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Commentary

A Short Note on Remote Sensing in Geological Mining Hazards

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DESCRIPTION

In Geological survey remote sensing is a process of monitoring and detecting the physical characteristics of an area from a long distance by using aerial vehicles and satellite. Remote sensing application methods are used when desired area is dangerous to manual monitoring, and when the area is large in size impossible to detecting the measurements with old techniques. The working principle of remote sensing devices is, there is a one or more parts are having electromagnetic spectrums, these electromagnetic spectrums record the electromagnetic energy which is reflected or emitted by earth's surface. Remote sensing sensors are two types one active sensor and another one is passive sensor based on source of signal they use to explore the object or area. Instruments of active remote sensors works on their own emission or light source and the passive sensors works on the principle of reflection of the rely. The active remote sensor devices mostly use microwaves or light waves to determine the measurements like height, distance, atmospheric conditions, etc. Examples for active sensor devices are RADAR, LIDAR, sounder, scatter meter, laser altimeter, ranging instruments. Active remote sensors can work any time in the day they don't need sunlight, and didn't depend on atmospheric scatterings. Passive remote sensors are differed from active sensors they do not streamline energy of their own to the researched object or surface. These passive remote sensors are used to measure quantity with the use of multispectral or hyperspectral sensors, but these sensors depend on proper sunlight. Various types of passive remote sensors are spectrometer, radiometer, spectroradiometer, hyperspectral radiometer, imaging radiometer, accelerometer, and sounder.

Remote sensing in geological mining process provides better forecasting of hazards. General geological mining hazards are surface collapse, landslides, ground fissures, land slips and others these hazards sometimes leads to deaths of miners, and by forecast monitoring these mining hazards can reduce the deaths of miners. The process includes both remote sensing software and GIS software simultaneously. With using sensors high resolution data was collected to build the multiple variable logistic regression models to compute the occurrence probability geological hazards. In geological mining remote sensing factors to monitor are slope, roughness of the surface, geological structure, lithology, aspect and mining activity. And steps to follow for computing geological hazards are, initially to compute the factors, ArcGIS software is used to produce geo-rectified Digital Elevation Model (DEM) data of slope, roughness of the surface, and aspect. In factors computation step structures of lithology and geological structures are drawn from the geo-rectified geological map in the ArcGIS software to determine hazards in mining by comparing distance. Remaining factors mining activity and coal digging holes are determined by center distance to the nearest coal pile. The second step in the computation process is cell division, according to the spatial resolution of the DEM data study area was divided into 5 × 5 m small divisions. Factors are divided into segments and each segment is computes probability of hazard using the ratio of the hazards' cell quantities to the total cell quantities in the segment. After segment division for every factor curve fitting is developed with using variables, each segment act as an independent variable and the hazard's probability as the dependent variable. Using the data of hazardous cells and nonhazardous cells a multi-factor logistical regression model was built.

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