud and protect elderly customers'. The UCD Technology Transfer Office is engaged with other financial institutions regarding interest in licensing the alert model.

Health and wellbeing impact

Critically, the alert model better protects the host institution's older clients against financial crime. Likewise, due to dissemination, the clients of other institutions can benefit. At the host institution alone, around 5 million accounts belonging to older people benefit from this additional safeguard on their transactions.

The reach and significance of this work is further evident in that, at a minimum, between 2.7 percent and 6.6 percent of older customers were financially exploited in 2017, with tens of billions of US dollars likely to have been stolen. Corona Joyce, Senior Policy Advisor at Age Action Ireland, said that, in relation to this work, they 'are pleased to see the potential for artificial intelligence – rooted in a strong human rights based approach – to help detect and alleviate the financial abuse of vulnerable persons'.

Educational impact

Analysts within the host institution, and UCD researchers, now have new skills in AI which they can use to mitigate a wide range of risks – a skill set which is in high demand in industry. This work is conducted 'precisely where it is needed in modern banking' (Ken O'Sullivan, Director of Risk Management and Financial Services Education, Institute of Bankers), which is why in 2020 UCD launched two new modules, Machine Learning in Finance and Alert Models in Operational Risk Management.





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Presentations

Bank of Ireland, Deloitte and Citibank, Seminar title: Can alert models for fraud protect the elderly clients of a financial institution? January 18, 2019. Location: Deloitte Ireland LLP, Earlsfort Terrace, Dublin.

British Accounting and Finance Association, Seminar title: Can alert models for fraud protect the elderly clients of a financial institution? April 10, 2018. Location: Central Hall, Westminster, London.

Central Bank of Ireland, Seminar title: Can alert models for fraud protect the elderly clients of a financial institution? 16th July 2019. Location: North Wall Quay, Dublin.

Deloitte, Seminar title: Can alert models for fraud protect the elderly clients of a financial institution? Sept 15, 2020. Location: Risk Advisory Department, Deloitte Ireland LLP, Earlsfort Terrace, Dublin.

Host Institution, Seminar title: Can alert models for fraud protect the elderly clients of a financial institution? March 2017 to June 2018. Multiple presentations to various collaborating departments located globally.

Rennes School of Management, Seminar title: Can alert models for fraud protect the elderly clients of a financial institution? 21 June, 2019. Location: Center of Excellence for AI Driven Business, Rennes, France.