Optimisation des itinéraires dans un réseau routier dynamique: une plateforme de webmapping collaborative basée sur les événements routiers en temps quasi-réel

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Key words: Geoinformation/GI; Collaborative Web Mapping; Urban Mobility; Route Optimization

SUMMARY

This research presents an innovative web mapping platform designed specifically to address urban mobility challenges in Algeria. Built using a technology stack that integrates PostgreSQL/PostGIS, GeoServer and pgRouting, the platform is intended to optimise route planning in dynamic road networks based on OpenStreetMap data.

The platform's key feature is its collaborative, multi-stakeholder architecture. It allows the real-time integration of road event reports from various validated sources, including security agencies (National Gendarmerie), emergency services (Civil Protection), municipal technical services and citizens, via a dedicated interface. The technical architecture is based on a robust REST API that synchronises reports with the PostGIS spatial database, and a sophisticated trigger mechanism keeps the road graph constantly up to date. The pgRouting algorithm applies intelligent weighting to the network arcs based on the criticality and temporality of the reported events, and is executed dynamically for each request.

Rigorous comparative evaluations conducted in the specific context of the wilaya of Oran demonstrate the superior performance of our solution. Systematic testing, including various congestion and obstacle scenarios, reveals significant improvements in query processing time and route reliability. The system achieves a significantly higher obstacle avoidance rate than conventional solutions such as Google Maps and OSRM. This exceptional performance is primarily due to the integration of data that has been validated and contextualised by local authorities, ensuring an exact match with the situation on the ground.

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This research has numerous and significant practical implications. The platform directly contributes to improving urban mobility by reducing travel times and pollutant emissions while strengthening the overall resilience of the road network. Beyond its technical performance, this solution offers an innovative framework for the collaborative management of Algerian transport infrastructure, facilitating daily travel and emergency response.