DATA-DRIVEN BUSINESS AND BEHAVIOUR ANALYTICS

THE UNIVERSITY OF EDINBURGH

ACADEMIC YEAR 2023/2024
TEAM
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MATERIAL AND INFO
LEARN ULTRA
https://opencourse.inf.ed.ac.uk/dbba
TUTORIALS

Weekly tutorials from week 3 - in person

Students are expected to attempt the exercises before attending the tutorial
COURSEWORK

Two assignments (25% each of final marks)
First assignment issued on week 4, deadline week 7
Second assignment issued on week 7, deadline week 11
Exact dates will be available on the websites
EXAM

50% of final marks

Exam diet: december

More details later this term
MATERIAL

Main textbook for the first part:
Menczer, Fortunato, Davies - A first course in network science

Another good book is:
Barabasi - Network Science (Available for free at www.networksciencebook.com)

Main textbook for the second part:
Delli Gatti et al. - Agent-Based Models for Economics: a Toolkit

Supplementary material will be provided when needed
PIAZZA

Accessible from: LEARN and opencourse

Primary use: Discussion for students
PROBLEMS?
QUESTIONS?

If about current lecture, ask in class
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If about anything else ask on Piazza
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If about exercises, ask on Piazza after the relevant tutorial
PROBLEMS? QUESTIONS?
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If about anything else ask on Piazza
If about exercises, ask on Piazza after the relevant tutorial
If about coursework: ask on Piazza, the TA or the lecturer will answer
HOW TO SUCCESSFULLY TAKE THIS COURSE

Engage during lectures
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Interact with other students
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Engage during lectures

Interact with other students

Learn how to solve problems
1) **Critically** analyse and explain human behaviour based on empirical observations.
LEARNING OUTCOMES

1) Critically analyse and explain human behaviour based on empirical observations.

2) Apply a range of mathematical and computational modelling techniques to human-related data and decide which one is the most appropriate for a specific task.
LEARNING OUTCOMES

1) **Critically** analyse and explain human behaviour based on empirical observations.

2) Apply a range of mathematical and computational modelling techniques to human-related data and decide which one is the most appropriate for a specific task.

3) **Model and simulate realistic social systems** with independent or interacting individuals.
LEARNING OUTCOMES

1) **Critically** analyse and explain human behaviour based on empirical observations.
2) Apply a **range of mathematical and computational modelling techniques** to human-related data and decide which one is the most appropriate for a specific task.
3) **Model and simulate realistic social systems** with independent or interacting individuals.
4) Discuss the legal and **ethical implications** of working with human-related data.
LEARNING OUTCOMES

1) **Critically** analyse and explain human behaviour based on empirical observations.

2) Apply **a range of mathematical and computational modelling techniques** to human-related data and decide which one is the most appropriate for a specific task.

3) **Model and simulate realistic social systems** with independent or interacting individuals.

4) Discuss the legal and **ethical implications** of working with human-related data.

5) **Present** (written/oral) **highly interdisciplinary work** in an understandable and comprehensive manner to people with different backgrounds.
COURSE OVERVIEW

Learn about (socio-economic) complex systems

Networks and social networks

Agent-based models and simulations
O0000H....

I"M READY, ARE YOU READY?
COMPLEX SYSTEMS

“I THINK THIS CENTURY WILL BE THE CENTURY OF COMPLEXITY.”
STEPHEN HAWKING
WHAT ARE COMPLEX SYSTEM?
SOCIO-ECONOMIC COMPLEX SYSTEMS
TWO APPROACHES

Describe the system
- TOP-DOWN APPROACH
- MODEL MACRO BEHAVIOUR
- DESCRIPTIVE ANALYSIS

Describe the elements
- BOTTOM-UP APPROACH
- MODEL MICRO BEHAVIOUR
- EMERGING PATTERNS
DESCRIBE THE SYSTEM

Network science

INTERACTION BETWEEN ELEMENTS

UNVEIL PROPERTIES OF A SYSTEM WITH ANALYSIS

RELATED TO DATA SCIENCE
WHEN TO USE

Network science

WE DON’T KNOW THE BEHAVIOUR OF ELEMENTS OR IT IS TOO COMPLICATED TO MODEL

WE HAVE DATA ON THE BEHAVIOUR OF THE SYSTEM

WE DON’T NEED TO KNOW WHY ELEMENTS BEHAVE IN A PARTICULAR WAY
EXAMPLES IN BUSINESS

Interbank networks

Financial crisis

Great Crash of 2008

Disbelief, and a punter reach...
EXAMPLE IN BUSINESS

Opinions on markets

Historical

Simulated
DESCRIBE THE ELEMENTS

Agent-based modelling

MAY OR MAY NOT HAVE INTERACTIONS BETWEEN ELEMENTS

DESCRIBE THE BEHAVIOUR OF ELEMENTS

SOCIAL SCIENCE AND PSYCHOLOGY
WHEN TO USE
Agent-based modelling

WE DON’T KNOW THE BEHAVIOUR OF THE SYSTEM
OR IT IS TOO COMPLICATED TO MODEL

WE HAVE DATA (OR THEORIES) ON THE BEHAVIOUR OF THE ELEMENTS

WE NEED TO KNOW WHY THE SYSTEM
BEHAVES IN A PARTICULAR WAY
EXAMPLES IN BUSINESS

TRADERS IN THE MARKET

CREDIT RISK

MARKETING
EXAMPLES IN BUSINESS

Traders in the market
Economics focus
Agents of change
Conventional economic models failed to foresee the financial crisis. Could agent-based modelling do better?
WHY IS THIS COURSE USEFUL?

Many financial institutions and businesses have loads of personal data. Such institutions don’t know how to use these data. They need experts to do so but can’t find them!
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YOU WILL BE THOSE EXPERTS!
WATCH THIS DOCUMENTARY

Connected: the power of six degrees

https://www.youtube.com/watch?v=2rzxAyY7D7k