8.1 Review of Objectives
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8.1 REVIEW OF OBJECTIVES
In the beginning of present research work all the objectives were well thought and decided. The primary objective of this research work was to analyse and design data mining techniques for prevention and detection of financial statement fraud. Extensive literature survey was carried out to understand the existing research work in the area of prevention and detection of fraudulent financial statements. After the review of literature, three major areas in usage of data mining methods for prevention and detection of fraud were targeted for future research. These targeted areas include, comparative analysis of four commonly used data mining techniques, identification of financial variables, and designing and implementation of a data mining framework for prevention and detection of fraudulent financial reporting. Seven specific objectives were achieved as a part of this research work.

First objective was achieved by performing thorough study of existing data mining techniques by focusing on purpose, nature of data mining techniques used, data sample specifications and empirical results. Second objective was realised by elaborating the concept of financial statement fraud along with various factors responsible for financial statement fraud. Third objective was accomplished by comparative analysis of four commonly used data mining techniques namely Neural Networks, Decision Tree, Genetic Programming and Bayesian Belief Network on the basis of eight performance criteria. Fourth objective was fulfilled by identifying financial variables from publically available financial statements. These variables were further used as input vector to the proposed framework for realising the primary objective of prevention and detection of financial statement fraud.
Fifth objective was achieved by suggesting three descriptive data mining techniques for preventing fraudulent financial reporting. Sixth objective of this research was fulfilled by designing a new data mining framework for prevention and detection of fraudulent financial statements. Seventh objective was realised by implementing the proposed data mining framework which resulted in seven association rules for prevention of financial statement fraud and five decision rules for detection of fraudulent financial reporting.

8.2 FINDINGS AND SIGNIFICANCE

This research work conducts study and survey of existing use of data mining techniques for prevention and detection of financial statement fraud, which provides better understanding of existing use of data mining technique and their applicability. It helps in setting objectives for conducting the research work. Further whole research work is divided into three parts – comparative analysis of four commonly used data mining techniques, identification of financial variables, and designing and implementation of a data mining framework for prevention and detection of fraudulent financial reporting. Specific findings and significance of each part are given as follows:

First part (Chapter – 4) analyse the data mining techniques commonly used for detection of financial statement fraud. In order to understand the seriousness and cost of financial statement fraud, Chapter – 3 of this part present a brief overview of financial statement fraud, its causes, consequences and various methods of perpetrating it. This part is useful in understanding the concept of fraud especially financial statement fraud along with its causes and consequences. In order to have better understanding the process of fraudulent financial reporting, fraud triangle and a flow chart for financial statement production is also presented in this part. Four data mining techniques are identified as a result of extensive literature survey. Data mining techniques namely Neural Networks, Decision Trees, Genetic Programming and Bayesian Belief Networks were compared on the basis of eight performance criteria. These performance criteria includes: classification accuracy, ease of problem encoding, flexibility, computation complexity, interpretability, optimization capability, scalability and accessibility. Neural Network outperforms the other data mining techniques. This part is useful in selecting a data mining technique for identifying organisations into fraud or non-fraud organisation.
Second part comprise of Chapter – 5 and Chapter – 6. Financial variables for prevention and
 detection of financial statement fraud have been identified in Chapter – 5. Sixty two financial
 ratios and variables were identified on the basis of behavioural characteristics and
 profitability, liquidity, safety and efficiency of the organisation concerned. These financial
 variables and ratios are used as input vector to the proposed data mining framework in the
 third part. Chapter – 6 suggests the use of descriptive data mining techniques for prevention
 of financial statement fraud. Three techniques namely Association Rule, Cluster Analysis and
 Anomaly Detection were proposed for preventing fraudulent financial reporting. This part is
 useful in identifying financial variables and selecting a data mining technique for prevention
 of financial statement fraud.

Third part (Chapter – 7) proposes a data mining framework for prevention and detection of
 financial statement fraud. This framework suggests the use of descriptive data mining
 techniques for prevention and predictive data mining for detection of fraudulent financial
 statements. This framework was implemented by using Association Rule as descriptive data
 mining method for prevention and three predictive methods namely Decision Trees, Naïve
 Bayesian Classifier and Genetic Programming for detection of financial statement fraud. This
 implementation results in seven Association Rules and five Decision Rules for prevention
 and detection respectively. This part also finds the applicability of the framework by
 evaluating the performance of the data mining techniques. The performance of classification
 techniques used in this research has been evaluated by using sensitivity, specificity of the
 method. This part is useful to both researchers and practitioners in preventing fraudulent
 financial reporting at the first place and detecting it in case of failure of prevention
 mechanism.

8.3 LIMITATIONS OF CURRENT WORK AND FUTURE DIRECTION
The limitation of the current work is that case studies used are small and have limited
 applicability. The current work shows that proposed framework works well for prevention at
 the first place and detection if management of an organisation is able to perpetrate fraud even
 in presence of anti – fraud environment. Results obtained are very interesting and
 encouraging; however the framework should be tested out on financial data of non – trivial
 organisations. There is always a need of enhancement in the area of prevention and detection
 of financial statement fraud. Number of specific potential enhancements to current work can
 be as follows:
The impact of data discretisation on the data mining methods’ performance and the topic of optimal discretisation algorithms should be taken into account in future research. Research is also needed to examine the circumstances under which data mining techniques perform better than other techniques.

However, it is fact that each and every data mining technique has its strength and weakness and no individual technique appeared as a perfect solution to the problem of detection of financial statement fraud. Hence multiple data mining techniques may be integrated to form a hybrid system for successful and timely detection of fraud in favour of the economy of the organisation and the nation concerned.

The accuracy rate of the data mining techniques can be further enhanced by using some qualitative information such as composition of administrative board along with financial ratios used in this research. Moreover, particular studies of the industry could reveal specific indicators.

Furthermore, the data mining techniques used in this research can be integrated with text mining algorithms for sentiment analysis of the textual description of the financial statements for assessing the financial items in the financial statements in order to provide better prediction of financial statement fraud.