主 論 文 要 旨

論文題名

Study of Analytical Method for Building Arrangement Based on Mathematical Morphology

-Case Studies on Gap between Buildings, Precincts of Temples and Shrines, Shelters, Cultural Properties and the Consideration from the Standpoint of Urban Disaster Prevention -

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主論文要旨

In this paper, I proposed the two analytical methods based on mathematical morphology, and apply these methods to actual cities. Through these studies I assert usefulness and versatility of these methods.

In Chapter 1, I explained basic arithmetic processing of mathematical morphology, which is main theme of this study. And I proposed the two analytical methods based on mathematical morphology, one is 'Disk Sweeping Method' and the other one is 'Dilated Volume Fraction'.

In Chapter 2, I defined the word 'the gap between buildings'. To extract the gap area, the operations of image processing method called 'Disk Sweeping Method' are applied to the building location of Tokyo and Osaka cities, and I analyzed the distribution of the gap between buildings.

In Chapter 3, I analyzed the characteristics in morphology and distribution of precincts of temples and shrines in large cities and to obtain basic data for disaster prevention. I calculated the amount of effective open space by using disk sweeping method.

In Chapter 4, I clarified the admission capacity of temporary evacuation sites in Kyoto city. I compiled data of daytime and night-time population by each school district, and made a distribution map of temporary evacuation sites. I calculated the number of indoor and outdoor refugees admitted in temporary evacuation sites by using disk sweeping method in morphology and analyzed the admission capacity for the population.

In Chapter 5, I examine the risk of fire spreading to cultural properties by documenting the current distribution of ordinary buildings in the vicinity of cultural properties and quantitatively analyzing the risk of fire spreading. I calculated the critical distance of fire spreading taking into account the weather conditions of wind speed and direction, and illustrated the DVF buffer using image processing techniques and created a fire spreading graph.

In Chapter 6, I proposed some new temporary evacuation sites in Shrines or temples, which are safe against fire spreading and have large amount of effective open space.