

DIVERSITY-AWARE DESIGN OF INTERMODAL SMART-MOBILITY SOLUTIONS FOR AN INCLUSIVE AND SUSTAINABLE SOCIETY

ABSTRACT

The climate emergency and the substantial impact of road transport on greenhouse gas emissions necessitate an urgent shift to sustainable mobility practices. Despite governmental efforts to promote sustainable transportation, existing policies have fallen short of achieving the desired sustainability goals and have often worsened social inequalities.

In response to this challenge, we propose a data-driven framework to promote inclusive and sustainable mobility solutions, taking into account individual diversities to enhance policy effectiveness.

Our framework comprises three key components. First, we employ advanced machine learning techniques to create a detailed, data-driven representation of individual intentions towards sustainable mobility options. This helps capture the main socio-economic factors influencing adoption and assess individuals' readiness to embrace innovative mobility solutions.

Second, we use these insights to develop fostering policies that are diversity-aware, effective, and inclusive. By integrating concepts of distributive and epistemic fairness into traditional opinion dynamics models and optimal control strategies, we provide policymakers with a powerful tool for designing and comparing different incentive strategies.

Finally, we focus on real-time monitoring of driving behavior, emphasizing vehicle usage and driver's attitude. The collected data enable the optimization of maintenance activities and vehicle settings tailored to individual needs. This enhances safety, maximizes sustainability, and improves the overall mobility experience, favoring the widespread adoption of innovative solutions.

The proposed framework has been developed and tested on extensive real-world datasets across various application contexts, including shared mobility, electric mobility, and urban micro-mobility. The variety of these contexts demonstrates the framework's versatility and its effectiveness in guiding policymakers to design diversity-aware, effective policies that promote innovative mobility solutions for an inclusive and sustainable society.