

# FMS1204S: Fraud, deception and data

Week 8

Fraud in the financial world

# Fraud and Fraud detection

- ▶ The rapid advance of technology creates new opportunities for criminals wanting to commit fraud.
- ▶ There are many different types of fraud, such as:
  - ▶ Credit card fraud
  - ▶ Money laundering
  - ▶ Telecommunications fraud
  - ▶ Computer intrusion
- ▶ Increasingly, in order to detect fraud, investigators use statistical modelling and automated algorithms to search through large databases and flag suspicious patterns of behaviour.
- ▶ Broadly, the methods can be classified as either supervised or unsupervised.

# Statistical Methods for fraud detection

## Supervised methods:

- ▶ There is a past history of transactions available, some of which are known to be fraudulent and others not.
- ▶ Aim: try to build rules for predicting the fraudulent transactions based on the past history and then apply these predictive models to future data.

## Unsupervised methods:

- ▶ There is no past history of properly classified transactions available.
- ▶ The methods attempt to identify transactions that are somehow unusual compared to the others.

# Challenges in fraud detection

- ▶ A particular challenge in the area of statistical methods for fraud detection is that criminal behaviour evolves over time - criminals adapt to circumvent established detection methods.
- ▶ Statistical methods for fraud detection are naturally subject to error, and can sometimes fail to spot things which are obvious to a human investigator.
- ▶ A key challenge in flagging suspicious transactions in statistical fraud detection is obtaining a balance between false positives and false negatives.

# Group 1

- ▶ Mlodinow, L. (2008). The drunkard's walk: How randomness rules our lives. London: Penguin Books. (Chapter 9, Illusions of patterns and patterns of illusions).
- ▶ In this reading Leonard Mlodinow argues that we often overinterpret random patterns, and illustrates the application of the ideas he discusses in the financial world. In particular he discusses the legendary fund manager Bill Miller and asks what the chances are that he (or someone like him) would perform as well as he has purely by chance.
  - ▶ What figures have been suggested for the odds of matching Bill Miller's performance purely by chance?
  - ▶ Why is there such a discrepancy between the different figures?

## Group 2

- ▶ Salmon, Felix (2009). Recipe for Disaster: The Formula That Killed Wall Street. *Wired Magazine* 17 (3).

[http://www.wired.com/techbiz/it/magazine/17-03/wp\\_quant](http://www.wired.com/techbiz/it/magazine/17-03/wp_quant).

- ▶ One cause of the financial collapse of 2008 was the use of poor methodology for estimating the risk of so-called collateralized debt obligations (CDOs). This article explains in layman's terms the Gaussian copula model that was often used for this purpose.
  - ▶ Was it known beforehand that reliance on the Gaussian copula model to price risk was dangerous?
  - ▶ On what data does the copula model rely?

## Group 3

- ▶ Kumar, K. and Bhattacharya, S. (2007). Detecting the dubious digits: Benford's law in forensic accounting. *Significance*, 4, pp. 81–83.
- ▶ This article explains the idea of Benford's law, and how it may be used to detect faked data.
  - ▶ What is Benford's law?
  - ▶ In what situations is Benford's law useful, and how is it used for fraud detection?

## Group 4

- ▶ Hand, D. (2008). Privacy, data discs and realistic risk. Significance 5, pp. 11–14.
- ▶ In 2007 two computer discs, containing child benefit details for 7 million families and 25 million individuals in the UK went missing.
  - ▶ Explain why the loss of the data is a serious issue.
  - ▶ What trade offs need to be managed in controlling the risk of such events in the modern world?

## Group 5

- ▶ Lewis, Michael and Einhorn, David (2009). The end of the financial world as we know it. New York Times, January 3, 2009.

<http://www.nytimes.com/2009/01/04/opinion/04lewiseinhorn.html>

- ▶ Explain to the class what Bernard Madoff was accused of doing.
- ▶ How did Harry Markopolos uncover his deception, and why did it take regulators so long to act?