Foreword

Data mining is at the cross roads of several computer science disciplines such as database systems and machine learning. The ultimate goal is to extract meaningful information from large data sets and put this information to effective use for knowledge support. The potential applications cover all aspects of business and everyday life. An archetype is public safety. Public safety and other law enforcement agencies often seek to identify smart ways or effective strategies to deter crime. Yes, indeed data mining could play a critical role in public safety application by extracting meaningful information (smart statistics) from large data sets and putting this information to productive use in criminal science and investigation.

Criminal science and investigation deal not only with ways and means for preventing crimes but also with ways and means for proving the guilt (or innocence) of suspected criminals. Large data sets do exist today on crimes. Classical examples are the national criminal databases. However, it is challenging, tedious, error-prone and resource consuming for public safety agencies to analyse these data sets using manual or conventional approaches. Therefore, meaningful information automatically extracted from these data sets using data mining techniques is certainly a vital input to crime pattern analysis, which contributes not only to crime solving, but also to (proactive) crime prevention solutions. Accordingly, it makes sense to understand existing solutions and explore alternative or unconventional approaches to inventing solutions to deterring crime across different domains.

The collection of chapters offered by this edited book, written by internationally recognized experts, discusses selected issues in this very broad area of data mining and criminal science and investigation. All chapters were subjected to a peer-review process. The book comprises three sections and each section is made up of several chapters. The first section reviews the challenges and existing solutions in this domain. It tackles both the data mining for crime situation recognition and the frameworks for criminal science and analysis. This is followed by a section on spatial analysis, visual analytics, hotspots and visualization. The third section is devoted to forensics, suspect modelling and intelligence gathering. Denial of service, cyber-crime and intrusion detection management are discussed in the fourth and last section.
It is worth mentioning that the challenges related to public safety are magnified in developing or emerging countries such as in Africa, where crime rates are relatively high and resources for preventing them and proving guilt or innocence of suspected criminals relatively low. This makes the two co-editors (Omowunmi E. Isafiade and Antoine B. Bagula) uniquely qualified for collecting and editing the chapters of this book. They are academics in South Africa, University of Cape Town and Western Cape University (respectively) and are deeply involved in research on data mining in criminal science and investigation, research in which they factor the challenging local issues.

This book should be read by advanced public safety practitioners, crime analysts and researchers working on innovative crime prevention challenges. From a researcher’s viewpoint, the book chapters provide a sound foundation to understand the scope of work in this domain of interest. The book can as well provide practitioners with a working knowledge on existing challenges and viable solutions.

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