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MAPPING INEQUALITIES FROM SPACE: A MACHINE LEARNING APPROACH TO INFORM POLICY AND DEVELOPMENT DECISIONS

Abstract

Despite the commitment of the international community to Sustainable Development Goals aimed at reducing inequalities and poverty, substantial inequalities within societies remain a persistent challenge for policymakers around the globe. This issue is particularly consequential in the developing world, where rapid economic progress of the higher income portions of society can effectively mask suffering experienced by the lower income or otherwise disenfranchised groups. This issue is further compounded by a lack of reliable, up-to-date, and comprehensive census data – an issue endemic to many developing nations due to lack of funding, inadequate infrastructure, geographical difficulties, corruption, and multiple other barriers added on top of the already low cadence of census data (usually taken every 10 years). It is therefore difficult for policymakers and IFIs to identify priority areas for investment.

This paper explores the feasibility of a machine learning tool that uses space data to map inequalities from space. The tool would ingest existing census data in regions where such data is available and use machine learning to correlate conventional indicators for inequality from the census (household income, female literacy, etc.) with features identifiable from satellite data (land use, building type / function etc.). The tool would then extrapolate the data, using identified features as a proxy, to other regions of the same country where reliable census data is unavailable, giving local authorities/IFIs an indication of priority regions for further study and potential investment. The use of the tool is not intended to replace census data, but rather to indicate to policymakers where there may be a need for action.

We select and consult with priority countries that exhibit a lack of census data in some regions are to understand the added value of this application. Concurrently, we engage EO companies specialized in machine learning to determine the technical and financial challenges of this solution. This analysis leads to a high-level proposition on the form of the tool and a possible approach to implementation and deployment with relevant players identified.

We conclude the paper by illustrating the added value of EO data to policymakers and society in reducing inequalities while also underlining the opportunities and challenges associated with developing and deploying such a tool. We, therefore, demonstrate how machine learning and space data, when harnessed effectively, becomes a powerful tool for positive change.