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Modelling large scale human activity in San Francisco

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Diverse group of people with a wide variety of schedules, activities and travel needs compose our cities nowadays. This represents a big challenge for modeling travel behaviors in urban environments; those models are of crucial interest for a wide variety of applications such as traffic forecasting, spreading of viruses, or measuring human exposure to air pollutants. The traditional means to obtain knowledge about travel behavior is limited to surveys on travel journeys. The obtained information is based in questionnaires that are usually costly to implement and with intrinsic limitations to cover large number of individuals and some problems of reliability. Using mobile phone data, we explore the basic characteristics of a model of human travel: The distribution of agents is proportional to the population density of a given region, and each agent has a characteristic trajectory size contain information on frequency of visits to different locations. Additionally we use a complementary data set given by smart subway fare cards offering us information about the exact time of each passenger getting in or getting out of the subway station and the coordinates of it. This allows us to uncover the temporal aspects of the mobility. Since we have the actual time and place of individual's origin and destination we can understand the temporal patterns in each visited location with further details. Integrating two described data set we provide a dynamical model of human travels that incorporates different aspects observed empirically.