A Mobile Consumer Analysis Platform

Győző Gidófalvi
Geoinformatics, KTH
gyozo.gidofalvi@abe.kth.se

Abstract

Advances in mobile communication, computing and positioning technologies allow the real–time acquisition of continuously evolving locations of moving objects, e.g., users carrying location-aware mobile devices. This short paper proposes the geocontextual analysis and data mining of these location traces to deliver deep insight into consumer behavior and enable a number of promising Business Intelligence services.

1 Introduction

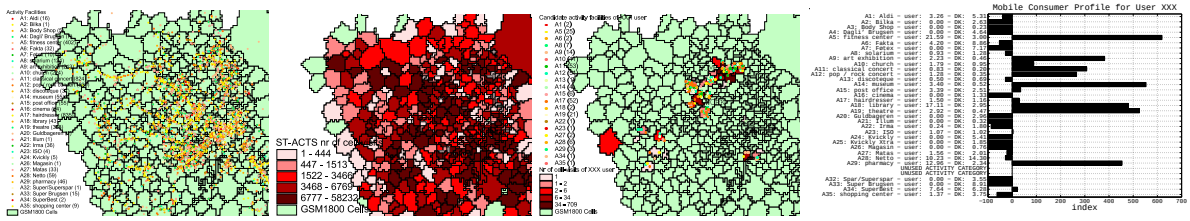
Through mobile positioning technologies (network–, satellite– and/or sensor–based), mobile phones, in addition to communication, are increasingly used to interact with Location-Based Services (LBSes) to receive information that is tailored to the location of the user. The geocontextual analysis of locations and/or LBS–interactions of users can reveal valuable mobile consumer patterns, which can be both used to provide a number of Business Intelligence (BI) services and to increase the attractiveness the LBSes through personalization. Therefore, this paper proposes the development of a mobile consumer analysis platform that allows the aforementioned extraction and use of anonymized mobile consumer patterns. The proposed platform is currently being implemented and evaluated using large scale, realistically simulated mobile consumer trajectory data sets [1].

2 Location Privacy

As the centralized analysis of the aforementioned location information can introduce sever privacy threats, the proposed analysis platform is to be designed in a way that it can be integrated into typical location anonymization frameworks. In particular, in addition to only using pseudo user identifiers, the analysis platform should assume that locations of users are reported with some accuracy, which can be interpreted as a *cloaking region* which the user resides in. The time of the location reports and size of the cloaking regions will be outside of the control of the analysis platform and it is assumed to be protected by an anonymization framework in which users define their individual privacy requirements [3].

3 BI Services

As Location-Based Advertising (LBA) is one of the most promising but yet not adequately realized proposed LBS, the proposed analysis platform should aim to provide knowledge about mobile consumer behavior that is most useful in this domain. Furthermore, the analysis platform should incorporate the extracted knowledge about mobile consumer behavior to provide a number of to-this-date unavailable BI services. More specifically, the analysis platform should support the following, arguably useful, initial set of functionalities:



(a) SaP distrib. (b) Population distrib. (c) Activity of X (d) AMCP of X

Figure 1: Derivation of AMCP of user X based on geocontextual analysis of mobile call records.

1. Based on the location traces of users and locations of businesses, i.e., Service and Products (SaP), the platform should support the calculation of individual Anonymous Mobile Consumer Profiles (AMCPs), which indicate the interest and consumer habits of the respective users. These profiles will allow a more detailed and realistic segmentation of users than it was previously possible by assigning static consumer profiles to users via geodemographic analysis [2]. Based on a preliminary case study, Figure 1 illustrate how geocontextual analysis of mobile call records can be used to derive highly informative AMCPs.
2. The platform should be able to make use of the explicit or implicit feedbacks of the users to the previously received LBA. More specifically, given a specific model that identifies positive or negative user feedbacks (reactions) to previously received LBA, the platform should be able to dynamically adjust the AMCPs of users. The extra consumer behavior knowledge extracted from user–feedbacks should be clearly measurable in the so–derived AMCPs.
3. Based on the AMCPs, the platform should provide the following new BI services:
   (a) Calculation and visualization the mobile consumer characteristics of users that pass through a given area during a given period.
   (b) Identification of cross–marketing opportunities based on frequent mobile consumer characteristics of users of pairs of businesses.
   (c) Support location prospecting, i.e., finding potential locations for a given business where so far the business potential has been underexploited.

References

[1] G. Gidófalvi and T. Bach Pedersen. ST–ACTS: A Spatio–Temporal Activity Simulator. In Proc. of ACM-GIS, pp. 155–162, ACM, 2006.

[2] G. Gidófalvi, H. R. Larsen, and T. Bach Pedersen. Estimating the Capacity of the Location–Based Advertising Channel. International Journal of Mobile Communications (IJMC) 6(3):357–375, Inderscience Publishers, 2008.

[3] G. Gidófalvi G, X. Huang, and T. Bach Pedersen. Probabilistic Grid–Based Approaches for Privacy Preserving Data Mining on Moving Object Trajectories. In Privacy–Aware Knowledge Discovery: Novel Applications and New Techniques. CRC PRESS, 2010.