

Interactive Map for Local Services

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FRONT END DEVELOPMENT FRAMEWORKS - 24SDCS01A

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Introduction

In modern urban environments, timely access to local services is critical for convenience, safety, and efficient resource utilization. However, information about nearby facilities such as hospitals, educational institutions, grocery stores, transport hubs, and government offices is often scattered across multiple sources, making it difficult for users to locate services quickly. The Interactive Map for Local Services project addresses this challenge by providing a centralized, web-based platform that allows users to discover, navigate, and interact with local services in real-time. This system is developed using HTML, CSS, and JavaScript, with integration of mapping libraries such as Leaflet.js or the Google Maps API to provide dynamic geolocation-based services. Users can search for specific service categories, apply filters, and access detailed information including addresses, contact numbers, operational hours, and user reviews. The platform also incorporates interactive features such as clickable markers, pop-up information windows, and smooth map navigation to enhance user experience.

The project leverages geolocation functionality to display services relative to the user's current location, enabling personalized and context-aware results. Additionally, it supports user contributions for updating service information, reporting discrepancies, and suggesting new services, ensuring the database remains accurate and up-to-date. The interface is designed to be responsive, allowing seamless access across devices such as desktops, tablets, and smartphones.

By consolidating local service information into a single interactive interface, this project not only simplifies daily decision-making for users but also enhances visibility for local businesses and improves resource accessibility within the community. The system exemplifies practical application of web technologies and geospatial data management, offering an efficient, reliable, and user-friendly solution for modern urban living.

Literature Review/ Application Survey

Overview

Interactive maps and location-based services (LBS) have become crucial for modern urban living, helping users efficiently locate and access essential services. With the rapid growth of smart cities, there is increasing demand for systems that provide real-time, accurate, and context-aware information about nearby facilities such as hospitals, schools, grocery stores, public transport, and government offices. These technologies aim to reduce search time, improve decision-making, and enhance community engagement. The development of web-based mapping platforms has revolutionized how people interact with geographic information, making it possible to visualize, search, and filter services seamlessly.

1. Interactive Maps for a Digital Video Library

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https://web.archive.org/web/20070610052712id_/http://www.informedia.cs.cmu.edu/documents/interactivemaps-IEEE.pdf

The paper “Interactive Maps for a Digital Video Library” focuses on improving the way people interact with large video collections by adding a spatial, map-based dimension to browsing. Traditional search methods, like typing keywords or sorting by time, become less effective as the library grows larger. To solve this, the Informedia system automatically identifies geographic references in video content through advanced techniques such as speech recognition (to capture place names spoken in the video) and video OCR (to read text shown on the screen). These extracted geographic cues are then linked to an interactive map. While a video plays, the map highlights the locations being mentioned, giving viewers a clear visual understanding of the story’s geography.

In addition, the interactive map allows spatial querying—users can click on a country or region to instantly access all video segments related to that location. This feature is especially powerful for news or documentary libraries where geography is central to the story. The system scales effectively for large collections, like the Informedia library, which contained thousands of hours of video. By combining geographic visualization with automated video analysis, the approach makes searching, navigating, and discovering content faster and more intuitive. Overall, the paper emphasizes how maps can add a valuable “where” dimension to complement the traditional “what” (text/keywords) and “when” (timeline) in digital video libraries, enhancing user experience and information retrieval.

2. Localisation and Interaction for Augmented Maps

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https://www.researchgate.net/profile/Gerhard-Reitmayr/publication/4195912_Localisation_and_interaction_for_augmented_maps/links/0912f50bda5358c975000000/Localisation-and-interaction-for-augmented-maps.pdf

The paper describes a system that augments paper maps with digital information and interactive features, combining the strengths of traditional printed maps with the flexibility of computer-based systems. Printed maps have advantages such as high resolution, easy browsing, physical interaction, and the ability to be used by multiple people at once. However, they are static and cannot show dynamic or layered information like digital maps. The proposed system addresses this by overlaying digital graphics and user interface elements onto physical maps, creating an augmented reality experience without the need for head-mounted displays.

The system uses tangible user interface techniques, allowing users to interact naturally with the maps through touch and physical actions, while computer vision methods ensure accurate alignment without needing markers or changes to the maps. This approach provides an intuitive way to explore geographic data, combining the familiarity of paper with the power of digital tools.

Although not yet tested in user studies, the system demonstrates how such integration can support new forms of interaction and has potential applications in many fields, such as education, planning, and command-and-control environments. Future work includes automating calibration to make the system easier to set up, improving localisation accuracy, and integrating it into larger interactive environments with multiple input and output devices.

3. Interactive Visual Exploration of a Large Spatio-Temporal Dataset: Reflections on a Geovisualization Mashup

Jo Wood, Member, IEEE, Jason Dykes, Aidan Slingsby, and Keith Clarke

<https://openaccess.city.ac.uk/id/eprint/176/2/Interactive%20visual%20exploration%20of%20a%20large%20spatio-temporal%20dataset.pdf>

The paper “Interactive Visual Exploration of a Large Spatio-Temporal Dataset” by Jo Wood, Jason Dykes, Aidan Slingsby, and Keith Clarke presents a geovisualization mashup approach for exploring large, complex spatio-temporal datasets. The authors demonstrate their method using a dataset of 1.42 million requests from a mobile directory service. Instead of building a custom visualization system from scratch, they combine existing tools—MySQL for data storage and querying, PHP to connect the database, LandSerf GIS for spatial processing, and Google Earth with KML for interactive visualizations. This approach enables novel visual techniques such as spatial tag clouds, tag maps, data dials, and multi-scale density surfaces, allowing users to explore patterns across time, space, and attributes efficiently. The mashup approach provides rapid development, flexibility, and scalability, while leveraging Google Earth’s built-in navigation and visualization features. Limitations include challenges in hierarchical data organization, temporal filtering, and reliance on evolving APIs, but the authors highlight that mashups support iterative, exploratory visualization workflows effectively. Overall, the study demonstrates that combining loosely coupled tools and standards can create dynamic, interactive, and scalable visual exploration systems for large spatio-temporal data.

4. Service Maps for Heterogeneous Network Environments

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https://web.archive.org/web/20130409141426id_/http://www.netlab.tkk.fi/~jo/papers/2006-mdm-service-maps.pdf

The paper introduces the concept of “Service Maps”, a mobile data management approach designed for heterogeneous wireless networks that include different link-layer technologies like WLAN hotspots and wide-area mobile networks. In such networks, mobile devices need to select the most appropriate network based on factors like geographic location, mobility paths, and application requirements. Traditional network information services (IS) focus mainly on optimizing handovers, but this paper proposes a broader, generalized approach that provides mobile nodes with detailed information about available networks and their services, supporting a variety of mobile communication needs.

The proposed Service Maps system distributes network and service descriptions using an n-dimensional tuple space, allowing mobile nodes to generate a customized “map” of the networks and services relevant to their current context. This approach reduces the need for error-prone local probing by the mobile node, improves robustness and efficiency, and enables functions beyond handover optimization, such as service discovery and context-aware utilization.

The paper also discusses key requirements for a generalized IS, including operator independence, support for multiple transport mechanisms, scalability, and extensibility. Future work includes investigating how this generalized IS can interwork with low-layer IS standards (like IEEE 802.21) and developing specific data schemes for different applications, such as public WLANs. Overall, Service Maps aim to improve mobility support and enable new services in future heterogeneous network environments.

5. Location Based Services using Android

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The paper discusses how mobile phones have evolved from being primarily voice communication devices to multifunctional platforms with capabilities like web browsing and GPS services. Traditionally, these features were limited by proprietary systems, preventing users and developers from directly accessing mobile hardware to create customized applications. With the introduction of Android, an open-source mobile platform, users can now directly access hardware components such as GPS, camera, and other sensors, enabling the development of Location-Based Services (LBS) and geoservices.

The paper highlights the facilities provided by the Android platform for implementing LBS applications, including objects and tools available to developers for creating systems without needing to dive into the low-level function details. It also explains that mobile devices can act as servers using SQLite databases for storing information and can support peer-to-peer LBS services via SMS or MMS through appropriate Android intents. Overall, Android provides significant opportunities for developers to build customized GIS and location-aware applications that were previously restricted on proprietary platforms.

6. Public Participation in Local Policy Decision-making: The Role of Web-based Mapping

Richard Kingston

https://www.iapad.org/wp-content/uploads/2015/07/caj_paper.pdf

The paper “Public Participation in Local Policy Decision-making: The Role of Web-based Mapping” by Richard Kingston examines how Information and Communication Technologies (ICTs), especially web-based mapping, can enhance citizen engagement in local policy-making and service management. It emphasizes the role of Public Participation Geographic Information Systems (PPGIS), which allow the public to access and interact with geographic data, giving communities a stronger voice in decision-making processes. The study traces the evolution of active citizenship, from elite-driven initiatives to broader, technology-enabled participation, and highlights how digital tools can make planning more inclusive.

A detailed case study from the eastern area of Manchester illustrates how ICTs and e-governance tools were used in urban regeneration projects, enabling residents to contribute to planning, service delivery, and neighborhood management. The paper reviews the development and testing of specific web-based mapping tools, showing how they can improve transparency, facilitate collaboration between citizens and policymakers, and integrate public input into governance processes. It also discusses the practical challenges of implementing such systems, including data accessibility, usability, and the need for effective integration with existing planning frameworks. Overall, the paper demonstrates that web-based mapping and PPGIS can significantly strengthen community participation, improve local governance, and support more responsive urban planning.

7. Interactive web-based mapping: bridging technology and data for health

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<https://link.springer.com/content/pdf/10.1186/1476-072X-10-69.pdf>

The paper, "Interactive web-based mapping: bridging technology and data for health," discusses the development and implementation of the Community Health Information System (CHIS), an online mapping tool aimed at providing accessible health-related data to residents, researchers, and organizations in the Greater Houston area. Launched in 1998, the original CHIS allowed users to access health data reflecting the overall health and well-being of their communities. In 2009, planning began for a next-generation version of CHIS, which aimed to make the system more interactive and user-friendly. The new version, launched in 2011, features a web-based interactive mapping tool comprising two distinct portals: the Breast Health Portal and Project Safety Net, both accessed via a Google mapping interface. These portals cover an 8-county region centered on Harris County, Texas, and provide data including Census 2000 and 2010 data, cancer incidence from the Texas Cancer Registry, death data from Texas Vital Statistics, clinic locations for free and low-cost health services, and information on uninsured and poverty rates.

The system utilizes "query on the fly" technology, allowing users to interact in real-time with the databases and generate customized reports and maps. This approach enables users to control the data generated, such as generating breast cancer incidence rates by Census tract for specific age groups. The paper highlights that the Breast Health Portal and Project Safety Net are among the first local-scale interactive online mapping interfaces for public health data that allow users to control the data generated. By providing easy access to health data and enabling user interaction, the CHIS aims to improve public health outcomes and support informed decision-making in the community.

8. One-Page Multimedia Interactive Map

Nicola Maiellaro and Antonietta Varasano

<https://www.mdpi.com/2220-9964/6/2/34>

The paper presents the development of an interactive multimedia map designed as a single-page HTML application using AJAX and jQuery. The map allows users to explore cultural heritage content, including texts, images, videos, and 3D models, linked to specific Points of Interest (PoIs). All data are stored in GeoJSON files, simplifying updates and publication without relying on a database. Users can browse multimedia content via text search, list browsing, or sequential previews, while PoIs are visualized with multi-shape markers and can be filtered by category, type, accessibility, and timeline. The project was tested in collaboration with the “Ricciotto Canudo” secondary school in Gioia del Colle, offering a practical tool for managing and interacting with multimedia objects through a graphical user interface.

Future enhancements aim to improve the system’s interactivity and usability. These include a popularity ranking system for PoIs, a live-preview authoring environment for adding content, and responsive design for tablets, desktops, and mobile devices. The system also incorporates mechanisms for data quality, positional accuracy, and error detection, using both manual checks and tools like Keep Right and OSM Inspector. Usability testing is planned through scenarios and questionnaires assessing content, accuracy, format, ease of use, and timeliness. Overall, the study demonstrates an effective approach to integrating Volunteered Geographic Information (VGI) and multimedia for exploring and preserving cultural heritage.