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Forecasting of Earning Management by Support Vector Machine: Case Study in Tehran Exchange Stock

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Abstract: Earnings management has been one of the disputable issues in the recent researches. Most of performed researches in the area of earnings management have dealt with to examine the linear relationship of independent variables with earnings management by using statistical methods. However, they have not used these variables to expect earnings management. Today world is changing Para-permanently from classic modeling and early basic model based analyses to model development of the data itself directly. Today it has been possible to examine non-linear correlations between variables by growth of information technology and introducing artificial intelligence including artificial neural networks in the scientific researches area. Providing a model for predicting earnings management by using a Support Vector Machine (SVM) is the main objective of the present study. The population is the listed companies in Tehran stock exchange between 2004 and 2010. The results of the study show.

Key words: Earning management · Support Vector Machine

INTRODUCTION

The most important feature of a joint stock company is the separation of ownership from management. Accordingly, the directors have exclusive access to the proprietary information such as financial information that has been prepared and submitted. Due to accruals and incentives such as reward incentives, this property and accrual accounting feature make this opportunity and incentive for executives that manipulate data basing on their interests and against the interests of other groups. In a word, they manipulate data to make a profit management.

Effective transfer of financial information to people outside the organization in a timely and valid manner is the main role of financial reporting. One of the basic objectives of accounting standards is that users with relying on the financial statements are able to make correct decisions. On the other hand managers to achieve certain goals, provide the benefits of special people logically, report earnings so that it is inconsistent with the purpose of public benefits of users. Accounting standards in some of cases will open the managers to choose accounting methods. Performing researches show appropriate evidence on earnings management in different situations. The problem is the fact that earnings management sometimes confuses financial statements while financial statements do not have any problem in the context of accounting standards and auditors can't be wrong of financial statements about this opinion.

Companies have wide variety of backgrounds and motivations to manipulate profits, for example: showcasing a good picture of the financial statements before public securities of portfolio, compensating managers and avoiding providing information that indicate a violation of loan contracts and ordering actions that produce by manipulating results [1]. In recent decades, the results of the performing investigation indicate increasing trend of earnings management. Based bonus plans and stock options have appeared

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specially in recent years that having a high predictive power prediction with audacious accounting practices [2].

Earnings management researches are useful and beneficial for the knowledge of accounting in different aspects. Especially those that are directly related to the judgment role of management in the information of such process, how managers apply for financial statement reporting and finally the bond market's reaction to information manipulated by management. Earnings management can be the meet of two beliefs ranges in the better criteria for measuring performance (net income and operating cash flows fans). Theoretically aspect, earnings management researches show themselves interesting and controversial yet. This was undoubtedly one of the primary motivations for conducting this study. On the other hand, manipulation of accounting data, a form of earnings management, has the widespread consequences of the economic, social and political. Unpleasant experience of developed countries from manipulation of accounting information such as the Enron scandal and Worldcom in America seriously makes a phenomenon like earnings management more important.

In the accounting literature, many studies related to earnings management have focused on identifying factors affecting on earnings management only ¡ it means these have assessed the only relationship between earnings management and ranges of factors. Developing of information technology and making the ability to collect and store data at extremely high volumes in most organizations requires the necessity to develop theories and tools to assist human in extracting useful information (knowledge) from the rapidly growing volumes of digital data [3]. Due to the high potential of Artificial Intelligence in the processing of large databases and finding complex and nonlinear models in them, much researches has been made in the field of artificial neural networks in different areas. Financial decisions because of partly turmoil nature of effective variables are suitable for using the artificial neural networks. Therefore the aim of this study is that by using the techniques of the artificial neural networks and logistic regression offer a model for detecting earnings management in listed companies in Tehran Stock Exchange and the results of the two techniques is compared. The main research question is that whether the use of these techniques such a model will be presented or not and finally which techniques provide a better model. The paper outlines and discusses issues and research background is provided. Then the research method is described. Research findings will form the next article topic. Finally, conclusions and recommendations are presented.

Earnings Management: In recent decades, many studies have been done in the context of earnings management. Most studies are discussed on identifying the motives, means and factors affecting earnings management. Several explanations from different perspectives on earnings management have been offered. From Healy & Wahlen [1] point of view, earnings management occurs when managers use their own judgment for financial reporting and do this act aimed to confuse some shareholders about the true economic performance or to influence the outcome of the contracts based on reported accounting numbers. 000From Degeorge *et al*. [4] point of view, earnings management is a kind of artificial manipulation of earnings to reach the expected level of profits for some specific decisions (such as analysts' forecasts and trend estimation of previous profits for predicting future profits). In fact the main motivation for earnings management is belief management of investors about business unit.

In order to measure earnings management, it is necessary to consider the methods used by managers to manage reported earnings. The methods of measure earnings management generally assume that the reported profits through a change in accounting methods [5], the timing of real investment and financial decisions [6] or managerial discretion on accruals [7], are managed.

In a general classification, models that can detect and measure earnings management measures can be considered in two groups: the first model is based on discretionary accruals including arbitrary discretionary accruals and specifically discretionary accruals and the second model is non-discretionary accruals including distribution model, accounting changes model, Eckel [8] model and Red Flags model.

Dechow *et al*. [9] evaluated the relative performance of the five models of earnings management measure included Healy [7], DeAngelo [10], Jones [11], modified Jones model and the Industry model [9]. The results indicate that the Modified Jones model is the most robust criterion in earnings management detection. Bartov *et al*. [12] also claimed that the Jones model and modified Jones model are able to detect earnings management. Chang *et al*. [13] also evaluated that the cross sectional Jones model is better than the time series modified Jones model.

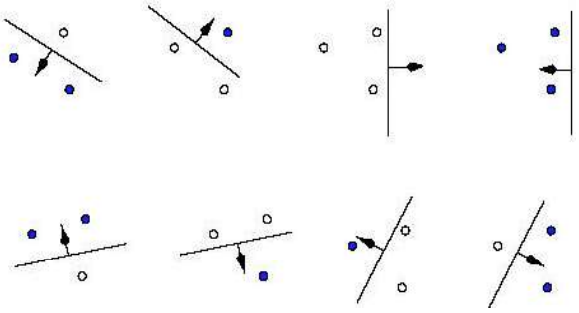

Fig. 1: Example of Support Vector [14]

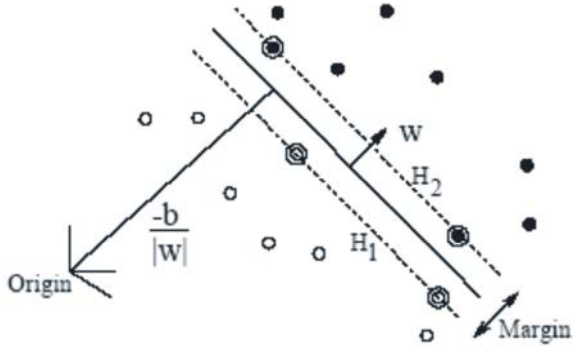

Fig. 2: Two-dimensional Support Vector [14]

SVM: In this report, checking linear support vectors and their performance in classification issues are processed. Using linear SV in classification problems is a new approach that has been remarkably noticed in the last few years and has been used in a wide range of applications such as OCR, handwriting recognition, traffic signals diagnosis and so on. Figure 1 has provided an example of problem solving by SVM.

In training phase of the SVM approach has tried to choose Decision Boundary that the minimum distance to each categories is maximized. This type of choice makes the decisions in practice tolerate the noisy conditions well and have had a good response. This type of boundary selection based on spots are called support vectors is done. In this section, firstly we generalize concepts such as pattern recognition and VC that has lots of usage in classification machines concepts and then explain linear and nonlinear support vectors.

A Learning Machine Generalization in Pattern Recognition: There is a large family of boundaries that explain the relationship between a size, learning machine generalization and its performance. Now we specify one of these limits. It is supposed that we have the one example that each of them are related as a pair consisting of a vector and a class. These elements represent something in each problem. For example, in the case of trees recognition problem, vector had represented vector of pixels and its handle is 1 (For states that image consists of tree) and -1 for states that the image don't consists of tree, -1 is used for covering zero in order to work easier in calculation of the formulas that we use later. It is assumed that there is an unknown probability distribution function P (x, y) that data are distributed according it. It is assumed that the data are independent and have distributed steadily. Now we suppose that we have the car that its task is learning of $X_i \rightarrow Y_i$ mapping. This car is actually defined by a collection of $X_i \rightarrow f(x, a)$ mappings that the functions F(x, a) are regulated by 'a' parameter. This machine is considered as a definitive machine. Input x and a given choice of 'a' always gives the same output. An 'a' special election gives us a machine that we call it the trained machine.

Separable Linear Support Vector Machines: Now we begin with the simplest case: linear machines that have trained on separable data. We label the training data like $\{X_i , Y_i\}$, $i = 1,...,l, Y_i \in \{-1,1\}$, $X_i \in R^d$. Assume that we have a hyper page that separates positive samples from the negative samples. X points located on hyper page satisfy w. x + b = 0 condition that W is the normal vector of hyper page, | b | / | | w | | is the vertical distance from the hyper page and | | w | | is the 'w' Euclidean normalized. Assume that d + (-d) is the minimum distance of positive (negative) points from the hyper page. Margyn is defined a separable hyper page as 2 / | | w | |. Support vector algorithm find the hyper page with the biggest margyn. This problem can easily be formulated as following: Suppose that all training data satisfy the following restrictions: [14].

x_i. w + b $\geq$ + ٦ for y_i = + ٦

x_i. w + b $\leq$ – ٦ for y_i = – ٦

These two relationships can be summarized in the following equation:

$y_i(x_i$. W + b – ٦ $\geq$. ∀) (2)

Now we consider some points that are corrected in 'a' unequal. These points are located on hyper page H1: xi. w + b = 1 with 'w' normal vector and the vertical distance | 1 - b | / | | w | | from the origin. Therefore we can find a pair

hyper page that give us the maximum amount of Margyn and do this through the minimization of | | w | | ^ 2 due to the current limitations [10].

Therefore, we expect that the solution of two dimensional normal forms has had a Figure like it is shown in figure four. Training points that are in 2 equation (It means they're located in the H1 or H2 hyper page) and their deletion change the found solution are called support vectors. These points are marked in figure 2 with an additional circle.

We're going to turn to the lagrangian formulation problem. There are two reasons for this. First, the shown limits will replace in the whole equation with lagrange multipliers that it will make our work much easier. Second, the in this formulation of the problem, training data appear as point multiplication of vectors. This is a critical feature that allows us to generalize the problem solving process to the nonlinear case [15].

So we introduce Lagrange multipliers α_i, i = 1, ..., l that one of them are for each unequal limitations. Recall that the rule for constraints like ci> = 0 is that the constraint equations multiply with positive Lagrange coefficients and is minus objective function.

Areas for which there is $\alpha_i \rangle 0$ are called support vector and are located on one of hyper pages H1 or H2. Other training points have $\alpha_i = 0$ value. Support vectors are the key elements of the training set for these machines. They are the closest to the decision boundary and if the rest of the training points omit and the education repeat, the separable hyper page will be acquired.

Literature Review: Several studies have been conducted on earnings management and these researches have been in various financial fields which are indicated to some cases below.

Moses [16] and Michaelson *et al*. [17] have provided evidence which indicated large companies have more incentive to smoothing earning than smaller one. Also, results from Michaelson *et al*. [18] indicated that smoother companies have mean risk and lower return than non-smoother companies is larger than non-smoother companies. In contrast, Albrecht and Richardson [19] have concluded that larger companies relative to smaller companies will attract more analysts so larger companies are more known and thus they need to smooth earnings less than smaller companies. Lee and Choi [20] also found that small companies' relative larger companies more likely will use earning management to avoid loss reporting. Ashari *et al*. [21] did not provide evidence effectiveness of firm size on income smoothing however he indicated that degree of company profitability and nationality and industry type would be effective factors in income smoothing. Dechow *et al*. [9] found that companies that their senior executive is chief of director board more likely to embark in actions and accounting practices which Securities and Exchange Commission has introduced them as violence of accounting generally accepted principles. Also in companies that percentage of its independent members in director board is more, the violence of accounting generally accepted principle is so limited. Steveny and Vanstraelen [22] investigated the behavioral difference between control manager companies and control owner socially. The results suggested that decision making policies in companies with control manager relative to companies with control owner have been toward income smoothing clearly. Peasnell *et al*. [23] concluded that as non-executive members' ratio increase in board of director the probability of existence of increasing-income accruals will reduce. Chtourou *et al*. [24] found that independence of board of director will limit activity of earning management. Becker *et al*. [25] and Francis *et al*. [26] found evidence which indicated amount of discretionary accruals in companies which are audited by 6 Big Audit Firms is less than companies which are audited by auditing smaller institutions. Krishnan [27] found that auditing play a significant role in limiting changing earning management. In Xie *et al* [28] study confirmed a negative relationship between the number of required members, independence of the board and financial knowledge board level with earnings management. Dang [29] indicated that auditing quality reduce earning management in the company issuing stock and quality of auditing limit the earning management. Chang *et al*. [13] found that size of auditing firm is an important for determining earning management. Sweeny [30] concluded that in strict auditing contexts the earning management will reduce. Prawitt *et al*. [5] have indicated that high quality of internal auditing lead to equilibrate earning management. However, Bauwhede and Willeekens [31] two Belgian researchers indicated that there is not a significant relationship between auditing size and auditing quality. One of the results of their research was that earning management in companies which are audited by Big Six Audit Firms would not be less than other firms. Odabashian [32] concluded that general increase of debts result in reduces opportunities' behavior and earnings management in companies with

free cash flows and low growth. Results of Jelinek [33] research also showed that changes and different level of leverage could have different impacts on earning management. Ebrahim [34] examined the relationship between earning management and activity of board of director and audit committee. Results indicated there is a negative relationship between earning management with independence of board of director and audit committee. His results also highlighted that the more active the audit committee will reduce earning management. Ming [35] found that the ten largest accounting firms in China are increasingly reducing earnings management. He also found that the smaller audit firms (compared to baseline) may signal lower earnings quality. Siregar and Utama [36] have concluded that family ownership have significant effect and type of adopted earning management. Firms with high ratio of family ownership and independence to business groups have more willingness to select efficient earning management than other firms. Jiraporn *et al*. [37] addressed that there is an inverse relationship between agency costs and earning management and firms which manage earning broadly (limited) are suffered lower (higher) agency costs. Siregar & Utama [36] concluded that the family ownership has a major impact on the type of earnings management. The firms, having a high proportion of family ownership and independent of commercial groups, have tendency to effective earning management more than other types of firms. Lo *et al*. [38] examine the relationship between board independence, dual role, financial expertise of audit committee and initial great shares with earnings management in a study. Iqbal & Strong [39] surveyed the effect of board size, independence, dual role, leverage, audit quality and major stake holders of the earnings management. Moradi *et al*. [40] in a study showed that when the flow of operative cash decreases, existence of non-board managers and changing in board members (or their agents) are the effective factors in decreasing the level of earnings management. Also by increasing the size of the company, management has greater incentive to increase profits in order to provide a better picture of his performance to holders and administrators. Although in the circumstances that audit company, the audit finance companies had done, there is not significant relationship between the size of company and the level of earnings management. Moradi *et al* [41] in a study surveyed the effective variables on earnings management in Tehran Stock Exchange between the years 81 and 87. Their test results proved negative correlation of coefficient performance and the positive correlation of gross profit to sales ratio, current ratio, changes in net income and firm size and earnings management. Supawadee Sukeecheep *et al* [42] in a study to these commonly employed factors, the present study also considers the influence of board interlocking on the earnings management practices in Thai firms between the years 2006 to 2010. Measure of earnings management, are estimated based on both the Modified Jones model and the Performance matched discretionary accruals model. Their result finds no impact on board size, board meetings and CEO-Chairman duality on the earnings management of top Thai listed firms. Soliman and Ragab [43] in a study surveyed the effective variables on earnings management in Evidence from Egypt between the years 2007 and 2010. This study examines the roles of independent members on the board, chief executive officer who also serves as a chairman of the company, board size on earnings management practices. The examination of the data shows that the ratio of independent board members is not significantly related to earnings management. Mojtahedi [44] The purpose of this study is to explore the relationship between Earning management and cost of equity capital in 150 Malaysian firms over the period 2000-2011. To determine cost of equity growth (Gordon) model has been used and adjusted model of Jones has been used to determine of earning management. Debt to equity ratio, firm size and return on equity were used as control variable. In general, findings from the empirical analysis indicate that the relationships between cost of equity and earning management was inverse but weak and all control variable have significant relation with cost of equity except return on equity. Khodaei Valahzaghard and Samadi [45] In this study, we present a study on relationship between tail risk on earning management in Iranian banking industry. In this survey, we use two series of data. The first set is associated with yearly information of 19 different banks over the period 2005-2011 and it contains 114 observations. The second set of data includes weekly historical data of eight banks over the same period 2005-2011. The result of this survey indicates that there is no relationship between tail risk and earning management. Hwang *et al*. [51] in this study empirically explores the relationship between corporate governance mechanisms and earnings management of the listed firms in China. It is also found that Tobin's Q and the debt ratio have a very significant positive effect on earnings management for all three groups of firms, while ROA plays a significant negative role on earnings management in China. The implications of our findings are

also discussed. Mehrazeen *et al*. [17] in this reaearch, the discovery of earnings management model is made by using the indexes of warning sings model by Genetic-Based Machine Learning Systems between the years 2001-2009. In this regard, prediction model is formulated based on the Pittsburgh approach as an optimized issue. Evaluation carried out in this study is based on model potentiality assessment in terms of dealing with two types of statistical inference errors known as alpha and beta. Company's observations lead to 13-bases model the importance of which is as follows: Operating accrual magnitude, Asset quality index, Reserve index, Accruals index, Inventory index and Sales Index.

In the financial sphere, researches have also been conducted that have used the ANN, which in this case can be referred to the below investigation.

Chiang *et al*. [46] used one error propagation network to predict the net cost of assets of investment companies. They compared network data and their work results with the results of traditional econometric techniques and found that if data are low, neural networks will significantly be better than regression techniques. Eakins & Stansell [47] also tested the hypothesis in your research that can you present a model by using the neural network that by regarding other rates could predict stocks return and by getting the expected return on the portfolio, whether the portfolio performance better than any other method or not? They could estimate stock returns by using neural networks, but concluded that the portfolio risk of this estimation is more than other methods in predicting risk. Chun & Kim [48] predict the rate of return and portfolio choice by using different models of data mining and particularly neural networks. Koh [49] examined the continuous activity of firms by using the technique of ANN, decision trees and regression. Chen *et al*. [50] predict fraud by using artificial neural networks and showed that ANN has high accuracy in detecting fraud. Tsai & Chiou [51] predict level of earnings management by using ANN and decision trees. The sample includes firms in the Taiwan Stock Exchange was between years 2002 and 2005 and to estimate earnings management used the modified Jones model. They presented ANN model with 81% accuracy and the number of decision rules using the decision tree.

Research Methodology: This research has been conducted on companies listed in the Stock Exchange between years 2004 and 2010 that have the following conditions:

- Comapny should be listed on Tehran Stock Exchange from the beginning of financial year of 2003.
- Sample companies would not be among financial (banks) and investment companies.
- Sample companies have not been stopped during 2003 to 2010 permanently.
- Sample companies have not been changed their financial year during 2003 to 2010.

In this study, in order to collect data, directly use financial statements of companies, attached notes and stock trading reporting and also use databases as well as exchange database and Tadbirpardaz and Rahavardnovin software. Initial processing of the data was performed by using excel and SPSS and Clementine SPSS statistical software was used for analysis.

Research Variables: In order to subscribe dependent variable, use the sharing of Jones models, modified Jones and Eckell and the results were considered as the dependent variable. If a company is managing its earnings, zero have been assigned otherwise one.

Independent variables in this research are as follow:

- Current ratio: It is dividing current assets on current debts.
- Total debt to equity ratio: divide total debt on equity.
- Financial leverage: dividing long-term debts on total equity and long- term debts.
- Firm size: natural logarithm of total assets.
- Political costs: natural logarithm of number of employee.
- Ratio of firm performance: Dividing average operating cash flows on total assets.
- Changes in net income: dividing difference of current period net income and previous period net income on previous total assets.
- Ratio of gross income to sale: dividing gross income on sale.
- Percentage of ownership at largest shareholder.
- Number at main shareholders: number at shareholders with ownership more than 5%.
- Percentage of owner ship at main shareholders.
- Type of ownership: if the ownership is government its value is zero and otherwise it is one.
- Auditor change: if it change it take one value and otherwise it is zero.

- Type of auditor: if the audit is to be zero, otherwise 1
- Tax.
- Discretionary accruals during the pre (It is assumed that prior period accruals in the current period has an adverse effect on earnings management)
- Industry: Industry will be considered as a dummy variable. Number of industries examined in this study due to the limitations of the regression (there are at least 8 companies in each industry), 14 the industry.

As we mentioned multilayer perceptron neural networks with error back propagation learning algorithm requires favorable output, so the network in training level can compare its output whit that and reform itself. Therefore, in this study companies that do earnings management should be separated from other companies. But because identify companies. But because it's no easy to determine the companies that do earnings management, to detect the output of model from sharing common models in earnings management fields have been used.

Before fitting modified Jones model and Jones should be calculated all accruals. All accruals can calculate by using the balance sheet approach and an income approach. The income approach is used in this research are as following:

$$TA_{it} = EARN_{it} - CFO_{it}$$

Ta_t = Total accruals
$EARN_t$ = Income before extra ordinary items.
CFO_t = Operating cash flow (cash flows from operational activities).

Then Jones models and Jones, moderated by discretionary accruals and the fitted regression non-discretionary accruals following is obtained:

Jones Model:

$$NDA_{it} = \alpha_{it1}\left(1/A_{it-1}\right) + \alpha_{it2}\left(\Delta REV_{it}/A_{it-1}\right) + \alpha_{it3}\left(PPE_{it}/A_{it-1}\right)$$

In this model:

NDA_{tt} = Non-discretionary accruals in year t,
ΔREV_{tt} = *Change* in annual income (the difference between the income of any year of income beginning of the year)
PPE_{tt} = Gross property, plant and equipment in year t
A_{t-1} = Total assets at year t-1,

Parameters $\alpha_1,\alpha_2,\alpha_3$ estimation period is estimated using the following model:

$$TA_{it}/A_{it-1} = \alpha_{it1}\left(1/A_{it-1}\right) + \alpha_{it2}\left(\Delta REV_{it}/A_{it-1}\right) + \alpha_{it3}\left(PPE_{it}/A_{it-1}\right) + \varepsilon_{it}$$

The above equation shows the estimated parameters of $\alpha_1,\alpha_2,\alpha_3$ by using method of least squares and TA_t is total accruals in year t which is measured on the basis of total assets in year t-1.
Finally, discretionary accruals based on Jones model, is calculated as following:

$$DA_t = \left(\frac{TA_t}{A_{t-1}}\right) - NDA_t$$

Modified Jones Model:

$$TA_{ijt}/A_{ijt-1} = \alpha_{it1}\left(1/A_{ijt-1}\right) + \alpha_{it2}\left(\left(\Delta REV_{ijt} - \Delta REC_{ijt}\right)/A_{ijt-1}\right) + \alpha_{it3}\left(PPE_{ijt}/A_{ijt-1}\right) + \varepsilon_{it}$$

ΔREC_{ijt} = Change in accounts receivable (difference between the accounts receivable accounts receivable at the beginning of the end of each year, the same year)
$\alpha_1, \alpha_2, \alpha_3$ = Model coefficients
ε_t = Error Model
i = Industry
j = Sample of firms in industry I

The discretionary accruals obtained from the following equation to do:

$$DA_t = \left(\frac{TA_t}{A_{t\text{-}1}}\right) - NDA_t$$

Eckell Model: In this model is used the coefficient of CV or coefficient of dispersion, an relative indicator of the dispersion, is achieved from divide an index called the standard deviation on a central index called average. Eckell theoretical model defines smoothing Institute several as a unit that several accounting variables are used in such a way that the resultant accounting effects minimize earnings volatility. According to this model, a company is known as smoothing that the scattering coefficient of profit variation on the scattering coefficient of a sale period is smaller than one.

Namely:

$$CV\Delta I \big/ CV\Delta S \leq 1$$

where:

ΔI = Benefit changes

ΔS = Change Sales

It is necessary to mention that Eckell index is not able to identify all the companies that are trying to smooth earnings. In other words, if the companies succeed to smooth earnings, partly succeed or completely fail, classified based on these criteria as non-income smooth. However, this characteristic of the conservative view is positive because enterprises that are classified on this basis are smooth with high confidence.

Research Findings: Providing a model for predicting earnings management in companies listed on the Stock Exchange of Tehran is the primary objective of the present study. The research question was whether we can provide a model by using the linear SVM that be useful in making investment decisions or not? whether we can provide a model by using the linear SVM for predicting earnings management?

Linear SVM with a linear interface can distinguish between the unknown and known values or between the values 1 and 0: Those that are placed in the category will be 1 and those that are not placed in the category will be 0. We have a similar system by using neural network. However, the dividing line in this model is more accurate and more obvious.

Linear SVM model considers values as input factor for each set of variables that coefficients are defined as neural network in our previous research in order to the available information and the ease so that addition to predicting by using of previous linear support vector machine model, two above models are compared with each other.

Rank	Input variables	Importance	Rank	Input variables	Importance
1	Industry	0.0754	10	Total debt to equity ratio	0.0024
2	Prior accruals	0.0077	11	Tax	0.0036
3	Number of Shareholders	0.0222	12	Percentage ownership of the largest shareholder	0.0229
4	Changes in net profits	0.1093	13	Financial Leverage	0.0124
5	Number of Employees	0.0252	14	Total shares of major shareholders	0.0251
6	Type of auditor	0.011	15	Ratio of firm performance	0.3651
7	Ratio of gros income to sale	0.1108	16	Change of auditor	0.0083
8	Firm size	0.0347	17	Type of Ownership	0.0197
9	Current ratio	0.1443			

Linear SVM to perform its procedure requires values to compare its values with them. Proximity and distance values to the available values illustrate our desired result.

According to the research aims to provide a model for predicting earnings management in companies in the Tehran Stock Exchange and also the fact that special conditions of each year on accruals is not ignored, we started to anticipate your requirements by using the linear model using SVM that its results with its comparison with neuronal networks have showed in the following table.

Predicting the outcome of research (%)	Existing models
93.8	The four-layer perceptron neural network with two hidden layer
63.2	Three-layer Perceptron neural network with one hidden layer
94.4	Linear Support Vector Mashine

CONCLUSION

In this research, set of variables including current ratio, the ratio of total debt to equity, financial leverage, company size, political spending, the coefficient of performance of the company, changes in net profit, gross profit to sales ratio, the percentage of ownership of the largest shareholder, numbers of holders of shares, the percentage of stock ownership holders, type of ownership, type of auditor, auditor change, tax, discretionary accruals of previous term and industry (control variable) were used to predict earnings management and it is tried to present a model by using the technique of SVM that is able to predict earnings management in companies listed in Tehran Stock Exchange. Therefore, providing a model for predicting earnings management by using artificial neural networks is the aim of the present study. The proposed research model has 94/4% accuracy. Researchers have believed this model can help to better decision making of investors on capital market and auditors to identify companies that manage earnings by using discretionary accruals.

In this study has been some limitations. Including:

- Except the studied variables, there may be other variables that help to improve the proposed models.
- Financial institutions and credit are deleted from research that if these not remove, research will probably change.
- There are some political and economic conditions, no possibility to check them, have not considered and the results should be generalized.

Suggestions for future research are presented as following:

- Use other techniques such as genetic and support vector machines to survey earnings management and the results will be compared with the results of the proposed model of study.
- Performance of different proposed models will be evaluated on earnings management estimating or discovering in companies of Tehran Stock Exchange.

REFERENCES

1. Healy, P.M. and J.M. Wahlen, 1999. A review of the earnings management literature and its implications for standard setting. Accounting Horizons, 13(4): 365-363.
2. Cornett, M.M., A.J. Marcus and H. Tehranian, 2008. Corporate governance and pay-for-performance: The impact of earnings management. Journal of Financial Economics, 87: 357-373.
3. Fayyad, U. and R. Uthwrsusamy, 1996. Data Mining and Knowledge Discovery in Databases, Communication of ACM.
4. Degeorge, F., J. Patel and R. Zeckhauser, 1999. Earnings Management to Exceed Thresholds, Journal of Business, 72(1): 1-33.
5. Prawitt, D.F., J. Smith and D.A. Wood, 2009. Internal audit quality and earnings management. The accounting review, 84(4): 1255-1280.
6. Hand, J., 1989. Did firms undertake debt-equity swaps for an accounting paper profit or true financial gain? The Accounting Review, 64: 587-623.
7. Healy, P.M., 1985. The effect of bonus schemes on accounting decisions. Journal of Accounting and Economics, 7: 85-107.
8. Eckel, N., 1981. The income smoothing Hypothesis Revisited, Abacus, 17: 28-40.
9. Dechow, P.M., R. Sloan and A. Sweeney, 1996. Cause and consequences of earnings manipulation: An analysis of firms subject to enforcement actions by the SEC, Contemporary Accounting Research, 13: 1-36.
10. DeAngelo, L., 1986. Accounting numbers as market valuation substitutes: A study of management buyouts of public stockholders. The Accounting Review, 61: 400-420.
11. Jones, J.J., 1991. Earnings management during import relief investigations. Journal of Accounting Research, 29: 193-228.
12. Bartov, E., F.A. Gul and J. Tsui, 2000. Discretionary-accruals models and audit qualifications. Journal of Accounting and Economics, 30: 421-452.
13. Chang, W.J., L.T. Chou and H.W. Lin, 2003. Consecutive changes in insider holdings and earnings management. The International Journal of Accounting Studies, 37: 53-83.

14. Dechow, P., R. Sloan and A. Sweeney, 1995. Detecting earnings management. The Accounting Review, 70(2): 193-225.
15. Dechow, P.M. and R.G. Sloanb, 1991. Executive incentives and the horizon problem: an empirical investigation. Journal of Accounting and Economics, 14: 51-89.
16. Moses, D.O., 1987. Income smoothing and incentives: Empirical using accounting changes. The Accounting Review, 2: 259-377.
17. Mehrazeen, A., P. Rezaie Pazhand and H. Rezaie pazhand, 2013. Discovery of Earnings Management by Using Machine Learning System Based on Genetic Algorithm: Iranian Evidence, 10: 1529-1537.
18. Michaelson, S.E., J.W. James and W. Charles, 1995. A market based analysis of income smoothing. Journal of Business Finance and Accounting, 8(4): 1179-1195.
19. Albrecth, W.D. and F.M. Richardson, 1990. Income smoothing by economy sector. Journal of Business Finance and Accounting, 17(5): 713-730.
20. Lee, B.B. and B. Choi, 2002. Company size, auditor type and earnings management. Journal of Forensic Accounting, 3: 27-50.
21. Ashari, N., H.C. Koh, S.N. Tan and W.H. Wong, 1994. Factors Affecting Income Smoothing Among Listed Companies in Singapore. Journal of Accounting and Business Research, 24(96): 291-301.
22. Steveny, M. and A. vanstraelen, 2006. Earning management withen Europe: The effect of member state audit environment audit firm quality and international capital market. Accounting and Business Research, 36(1): 33-52.
23. Peasnell, K.V., P.F. Pope and S. Young, 2000. Board monitoring and earnings management: Do outside directors influence abnormal accruals? Working paper, Lancaster University.
24. Chtourou, S.M., J. Bedard and L. Courteau, 2001. Corporate governance and earnings management. Unpublished Working Paper.
25. Becker, C.L., Defond, J. Jiambalvo and K.R. Subramanyam, 1998. The Effect of audit quality on earning management. Contemporary Accounting Research, 15(1): 1-24.
26. Francis, J.R., E.L. Maydew and H. C. Spark, 1999. The role of Big 6 auditors in the credible reporting of accruals. Auditing: A Journal of Practice and Theory, 18: 17-34.
27. Krishnan, G., 2003. Audit quality and the pricing of discretionary accrual. Auditing, 22: 109-126.
28. Xie, B., W.N. Davidson and P.J. DaDalt, 2003. Earnings management and corporate governance: the role of the board and the audit committee, Journal of Corporate Finance, 9: 295-316.
29. Dang, L., 2004. Assessing Actual Audit Quality, Drexwl University.
30. Sweeney, A.P., 1994. Debt covenant violations and managers' accounting response. Journal of Accounting and Economics, 17: 281-308.
31. Bauwhede H.V. and M. Willeekens, 2004. Evidence on (the lack of) Audit Quality Differentiation in the private client segment of the Belgian audit Market Europea. Accountng Review, 13: 501-522.
32. Odabashian, K., 2005. The effect of large leverage increases on opportunistic behavior and earnings management, University of Connecticut.
33. Jelinek, K., 2007. The effect of Leverage Increases on Earnings management. Journal of Business and economic studies, 13(2): 24-46.
34. Ebrahim, A., 2007. Earnings Management and Board Activity: An Additional Evidence. Review of Accounting and Finance, 6(1): 42-58.
35. Ming, L., 2007. Corporate Governance, Auditor Choice and Auditor Switch Evidence from China A hesis submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, Hong Kong Baptist University.
36. Siregar, S.V. and S. Utama, 2008. Type of earnings management and the effect of ownership structure, firm size and corporate-governance practices: Evidence from Indonesia. The International Journal of Accounting, 43: 1-27.
37. Jiraporn, P., G.A. Miller, S.S. Yoon and Y.S. Kim, 2008. Is earnings management opportunistic or beneficial? An agency theory perspective. International Review of Financial Analysis, 17: 622-634.
38. Lo, W.Y.A., M.K.R. Wong and M. Firth, 2009. Can corporate governance deter management from manipulating earnings? Evidence from related-party sales transactions in China, Journal of Corporate Finance, 11: 1-11.
39. Iqbal, A. and N. Strong, 2010. The effect of corporate governance on earnings management around UK rights. International Journal of Managerial Finance, 6(3): 168-189.
40. Moradi, M., M. Salehi, S.J. Habibzadeh Bighi and M. Najari, 2012. A Study of Relationship between Board Characteristics and Earning Management: Iranian Scenario, Universal Journal of Management and Social Sciences, 2(3): 12-29.

41. Moradi, M., M. Salehi and M. Najari, 2012. A Study of the Effective Variables on Earning Management: Iranian Evidence. Research Journal of Applied Sciences, Engineering and Technology.
42. Sukeecheep, S., S.R. Yarram and O. Al Farooq, 2013. Earnings management and board characteristics in Thai Listed Companies. Journal of International Conference on Business, Economics and Accounting.
43. Soliman, M.M. and A.A. Ragab, 2013. Board of director's attributes and earning management: Evidence from Egypt. Journal of International Business and Social Sciences Research Conference, pp: 6.
44. Mojtahedi, P., 2013. The relationship between Earning Management and Cost of Equity. Technical Journal of Engineering and Applied Sciences, 3: 375-379.
45. Khodaei Valahzaghard, M. and A. Samadi, 2013. A study on relationship between tail risk on earning management in Iranian Banking Industry, 3: 705-714.
46. Chiang, W.C., T.L. Urban and G.W. Baldridge, 1996. A neural network approach to mutual fund net asset value forecasting. Omega, Int. J. mgmt Sci., 24(2): 205-215.
47. Eakins, S.G. and S.R. Stansell, 2003. Can value-based stock selection criteria yield superior risk-adjusted returns: an application of neural networks. International Review of Financial Analysis, 12: 83-97.
48. Chun, S.K. and S.H. Kim, 2004. Data mining for financial prediction and trading: application to single and multiple markets. Expert Systems with Applications, 26: 131-139.
49. Koh, H., 2004. Going concern prediction using data mining techniques. Managerial Auditing Journal, 19(3): 462-476.
50. Chen, Hsueh-Ju. A., B. Shaio-Yan Huang and Kuo. Chung-Long, 2009. Using the artificial neural network to predict fraud litigation:Some empirical evidence from emerging markets. Expert Systems with Applications, 36: 1478-1484.
51. Tsai, C.F. and Y.J. chiou, 2009. Earning mangement prediction: A pilot study of combining neural networks and decision trees. Expert systems, with Applications, 36: 7183-7191.