Sustainability and Artificial Intelligence

A merger @ Sussex?

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What is Sustainability & AI?

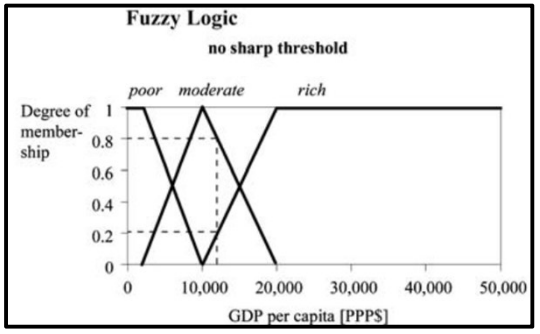
Sustainability & AI, 2 dimensions:

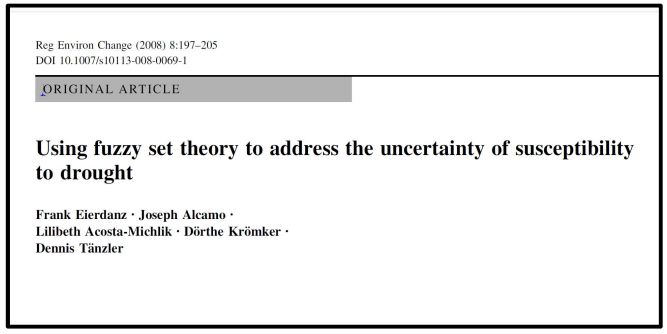
- Impact *for* sustainability (positive)
- Impact *on* sustainability (negative)

Impact *for* sustainability

Example, application of AI-type methodologies in environmental science

- Smart parameter optimisation in environmental models
- Fuzzy sets to link qualitative & quantitative scenarios
- Fuzzy sets to characterise vulnerability to drought





Impact *on* sustainability

- Carbon footprint 2-3% (4%) total greenhouse gas emissions
- Large water requirements
- Impacts on workforce
- Knowledge gap between haves and have nots
- Bias, prejudice in assertions and recommendations
- Narrow view of future – Training with historical sets → bias towards past
- Violations of privacy, human rights; autonomous behaviour - loss of human control

Solvable to an extent:

e.g. Carbon footprint

- Use servers where electricity provided by renewable E.
- Efficient machine learning architectures → less time → less energy + C

Impact *on* sustainability

AI is fuzzy notion

One way to classify:

- ❑ Artificial Narrow Intelligence (ANI)
- ❑ Artificial General Intelligence (AGI)
- ❑ Artificial Superintelligence (ASI)

All types, projects have same impact?
Likely, no

Impact depends on comprehensiveness; connectedness with other machines, autonomy from humans, …

To understand impact → assessment must be broad & systematic

Need general framework for sustainability assessment of AI

Tools to investigate sustainability of AI

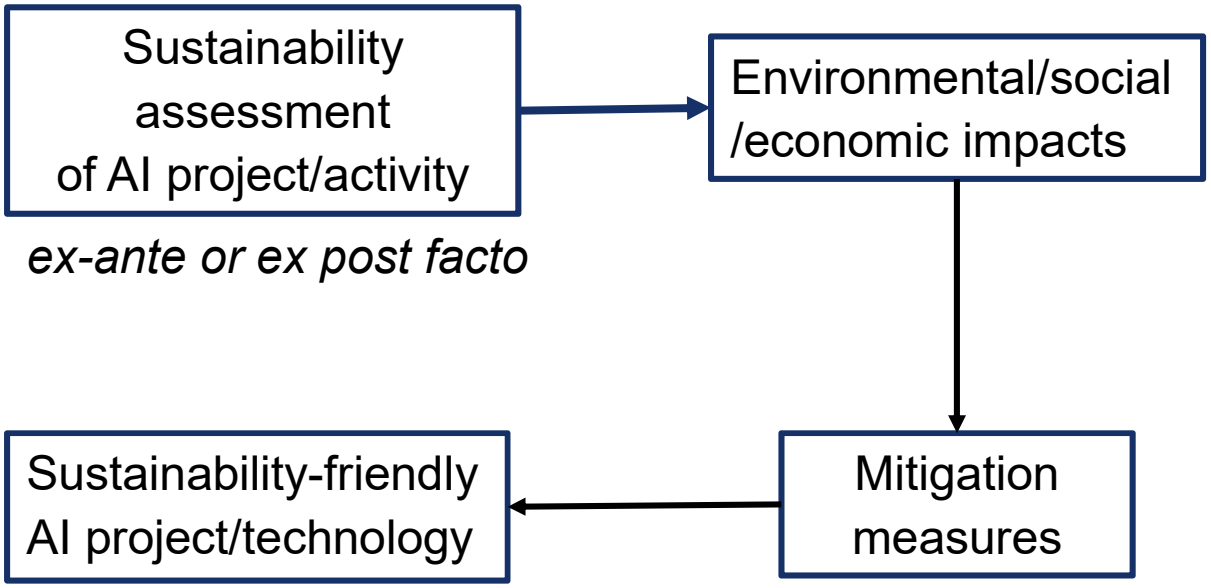
Environmental Impact Assessment

Social (Cultural) Impact Assessment

Life Cycle Assessment

Start by applying/adapting current tools

Sketching a framework for sustainability-friendly AI



Going forward

- We need open design of AI (public oversight) – too many potential negative consequences to leave in hands of private sector or academia
- We should *stress test* major AI projects and technologies against sustainability criteria
- Need sustainability assessment framework for AI → Experiment with existing assessment tools (env impact assessment, others)
- Sussex is ideal place for major research activity on “Making AI Sustainable”.
- Collaborate on bid for major interdisciplinary project to comprehensively assess Sussex AI projects as case studies:
  - ✓ Use and test existing assessment methodologies, develop new methodologies
  - ✓ Mutual learning → Identify impacts + develop assessment methodologies + find out how to make AI projects/models more sustainable