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Effective Prediction for Rock Burst Dataset Using Classification Algorithms with Particle Swarm

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ABSTRACT

Rock burst and Slope Stability is one of the common failures in hard rock mining and civil construction. This study focuses on the prediction of rock burst and Slope Stability classification with case instances using cloud models and attribution weight. First, cloud models are introduced briefly related to the rock burst and Slope Stability classification problem. Then, the attribution weight method is presented to quantify the contribution of each rock burst and Slope Stability indicator for classification. In addition, analysis and prediction of slope stability is of great importance in geotechnical engineering. With the development of economics, the number of slopes is increasing and landslides caused by slope instability have become one of the three major geological disasters in the world along with earthquakes and volcanoes. To reduce or prevent landslide damage, slope stability analysis and stabilization are required. However, accurately predicting slope stability is challenging because of the complexity of slope structures and the difficulty to determine the precise input data associated with key geotechnical parameters the proposed methodology PSO feature extraction preserves important distance relationships, such as : The Random forest, Naive Bayes of each object of the original dataset. This leads to preservation of any mining operation that depends on the ordering of distances between objects, such as Random forest, Naive Bays -search, SVM, J.48 and MLP classification, as well as many visualization techniques. In particular, it establishes a restricted isometric property, i.e., tight bounds on the contraction/expansion of the original distances.

Keywords: Raspberry Pi, USB Camera, Motor Driver, Motor, LCD Display, Road Side Speed Sign Controlling.

I. INTRODUCTION

Data mining is analyzing data from different perspective and summarizing it into useful information. The information can be used to increase revenue, cut cost, or both. Data mining allows the user to analyze data from many different dimensions or angles, categorize it, and summarize the relationships identified. It is the process of finding correlation or patterns among dozens of fields in the large relational database. [14]

ISSUSES IN DATA MINING

Mining different kinds of knowledge in databases

Data mining is used to cover a wide spectrum of data analysis and knowledge discovery task. Different user can use different kinds of knowledge.

Interactive mining at multiple levels of abstraction

It is difficult to know what can be discovered within database. The Data mining process should be interactive. Database containing a huge amount of data, appropriate sampling techniques can be used to facilitate interactive data exploration. [9]

Pattern evaluation

It can uncover thousands of patterns. Many of the patterns discovered may be uninteresting to the given user they present common knowledge or lacking novelty.

Handling noisy or incomplete data

The data stored in a database may reflect noise such as exceptional cases or incomplete data objects. The accuracy can be poor. Data cleaning and data analysis method is used to handle the noisy data.

II. LITERATURE SURVEY

CHUN'AN TANG AND JOHN A. HUDSON [1] he subject of rock failure has been studied in a coordinated way since the 1960s.It can be studied by examination of natural rock formations that have been stressed and strained over geological time, by laboratory experiments on the rock samples in situ experiments takes place, and by observing the results of rock excavation and loading during engineering construction. In this book, rock failure mechanisms explanations and illustrations are given. Over the years, there have been three main developmental phases supporting rock engineering design: analysis based on elasticity theory; the use of rock mass classification systems; and computer modeling. The elasticity theory approach is more useful because it enables the stresses around circular and elliptical holes to be determined, although the approach is most useful for deep excavations where the rock behavior is essentially elastic.

XIAO FAN and KAN WANG [2] In the field of nuclear engineering, deterministic and stochastic methods are used to solve radiation transport problems. To solve the transport equation for the average particle behavior and also contain uncertainties associated with the discretization of the independent variables such as space, energy and angle of the transport equation and can admit solutions that exhibit non - physics features. The Monte Carlo method obtains s results by simulating individual particles and recording some aspects of their average behavior. This method enables detailed, explicit geometrical, energy and angular representations and hence is considered the most accurate method presently available for solving complex radiation transport problems. One of the difficulties associated with Monte Carlo method is the amount of computer time required to obtain sufficient precision in the simulations.

QIANG YANG AND PING- AN DU [3] To present a novel approach for determining the weights of decision makers (DMs) based on rough group decision in multiple attribute group decision-making (MAGDM) problems. At first, we construct a rough group decision matrix from all DMs' decision matrixes on the basis of rough set theory. The second process we derive a positive ideal solution (PIS) founded on the average matrix of rough group decision, and negative ideal solutions (NISs) founded on the lower and upper limit matrixes of rough group decision. After that we obtain the weight of each group member and priority order of alternatives by using relative closeness method, which depends on the distances from each individual group member' decision to the PIS and NISs. Comparisons with existing methods and an on-line business manager with the selection example, the proposed method show that it can provide more insights into the subjectivity and vagueness of DMs' evaluations and selections.

MATTHIJS J. WARRENS [4] The kappa coefficient, denoted by κ, is widely used as a descriptive statistic for summarizing the cross-classification of two variables with the same unordered categories. Originally proposed as a measure of agreement between two raters classifying subjects into mutually exclusive categories, Cohen's κ has been applied to square cross-classifications encountered in psychometrics, educational measurement, epidemiology, diagnostic imaging, map comparison, and content analysis. The popularity of Co- hen's κ has led to the development of many extensions, including multi-rater kappas, kappas for groups of raters, and weighted kappas. The value of κ is 1 when perfect agreement between the two observers occurs, 0 when agreement is equal to that expected under independence, and negative when agreement is less than expected by chance.

YU ZHOU AND TINGLING WANG [5] Rock burst is one of main engineering geological problems greatly threatening the safety of construction. Prediction of rock burst is always to important for the safety of workers and equipments in tunnels. Here in this paper, PNN-based rock burst prediction model is proposed to determine whether rock burst will happen in the underground rock projects and how much the intensity of rock burst.

ZAOBAO LIU and JIANFU SHAO [6] Rock burst is one of the common failures in hard rock mining and civil construction. It focuses on the prediction of rock burst classification with the case instances using cloud models and attribution weight. At first, the cloud models are introduced briefly related to the rock burst classification problem. Now, the attribution weight method is presented to quantify the contribution of each rock burst indicator for classification. This approach is implemented to predict the classes of rock burst intensity for the 164 rock burst instances collected.

ZONG- XIAN ZHANG [7] are two missions for rock mechanics to accomplish in mining engineering: (1) to destroy rock efficiently; (2) to make rock structures safe. The missions are completed and mining operations are well managed, best mining results should be achieved. For accomplishments of the two missions, rock mechanics faces following challenges: (1) how to make drilling, crushing and grinding more efficiently, in particular for grinding whose energy efficiency is less than 1%; (2)now how to make full use of explosive energy and destroy rock effectively; (3) how to manage, reduce and finally predict seismic events and rock bursts; (4) how to the develop various mining methods; (5) how to reduce borehole damage in deep mines or in the mines with high in - situ stresses; (6) how to increase ore recovery and decrease dilution; (7) how to improve mining safety; (8) how to make rock support de signs more scientifically. All these challenges will be analyzed in this paper. In addition, few topics such as rock mass classification, environment protection and the effects of loading rates, temperatures, and cyclic loading on mining engineering will be discussed.

III. METHODOLOGY

NORMALIZATION PROCESS

It is the process of classify data into an associated table it also eliminates redundancy and increases the reliability which improves output of the query. For normalizing a database, we divide the dataset into tables and establish relationships between the tables.The dataset normalization can essentially be defined as the practice of optimizing table structures. Optimization is accomplished with the result of a thorough investigation of the various pieces of data that will be stored within the database, in particular concentrating upon how this data is interrelated

Min Max Normalization

Min max normalization is a normalization strategy which linearly transforms x to y= (x-**min**)/(**max**-**min**), where **min** and **max** are the **minimum** and **maximum** values in X, where X is the set of observed values of x. It can be easily visible when x=**min**, then y=0.

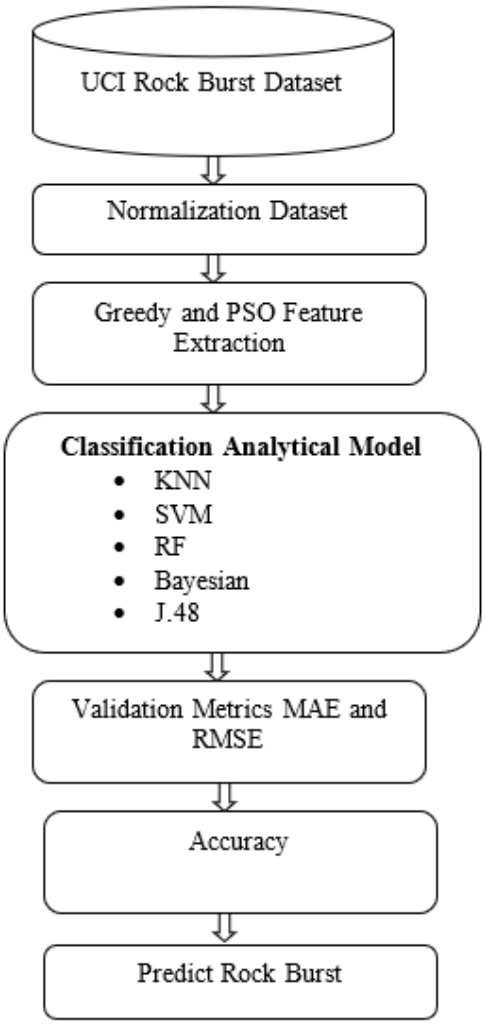
$$y=x-(min(x)) / (max(x)-min(x))$$

FEATURE SELECTION

HCR-PSO feature extraction model for Rock Burst dataset and applied an improve probability in many Geo-graphical application such as training artificial neural networks, linear constrained function optimization, wireless network optimization, data classification, and in many other areas where GA is applied. Computation in HCR-PSO is based on a swarm of processing elements called particles in which each particle represent a candidate solution. The system is initialized with a Rock Burst dataset swarm of random solutions and searches for optima by updating Rock Burst dataset generations. The search process utilizes the combination of deterministic and also tbe probabilistic rules that depend on information sharing among their population members to enhance their search processes. Rock Burst dataset prediction system sharing mechanism in HCR-PSO is considerably different.

In GAs, chromosomes share information with each other, so the whole Rock Burst dataset moves like one group towards a selected area. In HCR-PSO, the global best swam particle found among the swarm is the only Rock Burst dataset shared among particles. It is a one - way Rock Burst dataset prediction sharing mechanism. The Rock Burst dataset prediction computation time in HCR-PSO is much less than in GAs because all swam particles in HCR-PSO tend to meet to the best solution fast.

SYSTEM FLOW DIAGRAM



IV.CONCLUSION

This project analyzed the Rock Burst dataset using algorithms such as J48, MLP, SVM, Random Forest, and Bayesian Classification. These algorithm gives various result based on HCR-PSO feature extraction model. It has been seen that MLP and J48 Classification gives better results compare to other classification algorithms. There are many criterions for evaluating the selected feature subset; here this project used features to evaluate the performance of different classification algorithm. In future, we have attempted to classify different feature selection algorithms into four groups: complete search,

heuristic search, meta-heuristic methods and methods that use artificial neural network. The future methodology is used to analyze the Rock Burst dataset region into separable compartments i.e. Rock Burst dataset etc. However, the method requires further improvement mostly regarding feature selection of the Rock Burst dataset into multiple components: renal cortex, renal column, renal medulla and renal pelvis. Apart from that, this is planned to expand the database on which the system will be tested. And also, the proposed method in this project can be employed for detecting the Rock Burst dataset Geo-graphical in future with the Rock Burst dataset and classification of the Geo-graphical.

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