Philippine Stock Market Technical Analysis Modeling System

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# I. ABSTRACT

UPDATED—6 November 2015. In the Philippines, finding reliable technical indicator is a challenge for most stock investors given the big number of existing technical indicators. Possibility of bankruptcy would increase if investors will continue on guessing the indicator that will give them the right prediction. New technical analysis software program continue to emerge. This software comes with dozens of built in indicators, and even allow users to build their own. Our proposed work is to apply five technical analysis indicators (Momentum, Accumulation/ Distribution Line, Moving Average Convergence Divergence (MACD), Stochastics, On-Balance Volume) on gathered past stock market data from 2000 up to 2014 in order to identify the best indicator. Through this, investors can have higher probability of getting the right prediction on their investments. This proposed work can be tested by investing in a stock using the result technical analysis indicator. This should be observed for at least one month to see if the technical analysis indicator is indeed effective.

**II. Introduction**

Stock market, basically known as stock exchange, is a market in which distributing and trading of companies’ shares occurs through exchanging on a particular place or communicating over telephone, email and some exclusive electronic trading systems[3]. In recent times, as reported on Philippine Daily Inquirer News, declining of Philippine stocks continue [2]. It was stated that the Philippine Stock Exchange Index was down 0.14 percent on September 24, 2015[2]. It is a situation that is affecting the condition of the country together with the lives of the countrymen. In addition to this, finding a reliable technical indicator is a challenge for most stock investors given the big number of existing technical indicators which leads them to guessing the indicator that will give them the right prediction.

This study will be conducted for the investors and traders to have higher probability of getting the right prediction on their investments in the Philippines. Through having the knowledge of the most reliable technical indicator on analyzing trend on Philippine stock, these practitioners will be guided on deciding when to buy or sell Philippine stocks. This is a powerful tool for handling Philippine stocks.

The study primarily aims to provide an analysis of the common trend that can be observed on Philippine stock market history through a technical approach. This can be achieved by identifying the most effective technical indicator nowadays that will be a tool for forecasting the appropriate time for buying and selling stocks in Philippines. A web-based system will be created which will serve as a mathematical model for manipulating the gathered past data of stock prices and volumes of Philippine stock market from year 2000 up to 2014. This model will provide an interpretation of the trend on Philippine stock which includes the buy and sell signals based on the provided pattern of a particular technical indicator. This study will improve the skill of ICS Community on interpreting real-world set of data. It will also help them to have a better strategy on making decisions specifically on business analytics.

**III. Review of Related Literature**

In recent years, different approaches were directed for predicting stock trend.

There are researches regarding Artificial Neural Networks (ANN) which displays its ability to recognize patterns and to solve problems which involve learning from the previous data it classified. With these capabilities, it is considered as an effective solution for distinguishing future new patterns on stock market. In 2010, based on an international conference[8] , neural networks have a great capacity of predicting new patterns even if it was not observed on the recent data. Though it was proven that simple linear regression has the highest capacity in terms of predicting the direction of changes of stock market trend, Elman network reach its capability to detect error on recognizing changes on values and MLP has the most accurate values of changes compared to the two methods (Naeini, Taemian, & Hashemi, 2010).

Another technique conducted for stock market prediction is the finite state machine called Hidden Markov Model (HMM) [5]. The researchers include four inputs for the model: closing price, opening price, low price and high price. With these variables, the model predicts the next day’s closing price for a specific stock market share. It focuses on constructing framework for the probability of occurrence of the observation sequence and interprets broadly the observed data which greatly help on finding future patterns. This method was concluded to have a strong foundation on statistics but still it was on the process on improving its accuracy for recognizing new patterns on stock trend (Hassan & Baikunth, 2005).

In 2013, another new process called Kappa Measure was introduced on an international conference [4]. Aside from being a tool for evaluating the accuracy of the forecasted trend for a specific stock market, the system serves as a test for predictors since its input data involves searching for the share’s worth in which all of the predictors agree (Gupta, Nidhi, & Sanjay, 2013).

Recently, Foreign exchange (FX), a financial product, was generated and many FX companies were established. An increase in the number of investors was noted due to the spread of transactions on the Internet. However, difficulty in gaining profits by FX has been observed. Due to this problem, on a study conducted by Kato et al.(2010), technical analysis was applied for identifying trend on foreign exchange [7]. A gain in efficient transaction strategy was proposed by using Genetic Algorithm (GA) that consider price trend. The researchers considered starting transactions around the beginning of the trend that would earn much benefit. Technical indicators were used in the study to gain the technical transaction strategy. The researchers supported GA strategy by Exponential Moving Average lines (EMA) indicator which was noted by Tanaka et al.(2007) [10] and Jiang et al. (2003) [6] on their studies as an effective indicator for trend prediction as it puts higher weight on more recent date’s price [7].

In 2014, efficiency of technical analysis and predictive modeling was explored by Stankovic et al. in reaching the optimal strategy for investing stocks of emerging markets [9]. Technical strategies are set for different technical indicators based on moving averages and volatility of the value and returns on stock indices. Basic trading rules were implemented in the study using two moving averages: a long period and a short period moving average, and Moving Average Convergence-Divergence (MACD) and relative Strength Index (RSI). Features used in defining predictive model based on Least Squares Support Vector Machines (LS-SVMs) are preselected technical indicators. The LS-SVM classifier was used to predict trend of the stock indices’ value. The acquired outputs of the LS-SVM model are binary signals that can be used for defining the trading strategy. Through the model used in the study, EMA and MACD were accepted as indicators for the trend on emerging markets [9].

As mentioned on the earlier section, this study will adopt the use of technical indicators with modeling system. Technical indicators function as a key on it. On the other hand, scope of this study, technical indicators to be tested and modeling system to be used are the factors that set it apart from the others. It will focus on developing a modeling system for Philippine stock market using technical analysis.

**IV. Methodology**

For this study, the advanced knowledge on Philippine stock market movement will be managed through a modeling system. The information regarding the Philippine stock market from year 2000 to 2014 will be acquired from Philippine Stock Exchange Inc. This time-series data including stock volume and stock price will function as input of the model. Array structure will be used as the storing agent for the given inputs. A total of two arrays with the same length will be constructed for organizing data. First array will be consisting of values such as the price and volume while the second array will be made for storing the time data. It should be noted that each data will be sorted in order to correspond the numerical values on the first array with the time data on the second array. In this way, it will be easier to fetch the stock price and stock volume used on a specific time. This kind of structure will also be an advantage for the performance of the system since array structures are considered as cache-friendly.

In terms of analyzing the model inputs, a method called technical analysis will be implemented for predicting the graph of Philippine stock market movement. The crowd behavior is the foundation of technical analysis where the perception of technician centers on similarity of the occurrence of events (Burch, 2011). Though some people view this as a weak method, on the study conducted by Wong et al. (2010), concrete evidences was provided regarding the reliability of using technical indicators as tools on forecasting the right time for practitioners to buy or sell stocks. Aside from the test statistics prepared with some technical indicators which prove the effectiveness of this analysis on a specific stock market, its significance was also proven by old researchers [11]. It was noted by Frankel and Froot (1990a) that technical analysis was used by most market professionals in predicting the market. Moreover, according to the survey done by Euro money, a shift from fundamental analysis into technical analysis was held during 1980s [11].

The model for analyzing Philippine stock market through technical analysis will be developed on a web-based system with real-time and responsive environment. This will receive array of stock prices and volumes which will be analyzed based on a pattern given for a specific technical indicator. For this study, five powerful indicators will be considered such as:

1. MomentumIt is the ratio of the following two averages: short term and long term. It finds the price levels and measures the velocity of price change.
2. Accumulation/Distribution Line - It tracks the amount of money that flows in and out of stock through weighted sum of price and volume.
3. Moving Average Convergence Divergence (MACD) - It is similar to momentum which compares two moving averages but instead of dividing them, their difference is being computed.
4. Stochastics - It is based on the day’s closing price position.
5. On-Balance Volume - It measures the positive and negative flow of volume.

After analyzing data, the model will generate the numerical values of stock indices which measure the changes in the market value together with the buy and sell signals for that specific time.

**V. Evaluation**

To prove the accuracy and stability of the model output, five willing stock investors will be chosen to try the web application. The technical indicator output of the model will be used by one of the participants while the remaining participants will be given a chance to choose from the four technical indicators in the application. The company that was tested by the five indicators will also be the company that the participants will invest in. Present stock value owned by the participant will be noted for future reference.

In a span of at least a month, the investors will try to invest in the chosen company using the indicators assigned to them. After the time lapsed, current stock value will be noted to see the difference from their stocks before they used each of the indicators. Percentage of gained stocks of each of the investors will be compared. The technical indicator output of the application can be concluded as the best indicator for the company if the investor assigned to the said indicator gained the largest increase in the stocks.

% Gained = Present stocks – Past stocks x 100

Present stocks

**VI. Timeline**

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| **Date** | **Activity** |
| Second Week of January | Acquiring data of Philippine Stock Exchange(2000-2014) |
| Third Week of January | Sorting the collected information on Philippine Stock Exchange |
| Fourth Week of January | Creating an algorithm for developing the modeling system |
| February | Implementation of back-end of web application with a temporary front-end which includes the graphical user interface |
| First - Second Week of March | Test and debugging of the developed web application for modeling system |
| Third Week of March – Second Week of April | System Evaluation |

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