THE FUTURE OF SCIENCE AND TECHNOLOGY

Forecast: Geospatial technology blurs the boundary between cyberspace and urban space to form geocomputable cities

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Description:

The boundary between computing infrastructure and urban infrastructure were blurred to a fuzzy line some time ago and much has been written (and speculated) about on the ramifications of their consociation across a spectrum of topics, from sociology and public policy, to cyborgs and robotic management [1, 2, 3, 4]. Somewhere along the way to the fusion of the computational and the urban, cities became geocomputable spaces.

A number of catalyzing factors are, perhaps, responsible. First, software and computing became increasingly relevant in the management and production of space [5], across the board. Urban utilities are now monitored and managed as large-scale Geographic Information Systems of sensor networks and automated notification systems.

Second, cities and the throngs of people, vehicles, and things that pulse through them have become ambient physical and social infrastructure for large-scale distributed communications networks: digitally interactive crowds with hand-held devices, ubiquitous Wi-Fi signals leaking into the airwaves, and a spaghetti-knot of fiber sequestered in the urban fabric.

Together, these have provided the network-cloud for massively distributed information exchange and computation.

Fourth, digital positioning systems became important in cities, guiding fleets of bike messengers and mail trucks to their destinations with optimal locational accuracy; then, they became ubiquitous, public, and really cheap.

Fifth, near-field and locative technologies based around RFID readers and tags have become ridiculously cost-effective, to the point where individual stores can set up their own geo-grid for automated asset tracking, monitoring, and management. (The navi-wagon shopping cart is just one of many examples.)

Sixth, pattern recognition concentrated on spatial structures of, and spatial compositions in, the urban fabric became useful across applications, from monitoring cars and their licenses remotely in downtown congestion pricing schemes, to law enforcement and policing.

Seventh, intelligent transport systems with strong geospatial components enjoyed a surge in their development and deployment in cities, within roads and across transit systems.

Your location in cityscapes, and your geography in socio-technical urban networks, will become a commodity

Business models fashioned around location-based services have blossomed in very recent years, thanks in large part to a drop in the cost of integrating Global Positioning Systems (GPS) with mobile devices (cell-phones, handheld gaming platforms, personal display assistants, digital cameras, and so on). Concurrently, alternative positioning technology and algorithms based on triangulation of cell-phone and Wi-Fi signals with base stations and access points have evolved to the point where the positional accuracy they produce is useful for consumer mapping. Knowing where you are in a cityscape--and its mirror world in cyberspace--and, particularly, what is around you, will continue to become a commodity that consumers will pay for. At the same time, maps will continue to evolve as the new portal between meatspace and cyberspace, particularly for urban activities, services, and markets, with many groups

jostling for position in this new emerging commodity-scape, where commercial interests can pay for brand-name territory. Undoubtedly, there is keen interest in harvesting users' place-based search and queries to train a new generation of geospatial AI for location-based services. What remains to be seen is whether this arena will become dominated by traditional geospatial technology providers (the potential for Garmin's nuviphone to erode iPhone market share because of superior positioning technology is an early example [6]) or existing cyberspace behemoths (Intel and Microsoft both have long-standing R&D investment in alternative positioning technologies, for example [7,8]).

The potential for function creep

The emerging glut of technologies used to geoprocess and geocompute in urban areas is so massive that it is difficult to keep track, manage, and regulate them. This latter point is particularly salient with respect to the potential emergence of function creep in the use and application of these technologies and the vast stores of data they will produce. Geospatial technologies of this kind create a bridge between cyberspace and cyberplace and users' Online data-shadows can be potentially traced to the real-world with greater ease. This creates new emerging opportunities for marketing, advertising, and commercial data-mining, and as with most emerging technologies, it creates privacy concerns. Already, geodemographics for marketing have begun to farm these data-sets, and algorithms for creating privacy masks and filters are emerging. How these data and services creep across interoperability boundaries to add value to related (or unrelated) services will shape the future development and application of these technologies.

The potential for things to go wrong

What happens when geocomputable cities are hacked, crash, or succumb to malware or viruses? Thus far, we have been spared any serious locative-based mechanical, software, or system failures. As geocomputable cities begin to play host to intelligent highways and robotic drivers, thorny issues regarding positional accuracy and spatial ontologies will likely surface. These are not issues that are easily solved with version 2.0 iterations to existing technologies and they pose grand challenges for future research and development.

Geospatial technology will expand the Digital Divide

Many of these technologies already divide and partition urban spaces based on place-time tuples that authenticate some people as valid participants in particular buildings, places, and spaces at particular times (at the simplest level through RFID-embedded card access, for example). The potential for socio-technical spatial polarization among the geodigital valids and invalids is profound [9]. As geospatial technologies develop in sophistication and their application-sets grow and expand, newly segregated divides may well emerge.

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Signals:
Software-sorted geographies
Geoslavery
The Computable City paper

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