Identifying meaningful locations - Poster Abstract

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In context-aware mobile computing, location information has been, without doubt, the most widely studied source of contextual information [1, 2, 4]. The main reason for the situation is that current terminal devices can readily access location related information whereas other sources of contextual information are harder to gather and process. For example, mobile phones can access the GSM cell identifier and PDAs can use information about WiFi access points. In addition, prices of GPS devices with Bluetooth capabilities have decreased significantly and the amount of PDAs that have GPS modules integrated to them has increased rapidly, which makes enriching location information using a GPS a feasible option.

Different sources of location information have their peculiarities. GSM cell tower identifiers give coarse estimates of the location, the numbering of the identifiers is seemingly random and even though operators allow obtaining the current cell identifier they do not offer services to convert cell identifiers into geographic locations. On the other hand, GSM cell tower identifier information is available also indoors, whereas GPS measurements are not. Another weakness in GPS is that, e.g., buildings, trees and glass coatings in cars and trains can cause signal shadowing. Finally, WiFi access point information can be used for positioning only when the exact locations of access points are known (see e.g. [3]).

Regardless of the source of location information, the raw measurements are usually meaningless to the user. As a consequence, much work has been conducted on identifying significant locations, *places*, from the raw data. A place is defined to be a location that is meaningful to the user and to which the user can attach some (meaningful) semantics. For example, home, work and airport are places whereas SomeStreet 42, (60.42, 42.36) or 4287 are not.

A problem in existing work is that most approaches are not well suited to large scale mobile environments. Namely, users seldom have access to GPS information and GSM cell identifiers do not allow separating important places that are near each other, i.e. that are mainly covered by the same cells. In our talk, we consider a setting where we log GSM cell transitions and enrich the information using the GPS coordinates of the transition point whenever a GPS device that has a fix is present. To our best knowledge, this kind of setting has not

been addressed previously in the literature. We compare four algorithms for the problem using real data gathered from several users throughout Europe, discuss what kind of properties the clusters produced by the algorithms have and how suitable the algorithms are for mobile devices. Detailed information about the used algorithms and empirical results can be found in a forthcoming full version of the paper.

References

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