

Transfer Learning for Tourism Flash Estimates with Mobile Network Operator Data

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Abstract

This paper investigates different methodological approaches to produce timely flash estimates of tourist overnight stays at municipality level by integrating Mobile Network Operator (MNO) data with official survey sources. Three strategies: Traditional Modelling, Augmented Learning and Quasi-Transfer Learning are compared using Random Forest algorithms on monthly data for Emilia-Romagna region. MNO based proxies are bias corrected and incorporated into the learning models to anticipate official survey data by about two months. Results show that Augmented and Quasi-Transfer Learning substantially improve predictive accuracy over traditional approaches, reducing mean absolute percentage error. Conditional Conformal Prediction, implemented through a leave-one-out calibration scheme, provides us with reliable uncertainty quantification across heterogeneous municipalities.

Keywords: MNO data, flash estimates, tourism, augmented learning, transfer learning, data integration

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