CHAPTER 6
DATA MINING METHODS FOR PREVENTION OF FRAUDULENT FINANCIAL REPORTING

6.1 Introduction

Fraudulent financial statement costs millions of dollars to the world economy every year and is the main reason behind the failure of many companies. Financial statement fraud is a type of management fraud, since it is the management of the organization which manipulates the financial information. Prevention of financial statement fraud has become a major concern of many organizations. The industry recognizes the problem and is just now starting to act. Although prevention is the best way to reduce frauds, fraudsters are adaptive and will usually find ways to circumvent such measures. Fraudulent financial reporting includes acts such as reporting sales that did not happen, reporting income into the current year that actually belongs in the next year, capitalizing expenses improperly or reporting an expense in the next year that should be reported in the current year.

Auditors while analyzing the financial statements, categorize their observations into four groups namely: fraudulent cases, cases of circumventing procedures, errors or mistakes, and extreme values. The fraudulent observations are usually used for identification and detection of fraud, whereas the observation that circumvent procedures or are a result of mistakes errors helps in fraud prevention. A measure to stop fraud from occurring in the first place is termed as fraud prevention.

This chapter elaborates the conventional methods for preventing fraudulent financial reporting under Section 6.2 followed by the introduction of data mining techniques for prevention of financial statement fraud as Section 6.3. Section 6.4 summarizes this chapter.
6.2 CONVENTIONAL METHODS FOR PREVENTION OF FINANCIAL STATEMENT FRAUD

Prevention of financial statement fraud is not the sole responsibility of auditors because it is not their primary objective and they do not have enough knowledge regarding the management of the organisation. However, auditors' main responsibility is to express an opinion about whether financial statements are prepared within an acceptable accounting framework and thus provide assurance that financial statements are free from material misstatement, whether caused by fraud or error. Moreover, standard auditing procedures may prove insufficient because auditors have to examination the financial statements in accordance with applicable auditing standards with the objective of expressing an opinion as to their fairness and compliance with applicable statutory requirements [IAASB07]. These limitations suggest that there is a dire need of effective methods and techniques for prevention of financial statement fraud.

The emergence of fraud into our economic world did not go unnoticed. In 1985 the (US) National Commission on Fraudulent Financial Reporting (known as the Treadway Commission) was formed. To study the causes of fraudulent reporting and make recommendations to reduce its incidence, the Treadway Commission issued a final report in 1987 with recommendations for auditors, public companies, regulators, and educators.

This report re-emphasized the importance of internal control in reducing the incidence of fraudulent financial reporting and included a recommendation for all public companies to maintain internal controls. Hence, the first step towards prevention of financial statement fraud is a strong internal accounting control and it should begin at the transaction level of accounting. To strengthen the company operations, internal controls should also be instituted outside the accounting office. Auditors should analyse the following indicators of weak control environment so as to avoid fraudulent financial reporting and establish a strong internal environment.

1. Aggressive or intimidating management style
2. Poor supervision
3. Inadequate segregation of duties
4. History of internal audit reports with unacceptable control consciousness
5. Wrong attitudes toward financial reporting, including disputes over application of accounting treatments.
6. Inadequate investigation of allegations.
7. Low ethical and moral standards.
8. High incentives and temptations including pressure to meet unrealistic performance goals such as high performance – department rewards.
9. Inadequate risk awareness and control consciousness.
10. History of questionable dealings with employees, suppliers, customers, investors and auditors.
11. History of ethical complaints, particularly financial reporting related.
12. Failure to respond to known issues.
13. Failure to escalate concerns.

Internal control is of two types, active & passive internal control. Example of active internal control includes passwords, signatures and segregation of duties. [Davia00] compared active internal control with fences and like all other fences they have their weaknesses that can be easily whitewashed by an intelligent fraud perpetrator. Passive internal control suggests developing a state of mind in the prospective perpetrator that strongly motivates him for not performing any activity that leads to fraud. Neither active internal control nor passive one is good enough for prevention of financial statement fraud. Both internal and external control should go hand in hand for better prevention mechanism.

The second step is appointment of audit committees. This will help the management in finding weaknesses in their reporting process. Finally, management should review the financial statement in order to prevent fraud.

The above mentioned methods of preventing fraud recommend good internal control and fix the responsibility of the management for such fraud prevention. But in most of the cases, perpetrators of financial statement fraud are the top level executives or managers and generally auditors are deceived by managers.

6.3 DATA MINING TECHNIQUES FOR PREVENTING FRAUDULENT FINANCIAL REPORTING

The aim of data mining is to discover hidden knowledge, unknown patterns and unsuspected relationship from a large set of data. This capability of data mining can be utilised in
prevention of financial statement fraud. Descriptive tasks however, describe the data set as a whole. It aims to describe the underlying relationships in the data set. This fact accounts for the use of descriptive data mining instead of predictive data mining for fraud prevention.

An advantage of the use of descriptive data mining techniques is that it is easier to apply on unsupervised data. Thus the use of descriptive data mining techniques is recommended for overcoming the exclusion of types of fraud where supervised data is difficult to obtain. Descriptive data mining techniques such as association rules, clustering and anomaly detection are appropriate candidates for prevention of financial statement fraud.

6.3.1 ASSOCIATION RULE

Association rules are capable of detecting interesting relationship or association, frequent patterns, casual structures between specific values of categorical variables in a large set of data. A typical and widely-used example of association rule mining is Market Basket Analysis. Association rules are probabilistic in nature. Association rules provide information in the form of "if-then" statements. Degree of uncertainty about the rule can be expressed in the form of support and confidence. Support for a rule can be expressed as a percentage of the total number of records in the database and confidence can be expressed as conditional probability that include all items in the consequent as well as the antecedent to the number of transactions that include all items in the antecedent. The ratio of confidence to Expected confidence results in one more parameter of interest named as lift. An association rule system involve the creation of ‘if …then’ criteria to filter transactions to identify specific types of high risk transactions. These rules are created using the information of what characterizes fraudulent transactions. The effectiveness of rule based system depends on the knowledge and expertise of the person designing the rules. The disadvantage of association rule mining is that it can increase the probability of throwing many valid transactions as exceptions. This limitation can be overcome to some extent by prioritising the rules.

6.3.2 CLUSTER ANALYSIS

Cluster analysis or clustering is a collection of data objects into subsets called clusters so that observations in the same cluster are similar in some sense. Clustering is a method of unsupervised classification. General application of clustering includes pattern recognition, image processing etc. A good clustering method will produce high quality clusters with high intra-class similarity and low interclass similarity. The quality of a clustering result depends
on both the similarity measure used by the method and its implementation and its ability to discover some or all of the hidden patterns. Cluster analysis is a tool of finding associations and structure in data which, though not previously evident, nevertheless are sensible and useful once found.

6.3.3 ANOMALY DETECTION

Anomaly detection is an unsupervised mining technique used for detecting rare cases in the data. The goal of anomaly detection is to identify cases that are unusual within data that is seemingly homogeneous. Anomaly detection is a form of classification. Anomaly detection is implemented as one-class classification, because only one class is represented in the training data. A one-class classifier develops a profile that generally describes a typical case in the training data. Deviation from the profile is identified as an anomaly. One-class classifiers are sometimes referred to as positive security models, because they seek to identify "good" behaviours and assume that all other behaviours are bad. An anomaly detection model predicts whether a data point is typical for a given distribution or not. An atypical data point can be either an outlier or an example of a previously unseen class [Campos05]. The aim of anomaly detection is to provide some useful information where no information was previously attainable.

However, if there are enough of the "rare" cases so that stratified sampling could produce a training set with enough counterexamples for a standard classification model, then that would generally be a better solution.

6.4 SUMMARY

Financial statement fraud is a big concern for contemporary businesses, so companies place great importance to fight back with the problem. In order to avoid the damages caused by fraud; management, accountants and auditors should use new and innovative techniques to prevent financial statement fraud.

Financial statement fraud will decline in frequency and severity if more is learnt about it and if that knowledge is used to prevent it. Punishing and incapacitating violators of the law would probably help to reduce financial statement fraud, but measures must be implemented to prevent fraud from happening in the first place. No company is immune against the
Onslaught of fraud and it is becoming the responsibility of everyone - not only managers and auditors - to be aware of fraud and the means to prevent it.

Traditional auditing procedures may prove insufficient for prevention of financial statement fraud, because in most of the cases, top level managers are found indulged and managers deliberately try to deceive auditors. For these top level executives internal controls and systems to prevent fraud are least prevalent and effective. Hence, should be best reinforced by following best of fraud detection mechanisms for successful fraud risk reduction.

This chapter begins with an overview of conventional methods of preventing fraudulent financial reporting in Section 6.2. Section 6.3 presents and suggests a set of descriptive data mining techniques, not widely known to auditors, to help in the prevention of financial statement fraud. Data mining techniques presented here along with conventional method of fraud prevention will result in better and effective methods for preventing financial statement fraud.