A. PROJET DE COLLABORATION SCIENTIFIQUE (maximum une page)

 Titre du projet : Urban Models and Big Data

Résumé :

Urban computing is one of the fast-growing areas in interdisciplinary research that includes sociology, urban design, transportation and computing but contributes a lot to areas that are nowadays labeled as Internet of Things (IoT) and Big Data, since the urban setting is favorable for deploying a huge set of devices (both stationary and moving) that collect (big) data from a series of agents that move within it. In order to be able to correctly capture the urban reality we need to come up with various kinds of models that usually capture part of this reality. For example, in the literature have been proposed models for the city growth, the population distribution and dynamics, the movement within the city limits, models of the transportation and the transit networks and so on.

In this collaborative work, we propose to deal with one of the main challenges in urban city models, which is the relationship between the spatial distribution of the population and the structure of transport networks and especially of road networks. Most of the existing models, on spatial level, assume that the population is mainly distributed to the locations of the settlements (mainly as a point entity or alternatively as a polygon entity) and according to this distribution, the patterns of road network uses are also created.

In practice, however, this is not the case because the population is not allocated to the location of the settlements, due to the phenomenon of urban sprawl, and even more because the distribution of the population within the settlements is not taken into account (distribution at the level of building blocks). It is also assumed that the use of the road network is one-dimensional: in one segment only the corresponding population is distributed. A fact that does not correspond to the reality because the use of the road network is due to the origin - destination rules and the daily restrictions (availability of parking places, alternative routes, etc.).

Actually nowadays, we have the ability to acquire more exact data both on the origin – destination matrices that capture the movement in a city and for the actual occupancy of buildings based to IoT measurements. There have been works that provide accurate and real-time understanding of the movement in a city based on cell phone towers activity and other works that try to understand the occupancy and activity in buildings based on activity on electricity smart meters or activity of network devices. Thus, the idea is to use this type of accurate real-time measurements to better understand the distribution of population and the actual movement in a city.

The proposed research will explore and propose an alternative model of spatial structure, based on existing networks structure, where the population is distributed to the nodes of the network and not to the segments or building blocks. And where the data will come from IoT devices and will not be based on classical population surveys.

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