

Machine Learning & Dynamical Systems, AI Ethics, and Economic & Financial Data Analysis

R.S.MacKay

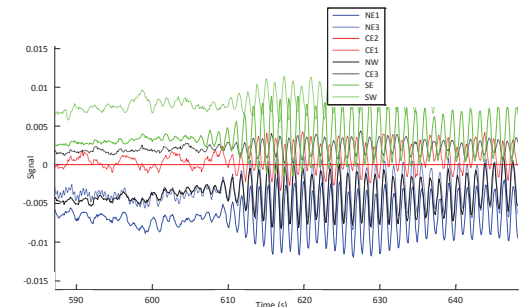
Mathematics and Centre for Complexity Science

University of Warwick

& ATI faculty fellow


ML & DS

- New special interest group (SIG) at the ATI
- Aim: Show how ML can be useful for DS and how DS can be useful for ML
- Based on two conferences: IC Feb 2019, Fields (Toronto, but online) Sep 2020, organised by Boumediene Hamzi (IC)
- E.g. why neural networks work, reservoir computing, controlled ODEs, model reduction
- Plan monthly seminar, host 3rd conference at ATI, and stimulate research in the area
- My work:
 - Linear stochastic processes to detect oscillations arxiv: [1909.10247](https://arxiv.org/abs/1909.10247)
 - Inferring value from price series (PhD Kutlwano Bashe)



AI Ethics

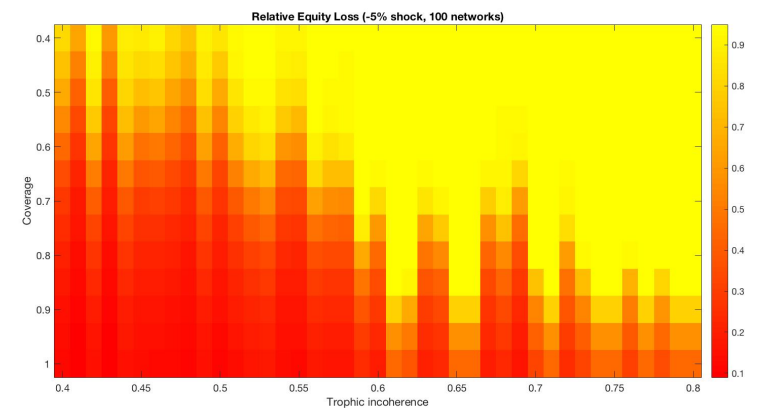
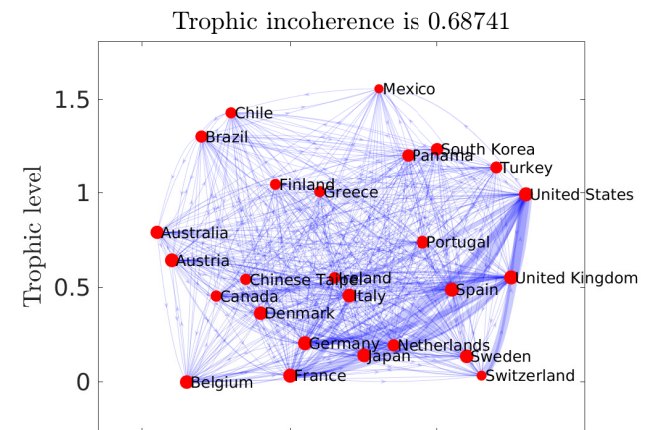
- Artificial Intelligence algorithms are highly likely to choose strategies that are regarded as unethical <https://doi.org/10.1098/rsos.200462> (Beale, Battey, Davison): extreme value statistics
- ATI has a Public Policy programme dealing with ethical foundations and a Data Ethics Group

| PRICE OF INSURANCE | | | |
|---|----------|------------|-------------|
| | Mo Smith | John Smith | Extra cost |
|  Admiral (Leicester) | £2,252 | £1,333 | £919 |
|  Bell (London) | £1,572 | £1,029 | £543 |
| M&S M&S (Cardiff) | £3,182 | £2,949 | £233 |
|  Elephant (Manchester) | £2,173 | 1,956 | £217 |
|  Diamond (Bradford) | £2,048 | £1,843 | £205 |

Economic & Financial Data Analysis

- ATI has a programme on Economics & Finance, supported by HSBC and with some input from FCA.
- My work is focussed on
 - financial regulation to reduce systemic risk (Beale, Mousavi, Tucker)
 - inferring value from price (KB)
 - trophic analysis <https://doi.org/10.1098/rsos.201138> (Sansom, Johnson, Zhou) + see Shuaib

Coverage=Equity/Assets; Equity=Assets-Liabilities



My pitch to the ATI

- Directions in Data Science, New Turing fellow talk, <https://youtu.be/uvsdpMSabLU>