SYSTEMS AND METHODS FOR GENERATING AND SELECTING TRADING ALGORITHMS FOR BIG DATA TRADING IN FINANCIAL MARKETS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims the benefit and priority of U.S. Provisional Application Serial No. 61/949,938 filed on March 7, 2014, titled "Systems and Methods for Big Data Trading in Financial Markets," which is hereby incorporated by reference.

[0002] The present application is related to U.S. Non Provisional Application Serial. No. 14/642,577 filed on March 9, 2015, titled "Systems and Methods for Allocating Capital to Trading Strategies for Big Data Trading in Financial Markets," which is hereby incorporated by reference.

FIELD OF THE TECHNOLOGY

[0003] The embodiments disclosed herein are related to systems and methods for using big data analysis for trading in financial markets.

SUMMARY

[0004] Provided herein are various exemplary systems and methods for generating and selecting trading algorithms, including randomly selecting a technical indicator, randomly selecting an evaluation interval, randomly selecting a first tradable item, randomly selecting a first evaluation bar characteristic, calculating a past value of the technical indicator for the tradable item utilizing a product of the first evaluation bar characteristic times the evaluation interval, calculating a present value of the technical indicator for the tradable item upon an occurrence of the first evaluation bar characteristic, making a decision based upon a relationship between past and present values at each occurrence of the first evaluation bar characteristic for a predetermined period of time going forward, determining a predetermined historical period of time, calculating a past value of the technical indicator for the tradable item utilizing a product of the first evaluation bar characteristic times the evaluation interval for the predetermined historical period of time, calculating a present value of the technical indicator for the tradable item upon an occurrence of the first evaluation bar characteristic during the predetermined historical period of time, making a decision based upon a relationship between past and present values at each occurrence of the first evaluation bar characteristic for the predetermined historical period of time, determining a first performance metric and a threshold criteria of success with respect to the first performance metric, if the threshold criteria of success is satisfied, selecting a second evaluation bar characteristic, calculating a past value of the technical indicator for the tradable item utilizing a product of the second evaluation bar characteristic times the evaluation interval, calculating a present value of the technical indicator for the tradable item upon an occurrence of the second evaluation bar characteristic, making a decision based upon a relationship between past and present values at each occurrence of the second evaluation bar characteristic for a

predetermined period of time going forward, determining a predetermined historical period of time, calculating a past value of the technical indicator for the tradable item utilizing a product of the second evaluation bar characteristic times the evaluation interval for the predetermined historical period of time, calculating a present value of the technical indicator for the tradable item upon an occurrence of the second evaluation bar characteristic during the predetermined historical period of time, selecting a second tradable item, selecting a third evaluation bar characteristic, calculating a past value of the technical indicator for the second tradable item utilizing a product of the third evaluation bar characteristic times the evaluation interval, calculating a present value of the technical indicator for the second tradable item upon an occurrence of the third evaluation bar characteristic, making a decision based upon a relationship between past and present values at each occurrence of the third evaluation bar characteristic for a predetermined period of time going forward, determining a predetermined historical period of time, calculating a past value of the technical indicator for the second tradable item utilizing a product of the third evaluation bar characteristic times the evaluation interval for the predetermined historical period of time, calculating a present value of the technical indicator for the tradable item upon an occurrence of the third evaluation bar characteristic during the predetermined historical period of time, determining a second performance metric, ranking performance of the technical indicator relative to other similarly ranked algorithms, and selecting the algorithms achieving a predetermined threshold with respect to the second performance metric.

[0005] Further exemplary systems and methods include randomly selecting a plurality of technical indicators, randomly selecting a plurality of evaluation intervals, randomly selecting a plurality of tradable items, randomly selecting a plurality of evaluation bar characteristics, calculating a past value of each of the plurality of technical indicators for the tradable item utilizing a product of the first

evaluation bar characteristic times the evaluation interval, calculating a present value of each of the plurality of technical indicators for the tradable item upon an occurrence of the first evaluation bar characteristic, making a decision based upon a relationship between past and present values at each occurrence of the first evaluation bar characteristic for a predetermined period of time going forward, determining a predetermined historical period of time, calculating a past value of each of the plurality of technical indicators for the tradable item utilizing a product of the first evaluation bar characteristic times the evaluation interval for the predetermined historical period of time, calculating a present value of each of the plurality of technical indicators for the tradable item upon an occurrence of the first evaluation bar characteristic during the predetermined historical period of time, making a decision based upon a relationship between past and present values at each occurrence of the first evaluation bar characteristic for the predetermined historical period of time, determining a first performance metric and a threshold criteria of success with respect to the first performance metric, determining if the threshold criteria of success is satisfied, and if it is, selecting a second evaluation bar characteristic, calculating a past value of each of the plurality of technical indicators for the tradable item utilizing a product of the second evaluation bar characteristic times the evaluation interval, calculating a present value of each of the plurality of technical indicators for the tradable item upon an occurrence of the second evaluation bar characteristic, making a decision based upon a relationship between past and present values at each occurrence of the second evaluation bar characteristic for a predetermined period of time going forward, determining a predetermined historical period of time, calculating a past value of each of the plurality of technical indicators for the tradable item utilizing a product of the second evaluation bar characteristic times the evaluation interval for the predetermined historical period of time, calculating a present value of each of the

plurality of technical indicators for the tradable item upon an occurrence of the second evaluation bar characteristic during the predetermined historical period of time, selecting a second tradable item, selecting a third evaluation bar characteristic, calculating a past value of each of the plurality of technical indicators for the second tradable item utilizing a product of the third evaluation bar characteristic times the evaluation interval, calculating a present value of each of the plurality of technical indicators for the second tradable item upon an occurrence of the third evaluation bar characteristic, making a decision based upon a relationship between past and present values at each occurrence of the third evaluation bar characteristic for a predetermined period of time going forward, determining a predetermined historical period of time, calculating a past value of each of the plurality of technical indicators for the second tradable item utilizing a product of the third evaluation bar characteristic times the evaluation interval for the predetermined historical period of time, calculating a present value of each of the plurality of technical indicators for the tradable item upon an occurrence of the third evaluation bar characteristic during the predetermined historical period of time, determining a second performance metric, ranking performance of each of the plurality of technical indicators, and selecting the technical indicators achieving a predetermined threshold with respect to the second performance metric.

[0006] According to some exemplary systems and methods, the technical indicator indicates whether to buy or sell the tradable item based on activity, the activity is any of price activity, volume activity, time activity, market activity, economic activity, or weather activity, the tradable item is any of: an index, a stock, a bond, a commodity, a sports score, an article of real estate, or another asset, the first performance metric is minimum performance criteria, the plurality of technical indicators comprises at least one hundred technical indicators, the plurality of evaluation intervals comprises at least one hundred evaluation intervals, the

plurality of tradable items comprises at least one hundred tradable items, the plurality of evaluation bar characteristics comprises at least one hundred evaluation bar characteristics, randomly selecting at least one hundred technical indicators, each technical indicator associated with a randomly selected evaluation interval that is further associated with a randomly selected evaluation bar characteristic, and the decision is any of buy, sell, sell short, and buy to cover.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIGS. 1A-1D are flowcharts of an exemplary method for generating and selecting trading algorithms.

[0008] FIG. 2 shows an exemplary system architecture for generating and selecting trading algorithms.

[0009] FIG. 3 is another flowchart of an exemplary method for generating and selecting trading algorithms.

[0010] FIG. 4 shows an exemplary interactive graphical user interface for directing operation of the master cloud server.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0011] FIGS. 1A-1D are flowcharts of an exemplary method 100 for generating and selecting trading algorithms.

[0012] At step 101, a technical indicator, evaluation interval, first tradable item and first evaluation bar characteristic are selected. The methods of selection may vary from random selection of one or more of the above elements to the use of other models for making the selection. Selection methodologies may include, but are not limited to, human design, fuzzy logic, artificial neural networks, evolutionary algorithms, genetic algorithms, machine-learning, etc. In some instances, step 101 is a fully automated process.

[0013] A bar is comprised of an opening price, a closing price, intervening prices, volume and trading activity across a period of time for a tradable item. For example, the price of gold may open at $800 per ounce on an exchange at 9:00 AM and close at $900 per ounce on the same exchange at 5:00 PM. This may represent one bar.

[0014] A technical indicator at the most basic level is a series of data points that are derived by applying a formula to price data of a tradable item. Technical indicators provide a unique perspective on the strength and direction of the underlying price action of the tradable item. Exemplary technical indicators include, but not by way of limitation, Relative Strength Index ("RSI"), Average Directional Index, Stochastics, Money Flow Index, Moving Average Convergence-Divergence, Bollinger Bands®, etc.

[0015] An evaluation interval is the number of bars to evaluate if a condition is true. For example, with respect to RSI, if the evaluation interval is fifty-five bars, the method includes determining whether the RSI is true during the last fifty-five bars.

[0016] An evaluation bar characteristic may include a time period to evaluate if a condition is true. For instance, a 31 minute evaluation period may represent an evaluation bar characteristic. With respect to the RSI example (above), the method may include evaluating whether the Relative Strength Index is true over the previous fifty-five 31 minute evaluation bars.

[0017] Evaluation bar characteristics may be based on Time, Tick, Volume, or Market-Activity. For example, Time (e.g., second, minute, hour, day, month etc.), and/or Tick (trades at the exchange, e.g., X number of trades) and/or Volume (e.g., one, ten, two-hundred, one-thousand etc. contracts), and/or Market-Activity (e.g., 0.5%, 1%, 1.5%, 2% etc. market move).

[0018] Tradable items may include any item that is traded. For example, the futures market for Gold may be selected for generating trading algorithms. Tradable items may include any electronically traded market including: Futures (e.g., S&P, Euro, Gold, Crude, Cotton, Soybeans, 10-yr notes, Lean Hogs, etc.), Stocks (e.g., PG, GE, AAPL, GOOG, FB, etc.), Bonds (e.g., US Gov. Bonds, Eurodollar, etc.), and Forex (e.g., EURUSD euro to the dollar, etc.).

[0019] With respect to step 101, as an example, the Relative Strength Index ("RSI") may be selected as a technical indicator. 55 evaluation intervals may be selected. The price of gold may be selected as the first tradable item. Every 31 minutes may be selected as the first evaluation bar characteristic.

[0020] At step 102, a past value of the technical indicator for the tradable item is calculated utilizing a product of the first evaluation bar characteristic times the evaluation interval. For example, applying the data from step 101, a past value for the RSI for gold is calculated every 31 minutes for the past fifty-five 31 minute evaluation intervals (1705 past values of the RSI are generated).

[0021] At step 103, a present value of the technical indicator for the tradable item is calculated upon an occurrence of the first evaluation bar characteristic. For

example, applying the data from step 101, a present value for the RSI is calculated every 31 minutes going forward.

[0022] At step 104, a decision is made based upon a relationship between the past and present values of the technical indicator at each occurrence of the first evaluation bar characteristic for a predetermined period of time going forward. For example, applying the data from step 101, for a predetermined period of time going forward of the next three days, every 31 minutes, a present value of the RSI for gold is calculated. This value will be compared to the past value of the RSI for gold calculated 31 minutes prior to the present value calculation. If the relationship of the present value is higher, lower, or has not changed relative to the past value, a corresponding trading decision such as buy, sell, or hold is made.

[0023] At step 105, a predetermined historical period of time is determined. For example, the last five years can be a predetermined historical period of time.

[0024] At step 106, a past value of the technical indicator for the tradable item is calculated utilizing a product of the first evaluation bar characteristic times the evaluation interval for the predetermined historical period of time. For example, applying the data from steps 101 and 105, a past value of the RSI for gold is calculated every 31 minutes for the past 55 evaluation intervals for the last five years.

[0025] At step 107, a present value of the technical indicator for the tradable item is calculated upon an occurrence of the first evaluation bar characteristic during the predetermined historical period of time. For example, applying the data from steps 101 and 105, going back five years, at each 31 minute interval, a present value of the RSI is calculated.

[0026] At step 108, a decision is made based upon a relationship between past and present values at each occurrence of the first evaluation bar characteristic for the predetermined historical period of time. For example, with respect to the calculated

data from steps 106 and 107, going back five years, at each 31 minute interval, a present value of the RSI is calculated. The present value of the RSI is compared to a past value of the RSI calculated 31 minutes beforehand. If a relationship of present value to past value is one of higher, lower or no change, a corresponding trading decision such as buy, sell or hold is made.

[0027] At step 109, a first performance metric and threshold criteria of success with respect to the first performance metric are determined. For example, the first performance metric may be percentage profit, and the threshold criteria of success with respect to the first performance metric may be at least 10% profit.

[0028] Performance metrics include without limitation: total profit over 1-year, percentage of profitable trades over a time period, how much was gained or lost in each trade, % of profitable trades in a Bear market or a Bull market, profit factor (total gain > total loss), correlation to other indexes, ratio of profitable trades to cover largest loss etc.

[0029] In various embodiments, many conventional and unconventional performance metrics are used. For example, a conventional performance metric is comparing the same time evaluation bar interval on the same market between two or more trading algorithms. For instance, comparing the performance of a first trading algorithm with a 15-minute time evaluation bar characteristic on the S&P 500 with the performance of a second trading algorithm with a 15-minute time evaluation bar characteristic on the S&P 500.

[0030] At step 110, if the threshold criteria of success determined at step 109 is satisfied with respect the performance of step 108, a second evaluation bar characteristic is selected. For example, if the performance of step 108 resulted in greater than 10% profit, a second evaluation bar characteristic of every 50 minutes may be selected (employing the selection methodologies described herein).

[0031] At step 111, a past value of the technical indicator for the tradable item is calculated utilizing a product of the second evaluation bar characteristic times the evaluation interval. For example, applying the data from step 110, a past value for the RSI for gold is calculated every 50 minutes for the past 55 50 minute intervals (2707 past values of the RSI for gold are generated).

[0032] At step 112, a present value of the technical indicator for the tradable item is calculated upon an occurrence of the second evaluation bar characteristic. For example, applying the data from step 110, a present value for the RSI for gold is calculated every 50 minutes going forward.

[0033] At step 113, a decision is made based upon a relationship between the past and present values of the technical indicator at each occurrence of the second evaluation bar characteristic for a predetermined period of time going forward. For example, applying the data from step 110, for a predetermined period of time going forward of the next month, every 50 minutes, a present value of the RSI for gold is calculated. This value is compared to the past value of the RSI calculated 50 minutes prior to the present value calculation. If the relationship of the present value is higher, lower, or has not changed when compared to the past value, a corresponding trading decision such as buy, sell, or hold is made.

[0034] At step 114, a predetermined historical period of time is determined. For example, the last ten years can be a predetermined historical period of time.

[0035] At step 115, a past value of the technical indicator for the tradable item is calculated utilizing a product of the second evaluation bar characteristic times the evaluation interval for the predetermined historical period of time. For example, applying the data from steps 110 and 114, a past value of the RSI for gold is calculated every 50 minutes for the past 55 evaluation intervals for the last ten years.

[0036] At step 116, a present value of the technical indicator for the tradable item is calculated upon an occurrence of the second evaluation bar characteristic during

the predetermined historical period of time. For example, applying the data from steps 110 and 114, going back ten years, at each 50 minute interval, a present value of the RSI is calculated.

[0037] At step 117, a second tradable item is selected. For example, the price of oil is selected.

[0038] At step 118, a third evaluation bar characteristic is selected. For example, every minute may be selected as the third evaluation bar characteristic.

[0039] At step 119, a past value of the technical indicator for the second tradable item is calculated utilizing a product of the third evaluation bar characteristic times the evaluation interval. For example, applying the data from steps 117 and 118, a past value for the RSI for oil is calculated every minute for the past 55 one minute intervals (55 past values of the RSI are generated).

[0040] At step 120, a present value of the technical indicator for the second tradable item is calculated upon an occurrence of the third evaluation bar characteristic. For example, applying the data from steps 117 and 118, a present value for the RSI for oil is calculated every minute going forward.

[0041] At step 121, a decision is made based upon a relationship between the past and present values of the technical indicator at each occurrence of the third evaluation bar characteristic for a predetermined period of time going forward. For example, applying the data from steps 117 and 118, for a predetermined period of time going forward of the next six months, every minute, a present value of the RSI for oil is calculated. This value will be compared to the past value of the RSI for oil calculated 1 minute prior to the present value calculation. If the relationship of the present value is higher, lower or has not changed with respect to the past value, a corresponding trading decision such as buy, sell, or hold will be made.

[0042] At step 122, a predetermined historical period of time is determined. For example, the last twenty years can be a predetermined historical period of time.

[0043] At step 123, a past value of the technical indicator for the second tradable item is calculated utilizing a product of the third evaluation bar characteristic times the evaluation interval for the predetermined historical period of time. For example, applying the data from steps 117, 118 and 122, a past value of the RSI for oil is calculated every minute for the past 55 evaluation intervals for the last twenty years.

[0044] At step 124, a present value of the technical indicator for the second tradable item is calculated upon an occurrence of the third evaluation bar characteristic during the predetermined historical period of time. For example, applying the data from steps 117, 118 and 122, going back twenty years, at each minute interval, a present value of the RSI for oil is calculated.

[0045] At step 125, a second performance metric is determined. For example, the second performance metric may be percentage loss.

[0046] At step 126, the performance of the technical indicator for the second tradable item for the third evaluation bar characteristic is ranked relative to other technical indicators for the same/differing tradable items for the same/differing evaluation bar characteristics based upon the second performance metric. Each technical indicator, associated tradable item, evaluation bar characteristic, and evaluation interval may be referred to as a trading algorithm. For example, the trading algorithm of the RSI for the price of oil with the third evaluation bar characteristic of every 1 minute for 55 evaluation intervals may be ranked based on percentage loss against the trading algorithm of the Money Flow Index technical indicator for the price of beef every 27 minutes for 55 evaluation intervals.

[0047] At step 127, the trading algorithms achieving a predetermined threshold with respect to the second performance metric are selected. For example, those trading algorithms with less than a two percent loss are selected.

[0048] According to further embodiments, any trading algorithms that match selected criteria are automatically saved. For example, applying 10,000,000 trading

algorithms to market data and comparing the results determines the ranking of the algorithms with the highest % return, lowest drawdown, highest profit factor, etc. The trading algorithms that meet the minimum standards are stored in a database and/or a data warehouse and are the selected trading algorithms, and the ones that do not meet minimum standards are filtered out. For example, 1,000,000 of the aforementioned 10,000,000 trading algorithms have greater than 50% returns, these 1,000,000 trading algorithms are selected trading algorithms and are stored in a data warehouse.

[0049] In some embodiments, minimum standards refer to anything that is trade worthy. Minimum standards vary for different preliminary tests. For example, if the strategy is to look for safe trading algorithms, filtering criteria focus on safety (minimal losses) in unfavorable market conditions such as volatile or bearish market periods. If the strategy is to look for high performing trading algorithms, filtering criteria focus on superior returns such as any trading algorithm with a high annual return (i.e., greater than 50% return).

[0050] Based on further exemplary systems and methods, massive sets of combined technical indicators, evaluation intervals, tradable items, and evaluation bar characteristics may be generated (sometimes randomly) in bulk with varying combinations of each. The calculations described herein may be performed quickly across numerous computing devices.

[0051] Technical indicators may include anything that indicate whether to buy or sell a tradable item based on activity. The activity may include any of price activity, volume activity, time activity, market activity, economic activity, or weather activity. Tradable items may include any of an index, a stock, a bond, a commodity, a sports score, an article of real estate, or another asset. Decisions supported and/or executed

by the exemplary systems and methods described herein may include any of buying, selling, selling short, and/or buying to cover.

[0052] One of ordinary skill in the art will understand that trade data and/or the raw trade data is big data because of the large number of variables. For example, millions or more of trading algorithms on every electronically traded market, multiplied by thousands of trades per algorithm and multitudes of evaluation metrics, is a massive amount of data. This massive amount of data is tracked in real-time and is continuously updated. Thus, data analysis on this scale is "Big Data Trading" because the data is too diverse, fast-changing, and massive for conventional technologies to address effectively.

[0053] According to further exemplary embodiments, the methods described herein may be performed across multiple computation devices for quicker throughput. For example, the aforementioned 1,000,000 selected trading algorithms are scaled across multiple different machines for data processing. For instance, a cloud manger may run the methods described herein on multiple computer processors simultaneously, thereby boosting throughput to achieve more records in less time. In some instances, the amount of processing depends upon situational time constraints. For example, when the methods described herein need to be performed quickly, virtual machines are rented from commercial data centers to increase throughput, and the desired work is divided into smaller units. For instance, 1,000,000 selected trading algorithms may be subdivided into five units of 200,000 trading algorithms. Each smaller unit of 200,000 algorithms is assigned to a virtual machine or a group of virtual machines that are turned on when needed and turned off when finished.

[0054] FIG. 2 shows an exemplary system architecture 200 for generating and selecting trading algorithms. Exemplary system architecture 200 includes random combination generator 201, master cloud server 202 and selected strategy server 203.

[0055] According to some exemplary embodiments, random combination generator 201 is hardware for the random selection of indicators, evaluation intervals, tradable items, bar definitions, and/or other parameters. This hardware is also responsible for the random combination(s) of such parameters.

[0056] Master cloud server 202, according to various exemplary embodiments comprises a master virtual machine server. According to various exemplary embodiments, a virtual machine may comprise an emulation of a particular computer system. Virtual machines operate based on the computer architecture and functions of a real or hypothetical computer, and their implementations may involve specialized hardware, software, or a combination of both.

[0057] In certain exemplary embodiments, a master virtual machine server may comprise a single server responsible for generating all of or most of the virtual machines.

[0058] For example, a cloud manager may be a custom application that manages trading strategies or algorithms. The cloud manager is configured to the cluster of cloud computing instances for processing large amounts of data. The cloud manager serves as the user interface to handle the ordering and cancelling of virtual computing instances. Additionally, the cloud manager may allow for detailed customization of the virtual machines. For example, Random Access Memory ("RAM"), processor speed, number of processors, network details, security/encryption, and/or memory may be detailed for each virtual machine and/or all virtual machines. Once the cluster of cloud computing instances is ordered and running, the cloud manager is "listening" for idle machines and "assigning" any idle machine a trading strategy for analyzing.

[0059] A cloud-based computing environment is a resource that typically combines the computational power of a large grouping of processors and/or that combines the storage capacity of a large grouping of computer memories or storage

devices. For example, systems that provide a cloud resource may be utilized exclusively by their owners; or such systems may be accessible to outside users who deploy applications within the computing infrastructure to obtain the benefit of large computational or storage resources.

[0060] For example, from a 3rd party cloud provider, an order is placed to create virtual machine (vm) based of an image of a stored template vm with required specifications and name it "VM1."

[0061] Selected strategy server 203 according to some exemplary embodiments may comprise trading algorithms, trading strategies or "bots" that meet minimum standards as stored in a database and/or in a data warehouse.

[0062] FIG. 3 is another flowchart of an exemplary method 300 for generating and selecting trading algorithms.

[0063] Within circle 301, according to some exemplary embodiments, shows steps under the direction of the random combination generator, such as random combination generator 201 (FIG. 2) for the random selection of indicators, evaluation intervals, tradable items, bar definitions, and/or other parameters. This generator is also responsible for the random combination(s) of such parameters.

[0064] Outside of circle 301, according to some exemplary embodiments, shows steps under the direction of the master cloud server, such as master cloud server 202 (FIG. 2).

[0065] FIG. 4 shows an exemplary interactive graphical user interface 400 for directing operation of the master cloud server, such as master cloud server 202 (FIG. 2).

[0066] According to some exemplary embodiments, the exemplary interactive graphical user interface 400 is responsible for generating and selecting trading strategies, algorithms and/or bots. The exemplary interactive graphical user

interface 400 is configured to the cluster of cloud computing instances for processing large amounts of data. The exemplary interactive graphical user interface 400 is the interface to handle the ordering and cancelling of virtual computing instances. Additionally, it may allow for detailed customization of the virtual machines. For example, Random Access Memory ("RAM"), processor speed, number of processors, network details, security/encryption, and/or memory may be detailed for each virtual machine and/or all virtual machines. Once the cluster of cloud computing instances is ordered and running, the exemplary interactive graphical user interface 400 through the master cloud server is "listening" for idle machines and "assigning" any idle machine a trading strategy for analyzing.

[0067] The exemplary systems and methods described herein may be performed in a secure computing environment including the use of firewalls and encryption technology. Given the potentially high value of the information being generated, and the potential magnitude of the resulting investment decisions, measures may be taken to perform some or all of the steps herein in a secure manner, with emphasis on such steps as the determination of strategy and execution of trades. For example, in addition to an optimal strategy, non-optimal strategies may purposely be added in the same string or digital data environment of the optimal strategy to confuse any unwanted hackers intercepting such information. As another example, in addition to a desired trade to be executed, undesired trades may purposely be added in the same string or digital data environment of the desired trade to confuse any unwanted hackers intercepting such information. Further, the desired trade may receive funding for execution, whereas the undesired trades may not receiving funding for execution.

[0068] While various embodiments have been described above, it should be understood that they have been presented by way of example only, and not limitation. The descriptions are not intended to limit the scope of the technology to

the particular forms set forth herein. Thus, the breadth and scope of a preferred embodiment should not be limited by any of the above-described exemplary embodiments. It should be understood that the above description is illustrative and not restrictive. To the contrary, the present descriptions are intended to cover such alternatives, modifications, and equivalents as may be included within the spirit and scope of the technology as defined by the appended claims and otherwise appreciated by one of ordinary skill in the art. The scope of the technology should, therefore, be determined not with reference to the above description, but instead should be determined with reference to the appended claims along with their full scope of equivalents.

CLAIMS

What is claimed is:

1. A method for generating and selecting trading algorithms, the method comprising:

randomly selecting a technical indicator;

randomly selecting an evaluation interval;

randomly selecting a first tradable item;

randomly selecting a first evaluation bar characteristic;

calculating a past value of the technical indicator for the tradable item utilizing a product of the first evaluation bar characteristic times the evaluation interval;

calculating a present value of the technical indicator for the tradable item upon an occurrence of the first evaluation bar characteristic;

making a decision based upon a relationship between past and present values at each occurrence of the first evaluation bar characteristic for a predetermined period of time going forward;

determining a predetermined historical period of time;

calculating a past value of the technical indicator for the tradable item utilizing a product of the first evaluation bar characteristic times the evaluation interval for the predetermined historical period of time;

calculating a present value of the technical indicator for the tradable item upon an occurrence of the first evaluation bar characteristic during the predetermined historical period of time;

making a decision based upon a relationship between past and present values at each occurrence of the first evaluation bar characteristic for the predetermined historical period of time;

determining a first performance metric and a threshold criteria of success with respect to the first performance metric;

if the threshold criteria of success is satisfied,

selecting a second evaluation bar characteristic;

calculating a past value of the technical indicator for the tradable item utilizing a product of the second evaluation bar characteristic times the evaluation interval;

calculating a present value of the technical indicator for the tradable item upon an occurrence of the second evaluation bar characteristic;

making a decision based upon a relationship between past and present values at each occurrence of the second evaluation bar characteristic for a predetermined period of time going forward;

determining a predetermined historical period of time;

calculating a past value of the technical indicator for the tradable item utilizing a product of the second evaluation bar characteristic times the evaluation interval for the predetermined historical period of time;

calculating a present value of the technical indicator for the tradable item upon an occurrence of the second evaluation bar characteristic during the predetermined historical period of time;

selecting a second tradable item;

selecting a third evaluation bar characteristic;

calculating a past value of the technical indicator for the second tradable item utilizing a product of the third evaluation bar characteristic times the evaluation interval;

calculating a present value of the technical indicator for the second tradable item upon an occurrence of the third evaluation bar characteristic;

making a decision based upon a relationship between past and present values at each occurrence of the third evaluation bar characteristic for a predetermined period of time going forward;

determining a predetermined historical period of time;

calculating a past value of the technical indicator for the second tradable item utilizing a product of the third evaluation bar characteristic times the evaluation interval for the predetermined historical period of time;

calculating a present value of the technical indicator for the tradable item upon an occurrence of the third evaluation bar characteristic during the predetermined historical period of time;

determining a second performance metric;

ranking performance of the technical indicator relative to other similarly ranked algorithms; and

selecting the algorithms achieving a predetermined threshold with respect to the second performance metric.

2. The method of claim 1, further comprising randomly selecting a plurality of technical indicators.

3. The method of claim 1, further comprising randomly selecting a plurality of evaluation intervals.

4. The method of claim 1, further comprising randomly selecting a plurality of tradable items.

5. The method of claim 1, further comprising randomly selecting a plurality of evaluation bar characteristics.

6. The method of claim 2, further comprising calculating a past value of each of the plurality of technical indicators for the tradable item utilizing a product of the first evaluation bar characteristic times the evaluation interval.

7. The method of claim 6, further comprising calculating a present value of each of the plurality of technical indicators for the tradable item upon an occurrence of the first evaluation bar characteristic.

8. The method of claim 7, further comprising making a decision based upon a relationship between past and present values at each occurrence of the first evaluation bar characteristic for a predetermined period of time going forward.

9. The method of claim 8, further comprising determining a predetermined historical period of time.

10. The method of claim 9, further comprising calculating a past value of each of the plurality of technical indicators for the tradable item utilizing a product of the first evaluation bar characteristic times the evaluation interval for the predetermined historical period of time.

11. The method of claim 10, further comprising calculating a present value of each of the plurality of technical indicators for the tradable item upon an occurrence of the first evaluation bar characteristic during the predetermined historical period of time.

12. The method of claim 11, further comprising making a decision based upon a relationship between past and present values at each occurrence of the first evaluation bar characteristic for the predetermined historical period of time.

13. The method of claim 12, further comprising determining a first performance metric and a threshold criteria of success with respect to the first performance metric.

14. The method of claim 13, further comprising determining if the threshold criteria of success is satisfied, and if it is, selecting a second evaluation bar characteristic.

15. The method of claim 14, further comprising calculating a past value of each of the plurality of technical indicators for the tradable item utilizing a product of the second evaluation bar characteristic times the evaluation interval.

16. The method of claim 15, further comprising calculating a present value of each of the plurality of technical indicators for the tradable item upon an occurrence of the second evaluation bar characteristic.

17. The method of claim 16, further comprising making a decision based upon a relationship between past and present values at each occurrence of the second evaluation bar characteristic for a predetermined period of time going forward.

18. The method of claim 17, further comprising determining a predetermined historical period of time.

19. The method of claim 18, further comprising calculating a past value of each of the plurality of technical indicators for the tradable item utilizing a product of the second evaluation bar characteristic times the evaluation interval for the predetermined historical period of time.

20. The method of claim 19, further comprising calculating a present value of each of the plurality of technical indicators for the tradable item upon an occurrence of the second evaluation bar characteristic during the predetermined historical period of time.