Kansas Department of Transportation

TECHNICAL SUMMARY

Identifying the Critical Golden-Hour Zones in Rural Kansas

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Introduction

The objective of this research was to develop a comprehensive geospatial tool that enhances the efficiency of EMS responses during post-crash situations by integrating and visualizing critical data such as crash locations, EMS dispatch points, and nearby hospitals. This interactive platform is intended to support decision-making by enabling emergency responders to plan effective, timely responses. By analyzing historical crash data and response times, the tool highlights areas with delayed emergency responses and suggests ways to reduce delays.

This comprehensive tool also serves as a planning and assessment module for stakeholders, such as EMS, law enforcement, and transportation authorities, by providing a user-friendly interface to visualize crash hotspots, locate EMS and hospital facilities, and calculate the shortest routes for emergency services to reach crash sites. The primary goal is to reduce response times, particularly in rural areas. This ensures that EMS can reach crash victims faster, potentially saving lives and minimizing long-term injuries – ultimately improving post-crash care and enhancing traffic safety in rural areas.

Project Description

This study developed a data-driven geospatial tool to optimize emergency response strategies for vehicle crashes in Kansas. The tool analyzed more than a decade of crash data from the Kansas Department of Transportation (KDOT) and the Fatality Analysis Reporting System (FARS) to provide insight into T1 (crash to emergency medical services [EMS] notification), T2 (EMS notification to EMS arrival), and T3 (EMS arrival to hospital) intervals. The tool emphasized the importance of timely and efficient post-crash care, particularly in rural areas, where 36.6% of fatal crashes have response times that exceed 60 minutes, compared to only 10% in urban areas.

Leveraging Python-based mapping and data analysis libraries, including OpenStreetMap and Dijkstra's algorithm for shortest path calculations, the interactive tool allows users to visualize crash locations, EMS dispatch points, and hospital/trauma center locations. The tool also identifies high-crash regions with delayed response times and helps decision-makers improve emergency response strategies by simulating real-time EMS routing. Through its dynamic interface, the tool offers planning and assessment capabilities to decrease the number of fatalities and improve emergency care, especially in rural settings. This application specifically addresses the disparity in response times between rural and urban regions and can be adapted for similar efforts in other states, supporting life-saving strategies to enhance road safety.

Project Results

The tool's capacity to identify critical corridors and high-priority areas for EMS dispatching offers a direct benefit to state and local transportation safety entities. The insights generated by the tool can assist these agencies in strategically improving EMS coverage, ultimately contributing to the improvement of post-crash care across the state or in specific counties.

Overall, the web-based tool provides a practical solution for addressing the disparity in emergency response times between urban and rural regions, enhancing post-crash care and reducing fatalities across Kansas. This framework has the potential to be adapted for use in other geographic regions and could serve as a valuable resource for first responders across the nation.

Project Information

For information on this report, please contact H. M. Abdul Aziz, Ph.D., Kansas State University, 2132 Fiedler Hall, 1701C Platt St., Manhattan, KS 66506; azizhusain@k-state.edu.

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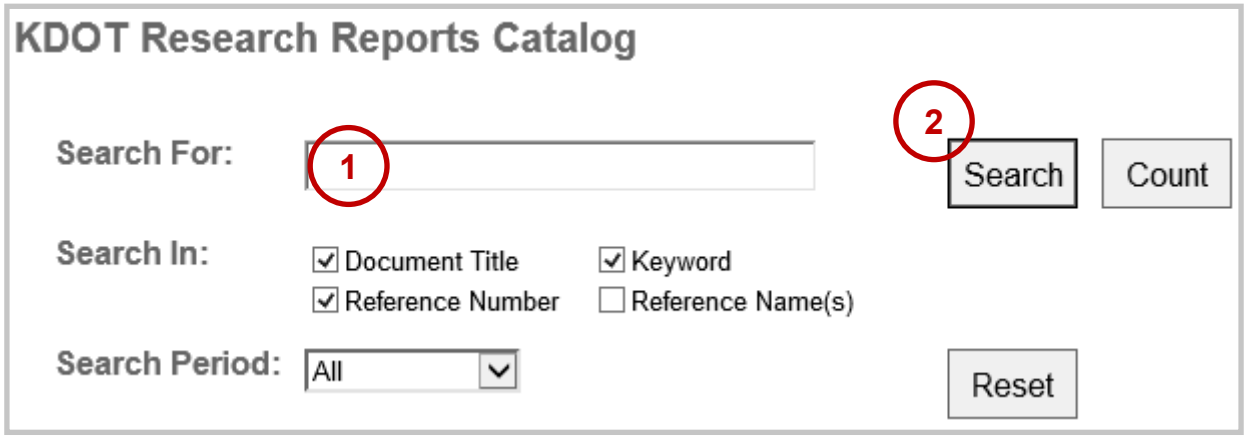

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