Scientific Report

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Name of the *Host Organisation*	CNR - Istituto di Scienza e Tecnologie dell'Informazione
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Period of the fellowship	01/04/2011 to 31/03/2012

I – SCIENTIFIC ACTIVITY DURING YOUR FELLOWSHIP

The first period of my ERCIM fellowship was accomplished with the professor Giannotti Fosca. The fellowship was mainly involved in the human mobility based on GPS data project. Primarily, mobility of human has involved an wildly applied research to study and analyse the methods and tools that support social network application, transportation schedule, communication system, civil engineering, and so on.

The tasks was assigned during the fellowship program covered the verification of the prior models of human mobility based on the GPS data which collected from Italy, analysis and functional testing of mobile model on GPS data and Panel Message Variable device (PMV) , classification the vehicle users by their mobility pattern, and prediction the traffic flow by the history data.

To carry out the work, We looked inside the data set firstly. As Giannotti Fosca and Professor Pedreschi Dino instructions, I verified our data set have the similar properties with the data set from other groups, especially the Center of Complex Network Research(Professor Albert-Laszlo. Barabasi lab). On our experiments , the users classified tby their radius of gyration and find a very interesting result about the user group.

In prediction section, we find the vehicle in one location has a potential information of entire city. try to introduce wavelet technical and regard the vehicle number as a signal. After decomposition the signal in one location , we can both prediction the locations vehicle count in the future and the vehicle count entire city in the acceptable relative error . As we know, nobody do the same thing from partly traffic information to predict whole traffic flow.

During this period, I am very thank Professor Giannotti Fosca and Professor Pedreschi Dino. They help me find the topic, analysis the work, provide constructive suggestions, and finish the article. In the project, I worked with Research Staff Rinzivillo Salvatore , Phd student Pappalardo Luca and Collaborator Gabrielli Lorenzo. They give me great help and we cooperation very well.

II – PUBLICATION(S) DURING YOUR FELLOWSHIP

Understanding the patterns of car travel

to be submitted

In this paper, we consider the models for human mobility introduced by Barabasi and others in (Gonzales. Mata, Chaoming Song) and address the following question: do these models apply to car travel?

It should be noted that the models in are developed with reference to mobile phone data, which, compared with our GPS trajectories, have two main differences: mobile phone data pertain to general mobility, while GPS data pertain only to cars, and are much less detailed than GPS trajectories, the latter providing for the precise spatio-temporal record of each travel.

It is therefore legitimate to investigate to what extent the previous models apply, which deviations are observed, and which 2 Will be inserted by the editor new analytical opportunities are provide by the finer spatio-temporal granularity.

On the other side, it is also compulsory to investigate to what extent our data are representative of the overall vehicular mobility, in order to generalize our findings.

To this purpose, we use independent ground-truth measurements of global traffic volumes obtained by sensors place in a set of locations during the same observational period of our GPS data, and show that the GPS data are an extremely accurate predictor of the overall volumes in each location, even if GPS data pertains to a 2% sample.

Our forecasting model is based on standard machine learning techniques, tailored to the peculiarity of trajectory data.

In conclusion, we obtain two intertwined results:first, the known human mobility models can be refined to deal with car mobility, and second, the available GPS data can indeed be used as a faithful proxy of car mobility.

III – ATTENDED SEMINARS, WORKHOPS, CONFERENCES

The International conference of Resource Allocation in Cognitive Radio Networks. Give a talk "Human behaviour factor effect in CR network" (In Chinese language), Chengdu, 2011-06-21

Guest Lecture, "Human mobility on GPS". the Norwegian University of Science and Technology, Trondheim, Norway, 2011-11-1.

Computer computation technical and its application, Workshop, Southwest University, Give a talk "BP Neural network prediction on GPS data", Chongqin, 2012-3-16.

IV – RESEARCH EXCHANGE PROGRAMME (REP)