

Statistical solutions to improving bike-sharing systems

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Urban mobility is receiving increasing attention as one of the most important dimensions of the so-called smart city. If mobility must be sustainable, i.e., if it contributes to the improvement of quality of life, bike sharing can be viewed as a possible bridge between wellbeing and economic development.

Understanding the mechanisms leading to a successful bike-sharing system (BSS) is indeed a hard task because of the many factors to be considered as, for example, the shape of the docking station network or the number of bikes deployed. One of the most important quandaries is in rightly predicting bike users' behaviour, avoiding an uneven bike distribution among docking stations. In this paper we implement a decision framework to help policy makers to obtain optimal predictions of bike usage in the BSS "BikeMi" in Milan, Italy, using data on each bike itinerary from June 2015 to May 2018, including user and bike ID, check-in and check-out time and location, docking station availability, ride length and check-in and check-out time. We also use meteorological and environmental indicators. By using machine learning methods and Bayesian networks we model check out times and rental duration in order to better understand the bike users' behaviour.