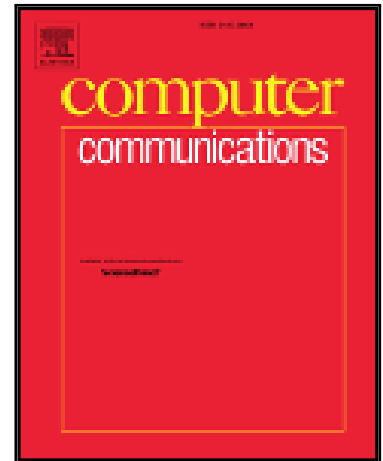


Accepted Manuscript

Enriching Sparse Mobility Information in Call Detail Records

Guangshuo Chen, Sahar Hoteit, Aline Carneiro Viana, Marco Fiore,
Carlos Sarraute

PII: S0140-3664(17)30923-4
DOI: [10.1016/j.comcom.2018.03.012](https://doi.org/10.1016/j.comcom.2018.03.012)
Reference: COMCOM 5671



To appear in: *Computer Communications*

Received date: 29 August 2017
Revised date: 12 January 2018
Accepted date: 13 March 2018

Please cite this article as: Guangshuo Chen, Sahar Hoteit, Aline Carneiro Viana, Marco Fiore, Carlos Sarraute, Enriching Sparse Mobility Information in Call Detail Records, *Computer Communications* (2018), doi: [10.1016/j.comcom.2018.03.012](https://doi.org/10.1016/j.comcom.2018.03.012)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Enriching Sparse Mobility Information in Call Detail Records

Guangshuo Chen^{a,b,*}, Sahar Hoteit^c, Aline Carneiro Viana^b, Marco Fiore^d,
Carlos Sarraute^e

^a*École Polytechnique, Université Paris Saclay, 91128 Palaiseau, France.*

^b*Inria, Université Paris Saclay, 91120 Palaiseau, France.*

^c*Laboratoire des Signaux et Systèmes, Université Paris Sud-CNRS-CentraleSupélec,
Université Paris-Saclay, 91192 Gif-sur-Yvette, France.*

^d*CNR-IEIT, 10129 Torino, Italy.*

^e*Grandata Labs, 550 15th Street, San Francisco, 94103 California, USA*

Abstract

Call Detail Records (CDR) are an important source of information in the study of diverse aspects of human mobility. The accuracy of mobility information granted by CDR strongly depends on the radio access infrastructure deployment and the frequency of interactions between mobile users and the network. As cellular network deployment is highly irregular and interaction frequencies are typically low, CDR are often characterized by spatial and temporal sparsity, which, in turn, can bias mobility analyses based on such data. In this paper, we precisely address this subject. First, we evaluate the spatial error in CDR, caused by approximating user positions with cell tower locations. Second, we assess the impact of the limited spatial and temporal granularity of CDR on the estimation of standard mobility metrics. Third, we propose novel and effective techniques to reduce temporal sparsity in CDR by leveraging regularity in human movement patterns. Tests with real-world datasets show that our solutions can reduce temporal sparsity in CDR by recovering 75% of daytime hours, while retaining a spatial accuracy within 1 km for 95% of the completed data.

Keywords: Call Detail Records, spatiotemporal trajectories, data sparsity,

*Corresponding author

Email addresses: guangshuo.chen@inria.fr (Guangshuo Chen),
sahar.hoteit@u-psud.fr (Sahar Hoteit), aline.viana@inria.fr (Aline Carneiro Viana),
marco.fiore@ieit.cnr.it (Marco Fiore), charles@grandata.com (Carlos Sarraute)

Download English Version:

<https://daneshyari.com/en/article/6879995>

Download Persian Version:

<https://daneshyari.com/article/6879995>

[Daneshyari.com](https://daneshyari.com)