Time & Location: March 25, 2014 at 9:00 AM in Engineering I 288
Title: A Human-Centric Approach for Data Fusion: The Development of a Fuzzy Set Theory Based Model

It is critical to provide an efficient and accurate information system in the post-disaster phase for individuals in order to access and obtain the necessary resources in a timely manner; but current map based post-disaster management systems provide all emergency resource lists without filtering them which usually leads to high levels of energy consumed in calculation. Also an effective post-disaster management system (PDMS) will result in distribution of all emergency resources such as, hospital, storage and transportation much more reasonably and be more beneficial to the individuals in the post disaster period. In this Dissertation, firstly, semi-supervised learning (SSL) based graph systems was constructed for PDMS. A Graph-based PDMS resource map was converted to a directed graph that presented by adjacent matrix and then the decision information will be conducted from the PDMS by two ways, one is clustering operation, and another is graph-based semi-supervised optimization process. In this study, PDMS was applied for emergency resource distribution in post-disaster (responses phase), a path optimization algorithm based ant colony optimization (ACO) was used for minimizing the cost in post-disaster, simulation results show the effectiveness of the proposed methodology. This analysis was done by comparing it with clustering based algorithms under improvement ACO of tour improvement algorithm (TIA) and Min-Max Ant System (MMAS) and the results also show that the SSL based graph will be more effective for calculating the optimization path in PDMS.

This research improved the map by combining the disaster map with the initial GIS based map which located the target area considering the influence of disaster. First, all initial map and disaster map will be under Gaussian transformation while we acquired the histogram of all map pictures. And then all pictures will be under discrete wavelet transform (DWT), a Gaussian fusion algorithm was applied in the DWT pictures. Second, inverse DWT (iDWT) was applied to generate a new map for a post-disaster management system. Finally, simulation works were proposed and the results showed the effectiveness of the proposed method by comparing it to other fusion algorithms, such as mean-mean fusion and max-UD fusion through the evaluation indices including entropy, spatial frequency (SF) and image quality index (IQI). Fuzzy set model were proposed to improve the presentation capacity of nodes in this GIS based PDMS.

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Approved for distribution by Pamela McCauley Bush , Committee Chair, on February 25, 2014.

The public is welcome to attend.