Abstract

The emergence of intelligent technologies is enabling a new era of connection between community residents and the surrounding environments, both in the United States and around the world. With the new wave of growth in urban areas, adequately addressing threats to public safety, from street-based crimes to robbery and property theft, is an essential precursor toward “smart” cities and communities. Law enforcement is expected to continue working towards needed crime reduction within a climate of budget restrictions and strained relationships across communities. This project proposes a novel "intelligent" policing technology as a transformative solution to efficiently expand law enforcement, while limiting unnecessary police/citizen interactions, and maintaining citizen privacy. The proposed technology offers a network of smart cameras that do not require continuous monitoring but instead are trained to generate alerts on the spot at real-time. Since the cameras identify behaviors and not identities, they can reduce biases, minimize false alarms, and protect personal privacy. The intelligent policing technology will be co-designed and co-created with the direct help of community residents, neighborhood leaders, and local business owners, as well as agencies including the City of Charlotte, and local law enforcement agencies in Charlotte-Mecklenburg and Gaston counties.

The proposed research makes fundamental advances in multiple areas from computer vision, computer architecture and real-time edge computing, to criminology and community-technology interaction. It paves the path for bringing the recent advances in deep learning and data analytics to enhance the safety and security of urban communities without jeopardizing the privacy of citizens. To this end, this project formulates social-technical advancements to efficiently analyze and assist communities and governing agencies in making real-time, smart reactions. It suggests a novel context-aware multi-tiered edge video analytics system, based on recent advances in deep learning, to enable real-time vision processing near the cameras (edge nodes) and cooperative processing over the edge network. At the same time, the proposed research interprets, formalizes, and models public safety and security events to be machine detectable, reducing the biases associated with profiling while improving the productivity of law enforcement, and enabling broad-based community support and trust. By demonstrating the use of powerful emerging edge computing technologies, the project will highlight the applicability and adaptability of such technologies to tackle many community challenges and broader smart cities and CPS applications, including smart transportation and pedestrian safety. Additionally, the proposed community-based pilots will serve as exemplars to other communities across the nation.