P8. Development of Activity-Based Modelling Leveraging Novel Deep Learning Methods

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The rapid evolution of urban agglomerations has propelled urban transportation systems towards greater dynamism, comprehensiveness, and complexity. Consequently, there is an increasing need for more effective transportation policies and nuanced urban planning. To address this demand, transportation modellers are turning to activity-based modelling (ABM) as an alternative to traditional four-step models. ABM, unlike its predecessor, requires granular individual-level travel activity data that is derived from various survey data to serve the discrete choice models at the individual level for activity and trip assignment. Despite its promise, ABM struggles to accurately interpret fundamental travel behaviour patterns and the complexities between travel choices and activities. Our research seeks to bridge this gap by introducing a deep learning-based approach to enhance ABM. Deep learning models excel in identifying underlying patterns and relationships within datasets, highlighting a promising future for capturing fundamental travel behaviour patterns. Our focus extends beyond precision in predicting transportation activities, we also aim to gain profound insights into the impact of various factors on travel demand and decisions. To achieve this, our work involves applying deep learning techniques leveraging Victorian Integrated Survey of Travel and Activity (VISTA) data to model travellers' choices, including but not limited to destination choices, travel mode choices, and departure time preferences. By evaluating multiple models for each choice, we aim to identify the most effective ones. Ultimately, our goal is to supplant the discrete choice models of ABM with our deep learning models. We will also leverage SHapley Additive exPlanations (SHAP) as an explainer to unveil the contributions of individual features. In doing so, our research aims to provide a comprehensive understanding of individual behaviour patterns and the underlying reasons for each travel decision, contributing to more informed policy-making and urban planning.