

Development of Real-time Landslide Inspecting and Monitoring System

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Abstract

This paper introduces a visual inspecting and monitoring system based on an image processing technique. We propose an image processing method for analyzing landslide movement in real time. The method adopts Laplacian of Gaussian operator to extract linear features for the captured images and uses a linear matching algorithm to distinguish the matching error for those features. When the algorithm is processed, motion parameters such as displacement area and its direction are computed. Once movement is recognized, displacements are estimated graphically with statistical amount in the image plane. The simulation results are shown us to verify the effectiveness of the developed method ^[1].

1. Introduction

Korea has often experienced landslide dangers because of its geographical features. Usually, inspecting and monitoring for landslide are done by random measurement based on human's eye and using instrument such as pluviometer and displacement gauge. Specially, in the case of dangerous rock or sliding place, the measuring instrument can not be easily set up and it need a lot of cost for installing. So we cannot obtain a real time information related with landslide and realize a forecasting system for emergency conditions such as heavy rains, a sudden shower or earthquake, etc.. In order to prevent and forecast a sudden landslide, a real time inspecting and monitoring system is needed.

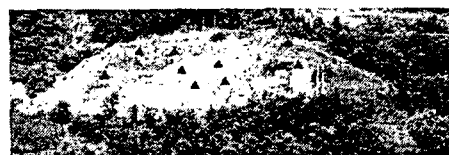
In this paper, we introduce a visual inspecting and monitoring system based on an image processing technique. We propose an image processing method for analyzing the movement of a landslide in real time. To prove the effectiveness of the proposed visual inspecting system, an example landslide picture is used and target points are marked on the picture arbitrarily. The displacement after landslide occurrence is evaluated graphically with statistical amount.

2. Problem statement

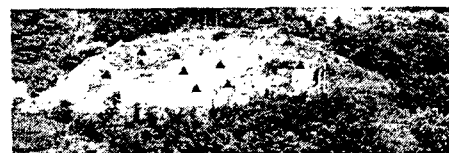


Fig. 1 Example landslide picture

Fig. 1 illustrates an example case about landslide. The landslide occurs slowly or suddenly according to its locations slope, weather condition (ex. cool and warm) and amount of rain etc.. The occurrence of landslide affects many hazards for human's life and national logistic flows. The circumstance around an expected landslide place is easily changed by growths of tree's color variations, heavy rain and snow according to season's circulation. Also, the natural target points to be inspected are disturbed even if change from day to night or night to day. Practically, when we construct the target points on landslide place, we must consider illumination and gray value changes corresponding to day light change and color change of background.



(a) before landslide



(b) after landslide

Fig. 2 Pictures with marked target points