

Computational-Based Approaches to Critical Infrastructure Research

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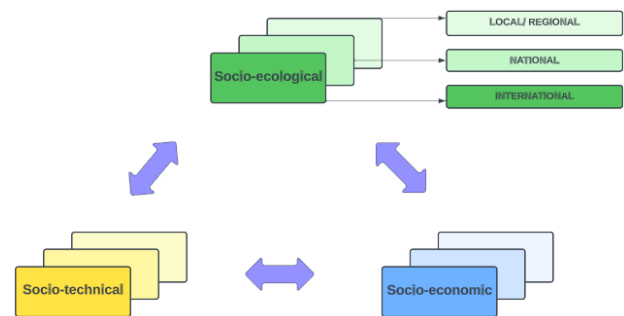
Python, Machine Learning, and Computational-Based Approaches to Critical Infrastructure Research.

Computational-based approaches to conducting research have been shown to increase the speed, transparency, repeatability, and rigor of social science research. Contemporary research has applied these new techniques to systematic literature reviews.

Computational Social Science

CSS 'leverages the capacity to collect and analyze data with an unprecedented breadth, depth and scale' (Lazer et al., 2009).

The primary CSS methods employed today can be categorised into five areas: Automated information extraction; Social network analysis (SNA); Geospatial analysis (socio-GIS or social GIS); Complexity modelling; Social simulation models.



Systematic Literature Review Applications – Gathering information

- Non-conventional or 'grey literature' is routinely one of the most difficult literatures to methodically gather for use in a systematic review
- Web-scraping, also known as 'Web Harvesting', 'Web Data Extraction' and 'Screen Scraping', is defined as, 'a procedure of automatic web data extraction instead of manually copying it.'
- Programmable Search Engines and Python constructed interfaces offer a cheap, transparent, and repeatable means to effortlessly gather grey literature for use in a systematic literature review.

Systematic Literature Review Applications – Data Extraction & Synthesis

- New approaches that utilise Generative Artificial Intelligence infused chatbots to converse with PDFs to extract data for use in reviews. New methods that utilise Topic Modelling approaches to synthesise data extracted during a review.

Automating Systematic Literature Reviews with AI and MLTs

Currently in review is a manuscript that proposes a data repository for organising policy documents pertaining to critical infrastructures. It was uncovered during a SLR (*infused with AI and MLTs*) into Transportation Infrastructure Resilience & Sustainability.

Publications:

Atkinson. C. 2023- Cheap, Quick, and Rigorous: Artificial Intelligence and the Systematic Literature Review. *Social Science Computer Review*

Atkinson. C. 2023- Cheap, Rigorous, and Transparent: How Web-scraping with Python can Improve Collecting Grey Literature for Systematic Literature Reviews. *The Grey Journal*

Atkinson. C. 2023- ChatGPT and computational-based research: benefits, drawbacks, and machine learning applications. *Disc AI*

Atkinson. C. 2024- Generative Artificial Intelligence, Python, and Gathering Grey Literature for a Systematic Literature Review with Google's Programmable Search Engine. *Research Square- Preprint*



Further information

For additional information scan the QR code or contact:

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