

Machine Legibility and Epistemic Governance in Malaysia’s Smart Cities: A Postcolonial Analysis of Algorithmic Knowledge, Identity, and State Power

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Abstract

This thesis examines how AI systems deployed in Malaysia’s smart cities encode constitutional and racial asymmetries through algorithmic infrastructures. Focusing on epistemic governance, it analyses how data, models, and legal frameworks shape machine legibility and citizen classification, with comparative insights from India and Brazil to contextualise Malaysia’s postcolonial governance model.

Summarized Thesis

In recent years, artificial intelligence (AI) has become central to the transformation of public governance, particularly through its integration into “smart city” initiatives. Smart cities are not merely sites of technological deployment; they are laboratories in which new forms of *algorithmic rationality* are institutionalised under the guise of efficiency, objectivity, and progress (Son et al. 2023).

Malaysia has embraced this global trend with increasing intensity, formalising its ambitions in frameworks such as the *Malaysia Smart City Framework* (MSCF) (2019), the *Artificial Intelligence Roadmap* (AI-Rmap) (2021), and the *National Guidelines on AI Governance and Ethics* (NGAI) (2023). These policy instruments articulate a vision of AI-enhanced urban governance focused on inclusivity, safety, sustainability, and innovation. Yet they emerge within a legal and political context shaped by *constitutional asymmetry*—specifically, the coexistence of Article 8(1) of the Federal Constitution (1969), which guarantees equality before the law, and Article 153, which enshrines race-based preferential treatment for the Bumiputera community (Affirmative Action). This duality is not a peripheral feature of the Malaysian state—it is a structuring logic of its governance, and it directly shapes how identity, entitlement, and citizenship are rendered legible to public institutions.

As AI systems are embedded into this landscape, they do not operate neutrally. They must necessarily interface with and translate the existing legal-political architecture into data, features, models, and outputs. The critical question, then, is not merely whether AI systems deployed in Malaysia’s smart cities are accurate, efficient, or fair, but how they encode, reproduce, or transform existing epistemic hierarchies. This requires a shift in perspective: from examining AI as a set of technical tools to analysing AI as an *epistemic infrastructure*—a mode of state seeing, classifying, and acting that is both computational and deeply political.

This thesis investigates the following central research question:

How do AI systems deployed in Malaysia’s smart city initiatives operationalise legal and racial asymmetries through algorithmic infrastructures, and what does this reveal about the nature of epistemic governance and machine legibility in postcolonial states?

Drawing on conceptual tools from science and technology studies (STS), legal theory, and critical algorithm studies, the research investigates how these systems organise knowledge about citizens, and how this knowledge production process is shaped by Malaysia’s racialised constitutional framework.

Focusing on Malaysia as the principal site of analysis, the thesis examines two key domains of smart city implementation: AI-enhanced surveillance systems and automated resource allocation platforms. It interrogates how data is collected, labelled, and transformed into algorithmically actionable inputs, and how these technical choices reflect deeper normative commitments about race, religion, and vulnerability. Particular attention is given to the legal and institutional frameworks that govern public-sector data processing, especially the exemptions under Section 3(1) of the Personal Data Protection Act (PDPA) (2010), which ex-

clude federal and state agencies from its scope. These exclusions render public AI systems largely opaque and unaccountable, particularly in the context of marginalised groups.

Methodologically, the thesis adopts a qualitative, multi-layered approach. It combines doctrinal legal analysis of constitutional and statutory texts with technical unpacking of AI systems used in selected smart city projects—focusing on their data pipelines, feature selection processes, and model architectures. In addition, it incorporates discourse analysis of national AI and smart city policies to understand the sociotechnical imaginaries that justify and legitimise algorithmic deployment.

To enrich and contextualise the Malaysian case, the thesis draws on India's Aadhaar-based governance regime (2016) and Brazil's racial data frameworks (Cadastro Único) (2023). While both countries share a postcolonial history and constitutional commitments to social inclusion, they operationalise identity and vulnerability in distinct ways within their algorithmic systems. India tends to pursue technocratic rationalisation, often avoiding caste as a direct input, while Brazil incorporates racial data to operationalise anti-discrimination.

Ultimately, this research contends that AI systems in smart cities are neither ideologically neutral nor epistemically transparent. They are shaped by, and in turn reshape, the normative orders within which they are embedded. In Malaysia, this means that smart city systems risk becoming automated extensions of constitutional racial exceptionalism, unless critically interrogated. The thesis thus aims to contribute a contextually grounded and technically informed theory of epistemic governance under conditions of postcolonial asymmetry—one that attends not only to bias and fairness but to the deeper politics of visibility, classification, and knowledge.

Achievements and Future Scope

The first year was primarily dedicated to deep theoretical immersion and methodological refinement. I focused on operationalising the concept of "epistemic governance" into a workable analytical framework, drawing heavily from science and technology studies, legal theory, and postcolonial studies. This involved moving beyond the abstract concept to identify tangible indicators, such as the choice of data categories in public service platforms, the definitions of "risk" or "need" embedded in algorithmic models, and the legal and policy narratives used to justify automated decision-making. Recognising the initial breadth of the proposal and the very real challenges of access, I have strategically narrowed the empirical scope. While AI-enhanced surveillance remains a critical area of interest, my primary investigation

now centres on the domain of automated resource and welfare allocation.

The second year marked the transition into substantive empirical fieldwork here in Malaysia. I began by conducting a comprehensive discourse analysis of the key policy architecture alongside parliamentary records and federal budget speeches. Following this, I successfully completed a significant phase of qualitative data collection. This has involved conducting over two dozen semi-structured interviews with a range of crucial actors, including former policymakers involved in digital transformation initiatives, senior technologists at firms developing public-sector AI, and advocates from civil society organisations working on digital rights and social justice.

Looking ahead, the third year is dedicated to analysis, synthesis, and the substantive drafting of the thesis. My immediate plan is to complete a final, targeted round of interviews, particularly focusing on legal experts who can speak to the constitutional implications of public-sector data practices.

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