Chapter 6
Application of Conventional Data Mining Techniques and Web Mining to Aid Disaster Management

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ABSTRACT

Data mining techniques have potential to unveil the complexity of an event and yields knowledge that can create a difference. They can be employed to investigate natural phenomena; since these events are complex in nature and are difficult to characterize as there are elements of uncertainty involved in their functionality. Therefore, techniques that are compatible with uncertain elements can be employed to study them. This chapter explains the concepts of data mining and discusses at length about the landslide event. Further, the utility of data mining techniques in disaster management using a previous work was explained and provides a brief note on the efficiency of web mining in creating awareness about natural hazard by providing refined information. Finally, a conceptual framework for landslide hazard assessment using data mining techniques such as Artificial Neural Network (ANN), Fuzzy Geometric Mean Model (FGMM), etc. were chosen for description. It was quite clear from the study that data mining techniques are useful in assessing and modelling different aspects of landslide event.

INTRODUCTION

With advancement in computing technology, there is an exponential rise in the evolution of digital data. From government agencies to private firms, each and every aspect of their working has been shifting to the digital framework. Furthermore, the access of technology has become so easy and user-friendly to different sections of the society that even users from rural areas can easily be seen on various social networking sites. It is not just policies of government agencies that are fueling the growth of digital data, the story of evolution of digital age has its roots in the change of approach in people's way of life; today even a school kid has a social account and an account on social platforms is like an identity for them. Most of the people's significant amount of time passes on computer either working or online shopping etc. It will not be exaggerating if it is said that in coming decades each and every aspect of earth encompassing from human to physical objects will be converted into a data. In fact, with an advent of social networking sites and few government policies, most of the people are already converted into digital identities. Now let the limitation of imagination break, each and every digital identity is further generating a series of data related to them originating from social networking sites, online shopping, health services, travel, or work. That means a trap of million data associated with a digital identity, isn't there is a chance that we can get lost in this data trap! And if that happens, then we can comfortably formulate a hypothesis that we live in a world surrounded by millions of data; however, we are deprived of information, since information requires scientific analysis of data, and if data is not handled with a scientific perspective, then it is just a data which is doomed to die. Therefore, there is an absolute necessity of some technology which can find useful information i.e. knowledge from such a huge data repository and save a user from information loss, so advanced technology like data mining comes into the picture to fill the void created by the fast evolution of data. However, the meaning of knowledge needs to be understood in the right context. The term, 'knowledge' literally represents inference of patterns by processing information that are meaningful and applicable to a decision-making process. At this point, it needs to be outlined that any data sciences ultimately serves the decision-making process. Thus to understand how data sciences work; we need to have a firm understanding of different aspects of the decision-making process. A decision hierarchy is based on alternatives and criteria's, and a closer look at the hierarchy surfaces the fact that criteria's are conditions postulated by the available data. Further, if the data is not processed and refined properly then, the whole process would be dependent on the erroneous information that can lead the results into a wrong direction.

The decision-making process is not just about data cleansing and refinement; it also requires formulation of appropriate conditions that can help to simulate the cognitive aspects of a decision-making process which finally assures precise decision making. Now it needs to be understood that we are not just surrounded by massive digital data, but there is always a need to come across of some decision-making for survival in this world. However it may look superficial theory at one glance, but digging deep will ensure the truth in this hypothesis. That means we just do not need to identify the data that are useful in our decision-making process, but also, there is a requirement of mechanism that can transform the data into a form that can be used for the processing that we call, a transformation of data. Moreover, there are many factors that are responsible and driving factors for origination and evolution of event, and therefore, to extract any meaningful aspect out of an event, we need a firm understanding of that event. If we have an in and out knowledge of an event then only a clear set of steps can be designed to derive information from that event; otherwise, extraction of meaningful information would be imprecise and inaccurate. A complete understanding of an event; be it a social or economic phenomenon or an

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