

The Reconfiguration of Human Inquiry: Social Science in the Digital Age

Shahjahana Begum

Department of Philosophy
Barkhetri College, Narayanpur, Mukalmua

Abstract:

The rapid expansion of digital infrastructure, ambient data generation and artificial intelligence (AI) has structurally transformed contemporary human society. This change has two consequences for the social sciences: on the one hand, it produces a large, multi-layered space of digital human behaviour that needs urgent study, and on the other hand, it gives the social sciences the chance of transformative computational methods. This article examines the main dimensions of social science in the digital age, illustrating how big data, machine learning and algorithmic systems are reshaping social stratification, identity formation and political communication. It finally tackles the pressing methodological, epistemic and ethical vulnerabilities this digital paradigm shift brings.

Keywords: Computational Social Science, Digitalisation, Algorithmic Governance, Big Data Ethics, Digital Identity.

1. Introduction

Social sciences have been decoding human behaviour and institutional structures for over a century with techniques like ethnographic fieldwork and surveys and the ways have not changed much. Traditionally the social scientists used surveys, structured interviews or ethnographic field work. In the case of archival work the techniques may still be old social science research techniques and be traditionally manual. However, this is no longer the case in the same way. Hilbert (2020) suggests that we have moved from a material-and-energy economy to an information-based economy or metaparadigm. The migration of social interactions to digital networks has generated a high fidelity digital trace. The digital version of social sciences has not had even a slight improvement in the techniques of social research. Instead it radically alters the relationship between the social researcher and the social subject. In the digital age social researchers must contend with an architected social order planned by social engineers through algorithms and new techniques of social research.

2. Theoretical Framework: The Anatomy of a Digital Society

To analyse society in the digital age, social science must synthesise classical sociological theories with contemporary digital realities. This transformation is best understood across three interconnected dimensions of human behaviour:

2.1 Digital Identity and Socialisation

The digital arena has altered the structural social norms. The human interaction now shifts from physical proximity to flexible and highly mediated digital networks (Sulianta, 2024). People are not just reacting to environments that already exist socially, they are building digital selves. These curated online spaces enable fluid self-representation, but also link social validation to immediate, quantifiable feedback loops (likes, shares, views) that deeply impact psychological well-being and community formation.

2.2 Algorithmic Governance and the Public Sphere

Algorithms now shape what information we see in the public sphere. Social media sites are designed for maximum engagement, and often favour incendiary or emotionally polarising content over nuanced facts. This architectural design produces digital echo chambers and enables hyper-targeted misinformation campaigns, fundamentally fracturing shared democratic realities and changing the pathways of political radicalisation (Balkin, 2017).

2.3 The Data Economy and Digital Stratification

Data has shifted from a passive record of human behaviour to an active currency and tool of governance (Strategic Vision SSH, 2022). Digital platforms are new opportunities for professional networking and flexible labour, but also reproduce social inequalities. There is a stark digital divide that lies not only in basic access to technology but in the structural power imbalance between the ordinary users who generate the data and the corporate platforms that own and capitalize on it.

3. Methodological Revolutions: Computational Social Science (CSS)

The move of human socializing, governance, and commerce into digital spaces has sparked a major shift in methods. By combining the detailed analysis of data science with the strong foundation of classical sociology, Computational Social Science (CSS) enables researchers to watch macro-societal changes as they happen. This approach avoids the sample-size issues and memory errors found in traditional methods.

3.1 Natural Language Processing (NLP)

Traditional content analysis needed teams of researchers to manually code text line by line. This process was both labor-intensive and subject to bias. In the digital age, NLP automates this on a large scale using computational linguistics, automated sentiment tracking, and semantic network analysis. Instead of just counting keywords, modern NLP models understand context, syntax, and emotions across millions of data points at the same time. This approach is especially important for tracking real-time changes in public mood during geopolitical crises. It also helps map the changes in language and the patterns of radicalization in online extremist rhetoric over time.

3.2 Big Data and Network Analytics

Human relationships online are fundamentally structural, operating within complex digital architectures. Big Data and Network Analytics allow social scientists to move past individual-level data and map graph-based relationships, structural nodes, and systemic information cascades. By calculating network density, centrality, and clustering coefficients, researchers can mathematically define how ideas spread. Practically, this approach is critical for uncovering the invisible structural patterns that sustain online echo

chambers and for tracing the specific propagation pathways that viral misinformation takes as it moves from fringe forums to mainstream media ecosystems.

3.3 Machine Learning (ML) Modeling

Where traditional social science has historically been descriptive or retrospective, the integration of Machine Learning (ML) introduces advanced predictive capabilities. By training models on immense repositories of behavioral metadata, researchers utilize predictive behavior analytics and macro-trend tracking to identify latent societal patterns before they manifest acutely in the physical world. This has profound application in public policy and welfare, including forecasting public health crises via regional search queries, identifying early digital markers of community-wide mental health degradation, and monitoring real-time economic strains through shifting digital consumer habits.

4. Epistemic and Ethical Vulnerabilities

Despite its immense analytical power, social science in the digital age faces structural vulnerabilities that challenge its epistemic foundations and ethical integrity.

Important Epistemic and Methodological Risks:

- **Algorithmic and Data Bias:** Computational data is rarely neutral. Algorithms are inherently embedded with the biases of their creators and the historical inequities present in their training datasets.
- **The Flaw of "Platform Dependability":** Relying entirely on digital platform APIs leaves social science vulnerable to corporate control. Platforms can restrict data access, shift privacy algorithms, or shut down entirely, rendering long-term, longitudinal studies fragile.
- **The Surveillance Paradox:** Traditional research rests on explicit, informed consent. In contrast, computational social science frequently harvests ambient metadata generated by individuals who have no active awareness that their daily expressions are being utilised for macro-behavioural research.

5. Conclusion and Future Directions

The digital age does not threaten to displace the social sciences; rather, it makes them more vital than ever. While computer science can map the raw mechanics of digital systems and track massive data flows, it lacks the theoretical vocabulary required to decode what these trends actually mean for human dignity, institutional trust, and systemic inequality.

Moving forward, social science must actively resist strict disciplinary isolation (RJ Wave, 2025). The path forward requires a deliberate, transdisciplinary synthesis: an approach where technical, algorithmic systems are built and audited in lockstep with critical social perspectives, ensuring that the digital world is built to sustain—rather than erode—democratic human values.

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