

Human mobility is the movement of individuals or groups embedded in space and time. A need to transfer to the location of work, home, leisure, and other places is a driving force of everyday movement. Due to these motivations, the trips are often regular and repeating in a circadian, seasonal and yearly fashion.

While there have been improvements in understanding migration between cities and countries as well as their impact on human well-being, studying how humans move on a daily basis has been problematic because of the lack of suitable data. The development of sensors such as mobile phone networks and GPS trackers that capture movement information in real time and at detailed spatial and temporal scales has transformed our ability to collect movement data. Currently, however, these developments in movement data collection technologies are much further ahead than current methods for extracting meaningful patterns from such data. While recently there have been several improvements in processing methods aimed at identifying patterns and behaviours in movement data, many of these ignore placing movement into the geographical context. Furthermore, there have been very few studies that have tried to explore and predict decision-making processes related with movements from GPS data and similar sources.

Understanding and predicting human mobility patterns can provide valuable information for understanding the impact of regular mobility behaviours in urban systems, usually with a specific focus on traffic prediction, public health or urban planning. While existing studies on human movement have placed huge emphasis on spatial location to predict where people go next, the time dimension component is usually being treated with oversimplification or even being neglected. Most prediction models are based on a historical movement trajectory, ignoring people's need for explorations of new locations, consequently predicting their movements only on their regular and routinely visited locations. Furthermore, human mobility behaviour is far from random and possess a high degree of regularity and predictability which has been neglected in the existing prediction models.

There is a need therefore to discover if new forms of mobility data can be translated into new insights about movement behaviour and whether they would allow better mobility predictions. The quality of life for people in urban regions can be improved by accurately predicting urban human mobility and adjusting urban planning accordingly.

To address the issues mentioned above this project will design and implement a framework for human mobility predictions where not only daily routines are being predicted but also potential exploration patterns. In order to achieve this goal the framework is divided into three main parts: 1) Data understanding which covers mobility data collection and analysis of existing mobility characteristics such as repetitiveness of movements and potentials for explorations; 2) Data processing which covers identifying trips and trip purposes from movement trajectories; 3) Model development where the existing mobility models will be implemented and then extended to facilitate more accurate and realistic predictions. These will not only reflect non-random routine-based spatial and temporal human mobility behaviour but also will include predictions of future locations that allow exploration of locations.