

GeoNotes: Social Enhancement of Physical Space

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ABSTRACT

This paper describes the design ideas behind *GeoNotes*, a system that allows users to annotate physical locations with virtual ‘notes’, which are then pushed to or accessed by other users when in the vicinity. *GeoNotes* employs a number of social filtering techniques, which all rely on logging of usage rather than content.

Keywords

augmented reality, social navigation, CSCW, social awareness, positioning technology

INTRODUCTION

A major function of *augmented reality* systems (AR) and *wearables* is to enhance physical space with a virtual information space that adapts to the geographical position of the user, e.g. [1]. Many AR systems are often based on some sort of positioning technology (e.g. GPS). AR systems, however, are often hardware intensive (e.g. goggles) and tend to be a bit ‘clumsy’ for the user. Moreover – and this is the major problem – the information in AR systems is mostly created by professional content providers like institutions and organizations. The virtual information space of AR systems is socially dead in so far as ‘ordinary’ users cannot leave explicit traces (e.g., annotations) or implicit traces of usage and other behavior. This makes AR information spaces non-dynamic, non-social and non-communicatory.

Implementing *social aspects* in information systems, has, on the other hand, been a major focus for Computer Supported Collaborative Work (CSCW), collaborative filtering and social navigation [2]. Navigation and work in real and virtual information spaces – it is argued – may be enhanced by giving people access to the traces of other users or groups of users. For instance, recommendation systems recommend books, records and recipes, not by analyzing the content of the user profile and the content of the information item, but rather matching users’ usage history in the system: ‘people who bought the book you just bought, also bought this one!’. Encouraging *social awareness* [3] and *direct* and *indirect communication* is a key objective for these researchers, not only because it supports work, but also because it enriches the experience of the system. For many user groups (e.g. young people),

this can be seen as an end in itself.

GeoNotes seeks to combine the best aspects of AR and social informatics. We faced three major design problems:

- Given that we have a positioning technology in place, how do we allow users on a mass-scale to annotate geographical places with virtual notes via their mobile devices (such as mobile phones and PDAs)?
- Given that mass-scale virtual annotations exist, how will information seekers access these annotations via their mobile devices? How can we support users to navigate this new information space?
- How do we provide social awareness and yet maintain privacy when needed?

GEONOTES DESIGN CHOICES

Placing Notes

Placing virtual annotations in geographical space via a mobile device involves a number of steps and choices. A user creates a *GeoNote* by typing in text (via a digital keyboard), sound (microphone) imagery (a camera on the device) or a drawing (digital whiteboard). Placing the *GeoNote* ‘here’ involves specifying the radius in which it will be active for other users (e.g. 2-40meters). *GeoNotes* can also be placed on other geographical positions than at the one the user is presently located (through a zoomable and clickable map interface). Moreover, *GeoNotes* can also be placed at *types of places*, as they are defined in the Yellow Pages (or other) directory. Since this database contains the geographical position of types of businesses, the sender may put a given note on, for instance, all ‘Thai restaurants’ in downtown Stockholm without knowing their addresses. The choice of ‘place’ will probably influence the users’ construction of the message.

In order to regulate privacy, we allow the *GeoNote* creator to add signatures of his or her own (e.g. ‘Anonymous’, ‘Kilroy’, ‘Sophie 070-633 15 07’ or ‘www.sics.se/~soph’). We also let the creator specify the access rights to the note (e.g. ‘myself only’, ‘friend(s) on buddy list’ or ‘all users’).

In order to support navigation of *GeoNotes* for other users, the creator is also encouraged to place the message in one of three ‘sender’ categories: ‘private’, ‘commercial’, or ‘information’.

Accessing GeoNotes: Push & Pull

Users will want to access other people’s *GeoNotes* in different ways, depending on situation and information need. In a strictly *push* mode, users will keep the mobile device in their pocket and when there is a high-ranking

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GeoNote in the vicinity, the device will signal and the GeoNote will pop up on the device (for filtering mechanisms, see below). If the device beeps too often, the user can change the push activity level (while still maintaining the filter preferences).

In a mixed *push/pull* scenario, the user is browsing the social information space of GeoNotes but has no focused information need. Through a circle, whose segments represent the categories of ‘private’, ‘commercial’ and ‘information’, the user can get an overview of the GeoNotes of a given place. The size of the circle represents the number of GeoNotes at this place. While moving through space (walking or riding a bus), the circle will continuously re-segment and change size, representing the ‘landscape’ of GeoNotes. At any time, the user can click on the circle and access the database of GeoNotes for the present position.

In a strictly *pull* scenario, the user actively searches for GeoNote information (e.g. all notes placed nearby the Swedish Parliament). Independent of geographical position, the user can browse a map with GeoNote circles overlaid. She can zoom in/out, but also set the granularity of the circles (defining the area that each circle represents). In addition to this geographical navigation, traditional word-based search engines will be available for any given geographical area. If standing on the actual place, sharing the spatial context of the GeoNote creator may enable the information seeker to exploit this context in formulating more exact search queries.

Navigating the World of GeoNotes

Eventually, geographical space will be cluttered with GeoNotes. Word-based search engines and the private-commercial-information categorization are two methods to support navigation. Since we focused on social aspects, we employed several other filtering mechanisms that are currently employed in CSCW and social navigation. By logging the *usage* of GeoNotes and the GeoNote history of each user, we can create filters like the following: ‘most recently put’; ‘most read (popular)’; ‘most commented or copied’; ‘put by friends’; ‘read by friends’; ‘match GeoNotes history’. These filters, some of which may be regulated by the information seeker, rank any GeoNote in the vicinity or in the area specified by the user. In addition, the information seeker will be able to reject a message or all messages from a given sender for the future (e.g. spam GeoNotes from MacDonald’s). Moreover, if the user already read a GeoNote it will be ranked lower.

When a given GeoNote is ranked over a certain threshold, it is pushed to the user. The filters are also active when accessing a GeoNote database: the top ranking GeoNotes will be placed highest in the list. In addition to this, each database will contain *sorting* mechanisms – which is something different than *filtering* – defining the order in

which GeoNotes categories are placed in the database list (e.g. ‘show all my buddies’ GeoNotes first in the list’).

In a system that logs usage, it will also be possible to see all GeoNotes that were created by a specific friend or person (e.g. ‘show me all GeoNotes Peter placed when he was traveling in Thailand last year’).

IMPLICATIONS FOR HCI

We believe that mobility sets completely new constraints on information technology usage. Things that users would not want to do, not dare to do, or not have time to do at their stationary work terminals, people will want to do with their mobile devices when ‘killing time’ in bars, public transportation, shopping or school breaks. GeoNotes creates a social awareness that encourages play, expressiveness and personal identity formation. Such aspects tend to be central for large user groups, e.g. teenagers [4]. At the same time, we must allow users to regulate privacy when so needed. How the balance between need for expressiveness and need for privacy is regulated by user, is still not well understood.

GeoNotes tries to bridge quite disparate areas of research within the HCI community. It tries to blur the border between physical and digital space (AR), and at the same time strives to socially enhance digital space (CSCW, collaborative filtering, social navigation). Moreover, it seeks to socially enhance *physical* space by letting users leave conscious and non-conscious traces in virtual space *that are tied to specific geographical positions*. When these traces are available to other users, we will be able to enhance and enrich the social awareness that already exists in physical space. User will be able to observe, create, and participate in large-scale social patterns in geographical space. The societal and sociological implications of such an information space in terms of public discourse, democracy, urban planning and public places, are yet to be determined.

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REFERENCES

1. The HIPS projects (Hyper Interaction with Physical Space) [<http://www.media.unisi.it/hips/>]
2. Munro, A., Höök, K. & Benyon, D. (eds.) (1999) Social Navigation in Information Space, London: Springer.
3. Dourish, P. & Bellotti, V. (1992) Awareness and coordination in shared workspaces. Proceedings of ACM CSCW’92.
4. Ling, R (1999) “We release them little by little”: maturation and gender identity as seen in the use of mobile telephony, *Telenor R&D report 5/99*, Norway.