

Visual Analytics for Emergency Response and Training on Mobile Devices

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Project goal and scope: During emergency response and training, situational awareness is indispensable for effective managing and safe-guarding civilians and in-field personnel. To better support both command center controllers and in-field operators, we have developed a mobile visual analytics system to help enhance situational awareness and support rapid decision making through integrated visual analytics. The goal of our work is to develop a mobile visual analytic system for emergency response and training. The main task is to demonstrate a low-cost monitoring system on small hand-held devices such as PDA and smart phone. Using mobile devices for visualization provides a ubiquitous environment for accessing information and effective decision making. Moreover, mobile devices could be essential tools for emergency response if a variety of relevant information (e.g., images, videos, 3D models, and sensor data streams) can be efficaciously visualized together on these devices that have varying capabilities and resolutions. Our mobile visual analytics system consists of both 2D and 3D visualization components which show personnel-related information, situational information and static scene-related information, and integrate video playback functionality for personnel outfitted with cameras.

Recent progress: We extend our previous work and present an enhanced visual analytic system for emergency response and training. In our previous work, our system introduced a prototype visual analytic system for emergency response on mobile devices. We have improved our system by providing additional visual analytic functionalities such as congestion visualization, video playback, and reinforced visualization of 3D personnel and scenes. Our current system has been employed in the evaluation of two different scenarios: a simulated evacuation of The Station nightclub fire that occurred in Rhode Island during 2003 and a testing exercise for a rescue operation in an elementary school. The first scenario has simulated fire information including temperature, carbon monoxide, carbon dioxide and heat release rate and movement information for 419 personnel. The second scenario includes real-time agent location, activity level, directional information and video feeds from both six on-agent and five stationary cameras. Our system has been deployed on a Dell Axim X51v PDA, a Sprint PCS VisionSM smart device PPC-6700 and an OQO 02.

Future Plans: As future work, our system will be tested by actual first responders during training and adding outdoor 3D tracking based on GPS capability. The integration of RSS data will provide interesting visual representation and will further increase the usefulness of our system for emergency response.

Publications

- [1] Kim, S., Maciejewski, R., Ostmo, K., Delp, E., Collins, T., Ebert, D., "Mobile Analytics for Emergency Response and Training," to appear Information Visualization Journal, 2008.
- [2] Kim, S., Jang, Y., Mellema, A., Ebert, D., Collins, T., "Visual Analytics on Mobile Devices for Emergency Response," IEEE Symposium on Visual Analytics Science and Technology (VAST), pp.35-42, 2007.