

Survey for Methods to Characterize the Landslide Caused By the Rainfall and Earthquake

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Abstract—Landslides are characteristic phenomena for the element offset of the world's surface. Substantial precipitation and tremors are the two main considerations for landslides. The appropriation of region size is the most essential quantitative parameter of landslides. Along these lines, the motivation behind this study is to describe the scale and spatial contrast of precipitation actuated as contrasted and those of quake prompted landslides. Due to successive events of precipitation and seismic tremors, mass developments are normal dangers to individuals' lives. In this paper, the elucidation of knowledge is quantified as recognition criteria. Multisource high-resolution data, for instance, a SPOT satellite picture, And Ranging (Lidar) data, and aerial ortho-photographs were utilized to build the peculiarity space for landslide investigation. Landslides were perceived by an object-oriented technique joining edge-based segmentation and a Supported Vector Machine (SVM) strategy. The characterization results are assessed in correlation with those by manual elucidation. Two cases from Malin town landslide and Uttarakhand's substantial precipitation are tried. Both cases demonstrate that the object-based SVM technique is superior to a pixel-based system in grouping accuracy.

Keywords-SPOT images, Landslides, Edge-based segmentation, Support Vector Machine (SVM).

I. INTRODUCTION

Due to various reasons, earthquakes take place every day in some countries. Landslides triggered by earthquakes become very common. The frequency of natural disasters is on an increasing trend. To minimize the impact of disasters, the effective mitigation procedures should be conducted [1], [2], and [3]. The latest examples of such disasters are Malin village landslide [7] and Uttarakhand's heavy rainfall [8]. There are three sorts of landslide survey strategies exist: ground, aerial, and space-borne, or a hybrid [5]. Ground survey can be exceedingly precise, yet is slow. At the point when disaster happens, accessibility is very low. Consequently, it is difficult to make the survey in close constant or in an extensive scope region after a torrential precipitation. In early days it was impossible to check whole landslide area, so it was very difficult for analysis. Ground survey requires that well-trained geologists delineate landslides under a stereoscopic environment, which is time consuming and labor-intensive Necessary to develop more efficient method to detect landslide for analysis. After landslides take places, the status of disaster has to be assessed and subsequent secondary hazards should be evaluated. To minimize the impact of disasters, the effective mitigation procedures should be conducted. Earlier ground survey was done for analysis of the landslide area, this process is very slow. It is difficult make survey of Large landslide area in ground survey type [4], [5].

II. LITERATURE SURVEY

Wherever Times is specified, Times Roman or Times New Roman may be used. If neither is available on your word processor, please use the font closest in appearance to Times. Avoid using bit-mapped fonts if possible. True-Type 1 or Open Type fonts are preferred. Please embed symbol fonts, as well, for math, etc. In this paper [5], the translation of knowledge is quantified as recognition criteria. Multisource high-determination data, for instance, a SPOT satellite picture, Digital Terrain Model (DTM) decreased from Light Detection And Ranging (LiDAR) data, and aerial ortho-photographs were utilized to build the gimmick space for landslide examination. Landslides were perceived by an object oriented strategy joining edge-based segmentation and a Supported Vector Machine (SVM) technique. The grouping results are assessed in correlation with those by manual translation. Two cases from northern and focal Taiwan are tried. Both cases demonstrate that the object-based SVM strategy is superior to a pixel-based system in arrangement accuracy. Kuan-Tsung Chang received an OOA strategy in this study to concentrate landslide Features. They surveyed its execution for accuracy in 2 cases coordinating multi-determination digital data, for instance, aerial or satellite symbolism, terrain data got from an airborne Lidar sensor, and its subsidiary pointers incorporating slope and OHM in the landslide elucidation. They likewise contrasted these data and an ordinary pixel-based SVM strategy. They connected edge-based segmentation in the first

place, and after that combined comparable properties. Therefore, they chose patches of preparing examples for a SVM arrangement.

In this paper [2], the customary system is focused around visual perception of shade tone and geo-morphometric features of landslides on the aerial photos. Both manual elucidation and automatic recognition of satellite pictures are likewise utilized. The majority of the late autocrat characterization systems for landslides utilizing pictures are focused around spectral features other than topographic features. Subsequently, landslides can't be effectively perceived. A late study is to make an intelligent methodology with a software interface for helping visual elucidation of landslides [9]. Both spectral and spatial parameters are utilized for the inputs of the software to support the translator/administrator to accurately perceive and depict landslides. Automatic recognition of landslides singularly on premise of spectral information of digital pictures is proficient as far as time utilization, though the results generally can't meet the prerequisites for taking designing measures. In any case; manual translation is so moderate there is no option meets the necessities for crisis reaction.

A hybrid methodology is to consolidate the focal points of automatic courses of action with manual understanding. The extraction of geo-morphometric parameters from airborne LiDAR data is hence considered (or coordinating in the intuitive interface to help the translator. For making an intuitive translation interface to help the mediator expert knowledge of morphometric properties of landslides are needed for entrances to automatic detection algorithm to highlight the potential territories of landslides in the framework. In this study, for comprehension these properties, Aerial overviews were completed with airborne LiDAR and digital camera to get Faint and DSNi of 1 m grid and ortho-photos of 50cm grid.

In this paper [3] Avalanche stock used to be carried out by manual judgment of experienced geologists. It is a period expending and work serious employment, to lead making successful debacle evaluation and recuperation plans incomprehensible. What's more let extensive scale catastrophe examination can't continue easily because of hindered by mountains or post-fiasco components, for example, street interruption. Along these lines, how to improve the automation and its execution of avalanche stock is a paramount exploration theme. Along these lines, Vector Machine (SVM) system is utilized. The characterization results are assessed in examination with those of manual elucidation. Also, the distinctness investigation for the utilized peculiarities on precipitation impelled landslide understanding is additionally given. The distinctness examination result shows that incline is a vital element to recognize the avalanche and different classes.

In this paper [4], a national geo-hazard mapping project utilizing state-of-the-art innovation of coordinated airborne LiDAR and digital photography is therefore launched by Focal Geological Review Taiwan. The results incorporate extremely itemized DEM and DSM of 1m grid and digital ethereal photo of 50 cm grid, and in addition a stock of the geological appalling gimmicks with the procured LiDAR data and images. The real issues experienced incorporate substantial cloud covers, greatly high terrain help, thick vegetation spread, and the wide scope of the study region. With the prerequisites of high determination data and brief time of task time, the test is to actualize a plan to get a complete scope of data free of voids and artifacts. A national project for calamity mapping is accordingly started and launched. As specified in the presentation, the LiDAR overview is just a part of the national geo-hazard mapping project. At the point when the LiDAR items are conveyed to Focal Geological Review, geologists will keep on exploring their applications.

III. PROPOSED APPROACH

In proposed system, edge-based segmentation method is used for segmentation of satellite images. Object Oriented Analysis method (OOA) is used to extract the landslide features. Support vector method (SVM) is used to classify and training segmented images SVM classification results gives the landslide detected areas and further processing of the analysis is done. Using the satellite (Spot) images and expert interpretation method, it is easy to cover the large area. Because of these spot images, the process of landslide detection and analysis is as fast as compared to the ground survey type. The ground surveys are done by well-trained Geologist only. But in this system, there is no need of such trained person. Thus, the status of the disaster is assessed quickly. This system simply, first detects the landslide area and makes the analysis of that area. Later, it analyzes the causes of such landslide disasters. It also makes the landslide detection process more efficient and minimizes the time duration required for the detection process.

The system is useful to detect and characterize the landslide induced due to heavy rainfall and earthquake. Satellite images (spot images) are used for detection and characterization so the system can be used to detect and characterize landslide in various regions in the world. The system can be used to detect and characterize landslide induced due to heavy rainfall and sever earthquake.

IV. CONCLUSION

Using SPOT satellite images and expert interpretation method, two representative landslide cases are performed to analyze the causes of different kinds of landslide disaster in the paper. The results of the landslide mapping indicate that the average

area size of the landslides only around two hectares and a half amount of landslides has an area less than ten hectares. The area sizes and slope gradients of landslides are different for rainfall-induced and earthquake-induced factors. In general, the average size of earthquake induced landslides is smaller than that of rainfall induced landslides. The general slope gradients of earthquake-induced landslide are larger than those of rainfall-induced landslide.

Further study can be conducted in different geological environments and geo-morphological regions. And, thus we can gain further understanding in the size and frequency of landslides in various geological and geo-morphological conditions.

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