ORIGINAL ARTICLE

Country crime analysis using the self-organizing map, with special regard to demographic factors

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Abstract Modern research on criminal phenomena has been revolving not only around preventing existing offenses, but also around analyzing the criminal phenomena as a whole so as to overcome potential happenings of similar incidents. Criminologists and international law enforcement have been attracted to the cause of examining demographic context on which a crime is likely to arise. Traditionally, little has been explored in using demographic variables as determinants of the aggregate level of crime in the crime literature. Rapid development and ubiquitous application of information technology enables academic field to perform crime analysis using visualization techniques. Automation and networking make it available to access massive amounts of crime data, typically in the form of crime statistics. In numerous fields, studies and research have shown that visualization techniques are valuable; in crime research, nevertheless, there is a general lack of its application. In order to efficiently and effectively process crime data, criminologists and law enforcement are in demand of a more powerful tool. The self-organizing map (SOM), one of the widely used neural network algorithms, may be an appropriate technique for this application. The purpose of this study is to apply the SOM to mapping countries with different situations of crime. A total of 56 countries and 28 variables are included in the study. We found that some roughly definite patterns of crime situation can be identified in traditionally homogeneous countries. In different countries, positive correlation on crime in some countries may have negative correlation in other countries. Overall, correlation of some factors on crime can still be concluded in most groups. Results of the study prove that the SOM can be a new tool for mapping criminal phenomena through processing of large amounts of crime data.

Keywords Data mining · Self-organizing map · Crime situation

1 Introduction

Modern society has long suffered from large volume of crimes almost everywhere in the globe. Deterrence of crime has become one of the most significant global tasks, along with the critical concern for reinforcing public security. Studies and research on criminal phenomena take the responsibility not only for control of existing crime, but also for exploring the criminal phenomena as a whole so as to prevent future occurrences of similar event. Both public and private sectors attempt to improve the effectiveness of crime prevention. Abundant exploration addressing this problem has by and large made use of behavioral sciences and statistics. Finding causation between crime and other phenomena has been a pursued and difficult research objective for long in natural and social domains. Crime can be perceived as an outcome of manifold undesirable personal, social, economic, cultural, and family conditions. Regardless of its complexity, to prevent crime, it is important to have an understanding of its causes (The Community Safety and Crime Prevention Council 1996). Studies and research on criminal phenomena have been situated in a long historical background with numerous studies endeavoring to divulge reasons of crime and search for final solutions, unfortunately, only in vain. There has

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