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Measuring the Impact of AI Adoption on the Sustainability of OpenStreetMap

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Abstract:

Advances in GeoAI are impacting open-source, community-driven platforms such as OpenStreetMap (OSM). AI methods are increasingly used to digitize features — e.g. AI-assisted mapping for buildings and roads (Zanchetta et al., 2024; Fila et al., 2025), automate mapping workflows (Niroshan et al., 2025; Niroshan & Carswell, 2025), extract information (Vohra et al., 2025) and support tagging (Memduhoğlu et al., 2024). Additionally, OSM data is increasingly used as input for training AI models. These developments raise significant questions around trust, transparency, and explainability (Andorful et al., 2025).

The lack of consistent mechanisms for identifying and tagging AI-generated or AI-assisted contributions complicates these issues further. Even geometric comparison of AI-generated and human-generated building footprints shows significant overlap, making reliable differentiation difficult (Memduhoğlu, 2026). As a result, contributors and data users often cannot distinguish between human-generated, AI-generated, or AI-assisted data — making the effect of AI on OSM hard to measure. This is not the first time OSM has faced questions of this kind: similar debates around contributor retention, spatial inequalities, and platform resilience arose with the emergence of armchair mapping and corporate mapping (Anderson et al., 2019), and AI's large-scale prevalence is prompting them again.

With AI and deep learning identified as a continuing driver of OSM and crowdsourced geographic research (Sun et al., 2026), understanding their effects on platform sustainability is increasingly relevant. This thesis evaluates a set of platform health indicators across the dimensions of User, Content, and Community (Park et al., 2026) to assess whether and how large-scale AI adoption has produced measurable changes in OSM's community and data ecosystem. Following a global analysis of platform indicators from 2020 onwards, these indicators are operationalized at the (sub)national level to examine a series of use cases and their spatial and temporal dimensions. Rather than detecting individual AI contributions directly, the overall share of AI-assisted mapping is approximated through the prevalence of large global datasets from Microsoft and Google, specific AI-assisted mapping tags, and RapiD editor usage. Drawing on methodological frameworks from OSM contributor research and parallel work on platforms such as Wikipedia and Stack Overflow (Bégin et al., 2017; Burtch et al., 2024; Park et al., 2026; Schott et al., 2021; Zhang et al., 2024), this thesis contributes to emerging discussions on how open knowledge communities can be evaluated and sustained in an era of pervasive AI.

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