Accounting+ Stock Predictions with Neural Network

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***Abstract*—**

Accounting is the language of the business. Affairs of the business unit are communicated to public as well as to those who own or manage business. Therefore, accounting information has to be suitably recorded, classified, summarized and presented to make the output convey the same meaning to all people. Also, this information should be practical. It should be of use to the organization. The paper is aimed on the techniques, which maintain details of monthly expenditures, & receipts as well as both monthly account and year wise account. It focuses mainly on Revolutionary Real Time Automated Trading Infrastructure Solution for Financial Institutions (traditional & online) [Focused on Futures and Options Markets].

***Index Terms*— Accounting+, Acc+SPRINN, BOP, equifinality**

I. Introduction

THIS American Institute of Certified Public Accountants has defined accounting as: "Accounting is defined as the art of recording, classifying and summarizing in a significant manner and in terms of money transactions and events which are in a part of at least, of a financial character and interpreting the results thereof."

Growth in any organization outsourcing spurred research in the area that spans many perspectives but contains contradictory findings. Inconsistent findings raise confusion and doubt, for example the balance sheet of that organization depends on the periods like monthlies, quarterlies, or year wise contains if any uncertain problems about its financial directions and researchers unclear about theoretical perspectives relevant to its sourcing. Here we argue that the concept of equifinality accounts for much of this confusion.

Equifinality suggests that, in the struggle to match conflicting functional demands with structural options, many equally viable alternatives may exist. This means that for financial sourcing, the different sourcing choices can be leveraged producing similar growth capabilities. Thus, embracing equifinality requires that we understand more fully the complexities in the financial function and in the range of sourcing options available. As well, that the existence of multiple paths raises the importance of implementation and execution issues. Illustrating the complexities of the how financial function issues involved during building of any domain-infrastructure of organization. For that, outline several function elements through simulation, including IT resources, PWD (Public Work Dept.) activities and Financial Account strategy. A Financial Business Partnering framework is then presented demonstrating the multiplicity of partnering options, situating sourcing as one aspect.

Basically this (Acc+SPRINN – Accounting + Stock Predictions with Neural Networks) accounting system which deals expenditure of receipts on monthly and yearly basis is design based on the concept of decision support system (DSS) help to forecast the new updated balance sheet and the simulated calculation based on it. Also ERP approach utilizing the prediction of the system based on Neural Network concepts are efficiently used during handling report system. At time of design the system, the concept of management information system (MIS) is involved as well as keeps awareness about different present marketing strategies.

We proved with several company illustrations based on marketing strategies they adopt showing these multiplicities for successful company outcomes. For financial domain sourcing researchers, equifinality holds important implications. No longer can afford to view the impact of financial function as a homogeneous entity nor can limit our scope to a narrow range of sourcing and partnering options. More than one path exists to achieve a particular outcome. Hence, the pursuit in financial sourcing research can no longer be for one good answer but for a few good answers.

II. Objectives of Acc+SPRINN

The accounting is one of the most and essential functions of any organization. The Financial Accounting System - Accounting+ is a general purpose accounting system. In this system user can create State Govt.'s Public Works Account, which handles budgets for K.H.E.P. (Koyana Hydroelectric Project) (Stage IV). Also the system can hold different documents necessary for building final month account; separate code is generated for achieving different tasks in same system. Hence there is maintaining opening date, opening balance, current credit and debit, cash voucher numbers, description, major head details, etc. For all this multitasking, computerization of Accounting+ system is must for avoiding manual limitations on the functionality of current financial system. As every commercial organization tries to

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achieve its target and they use recent advanced facilities of computers, by which they can provide the communicating GUI between an operator and a computer. The proposed account system deals with most of the difficulties of the user and stress is given on user friendliness. The system provides many reports. These are categorized into → registers, ledgers, books and current trail balance.

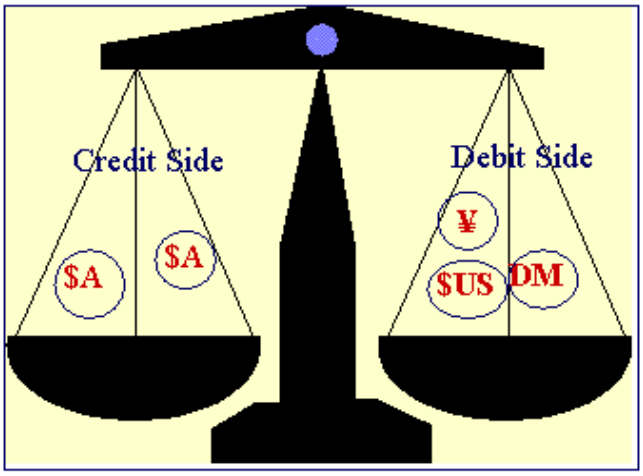

Fig.1 Balance of Payments (BOP)

The Balance of Payments (BOP) means

- Record of the value of all the economic transactions between residents of one dept. (e.g.- dept. in govt. or any firm) and residents of all other depts. during a given time period.
- Double-entry bookkeeping system
- For transactions with floating currencies, the entire balance of payments must be numerically balance by definition, while individual accounts or sub-accounts may not balance.

A. Features of Acc+SPRINN

Acc+SPRINN is an accounting system for the creation of temporary data, specially adapted to capital market. Its abilities are based on the application of accounts/ sales/ production.

Partially Dynamic: Unlike other existing programs, the accounting engine in Acc+SPRINN is dynamic, adapting internally the number of inputs and connections depending on the problem posed.

Multi-version: It has been built searching for the maximum use flexibility and making sure of leaving up to each investor the highest degree of freedom in the definition of accounts and in the parameters assigned to these. The depending on these characteristics and their definition, in near future tries out to present different versions of Acc+SPRINN.

Fragments: The structure given to the definition of each network or module allows also an easy exchange of results among users. In Acc+SPRINN you may obtain new data series supplied by other users of the program.

Complete with respect to Results: A large number of indicators have been entered, moving averages, graphical and some other elements of the technical analysis. We can then improve its validation capacity of the network, as well as the input data series. And these variables can also be other temporary or derived series from the original.

Goal: Unlike other accounting systems used normally, Acc+SPRINN may not be interpreted its results are determined. This objectivity in the results offered by this project constitutes one of its numerous assets. The program will tell you how to handle accounting terms at each moment, you decide whether you continue it or not.

B. Working scheme in Acc+SPRINN

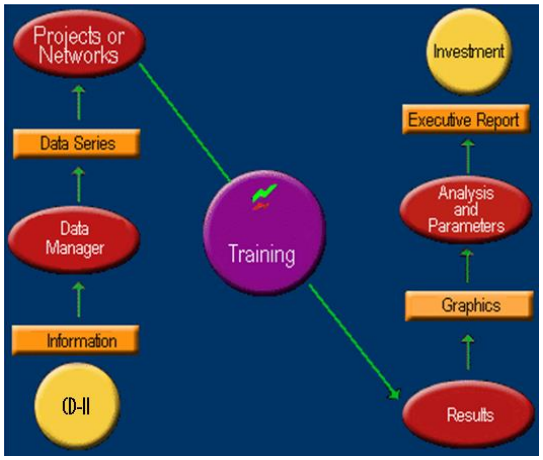

Fig.2 working scheme in Acc+SPRINN, where, CD-II implies Construction Division No. 2, Alore

- Acc+SPRINN is fed on data from capital market, these temporary data series are the information the program needs for its working.
- The introduction and maintenance of these data is made from the Data manager, which then transforms the gross data into Data series which are used in the program. The data can be downloaded automatically or be introduced manually.
- We now visualize accounts both in the results as well as graphics.
- We submit the data series to training and obtain the results. These results can be viewed in the form of graphics or through the Executive summary. We analyze the results and reconsider the parameters used. This process of analysis and parameters can lead us to a re-training of the network.
- Once this process has finished, the network is ready

to take decisions in the processes of investment.

- We regularly have to make safety copies or backups of our system.

C. The balance of current account

- The difference between the sum of credits and the sum of debits for different categories of transactions hold in single month called month wise credit/debit reports, while the reports for a year known as year wise credit/debit reports.

- Indicator of a current balance performance in the economy denoted as below

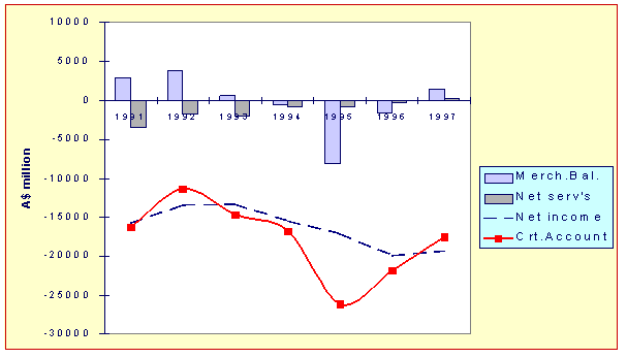

Fig. 3 indicator of a current balance performance in the economy

- The system contains real time execution module, risk control and full trading simulation. It defines and formulizes a virtual trader which shows flexibility. The system utilizes artificial intelligence principles to adapt strategies to market changes.

- The System opens up a window of opportunity for financial institutions to create a new online market which is non-intrusive, scalable and easily adaptable to local markets. It is fully automated, immediate (real time) and accurate and handles massive numbers of executions.

D. Accounting Formulae:

a. Index of Efficiency (IE) Calculation:

Profit_Total **:=** BalanceEnd – BalanceIni
if Profit_Total ≥ 0
then
IE**:=**100*Profit_Total/Sum_of_Profit_in_Positive_Operations
else
IE**:=**
100*Profit_Total/sum_of_Losses_of_Negative_Operations
end if
Rank of variation: -100 to 100
if Profit_Total ≥ 0 then
IE ≥ 0
else
IE ≤ 0
end if

Meaning:
Relation between Profit and losses
IE = +100 : always operations with profits
IE = +50 : more profits than losses
IE = 0 : same profits as losses
IE = -50 : more losses than profits
IE = -100 : always operations with losses

b. Index of Global Security (ISG) Calculation:

MaxRecNeg: maximum negative global run, this is, maximum distance below the BalanceIni that our patrimonial value has reached in the operating interval, even considering open operations

Profit_Total **:=** BalanceEnd - BalanceIni
if Profit_Total ≥ 0 then
ISG **:=** 100 * Profit_Total / (Profit_Total + MaxRecNeg)
else
ISG **:=** 100 * Profit_Total / MaxRecNeg
end if
Rank of variation: -100 to 100
if Profit_Total ≥ 0 then
ISG ≥ 0
else
ISG ≤ 0
end if

Meaning:
Relation between profits and global risk
ISG = +100 : high profit, global risk zero
ISG = +50 : half profit, half global risk
ISG = 0 : zero profit, global risk zero
ISG = -50 : half profit, half global risk
ISG = -100 : high losses, high global risk

c. Index of Medium Security (ISM) Calculation:

MaxRecNeg_Op: maximum negative global run, this is, maximum distance below the BalanceIni_Op that it has reached our patrimonial value of the period in which it was open this operation

Profit_Op **:=** BalanceEnd_Op - BalanceIni_Op
IS_Op: Index of Operation Security
if Profit_Op ≥ 0 then
IS_Op **:=** 100 * Profit_Op / (Profit_Op + MaxRecNeg_Op)
else
IS_Op **:=** 100 * Profit_Op / MaxRecNeg_Op
end if

ISM **:=** Arithmetic mean of the IS_Op of all operations
Rank of variation: -100 to 100

Meaning:
Media of the relation between profits and risk
IS_Op = +100 : operation with high profit, zero risk
IS_Op = +50 : operation with half profit, half risk
IS_Op = 0 : operation with zero profit, zero risk
IS_Op = -50 : operation with half losses, half risk
IS_Op = -100 : operation with high losses, high risk

ISM: average of IS_Op values

d. Index of Exploitation Calculation:

MaxRecPos_Op: maximum positive run of a operation, this is, maximum distance above the BalanceIni_Op that it has reached our patrimonial value of the period in which it was open this operation

Profit_Op **:=** BalanceEnd_Op - BalanceIni_Op
IA_Op: Index of Exploitation of an operation
if Profit_Op ≥ 0 then
IA_Op **:=** 100 * Profit_Op / MaxRecPos_Op
else
IA_Op **:=** 100 * Profit_Op / (MaxRecNeg_Op - Profit_Op)
end if
ISM **:=** Arithmetic mean of the IA_Op of all operations
Rank of variation: -100 to 100

Meaning:
The average relation between profits and oportunity
IA_Op = +100: operation with high profit, risk zero
IA_Op = +50: operation with half profit, half opportunity
IA_Op = 0: operation with half profit, zero opportunity
IA_Op = -50: operation with half losses, half opportunity
IA_Op = -100: operation with half losses, zero opportunity

IA: average of IA_Op values

e. Index of Presence (IP) Calculation:

IP**:=**100*Number_of_Days_Invested/
Number_of_Days_Totals
Rank of variation: 0 to 100

Meaning:
Percentage of days invested
IP = +100 : always invested
IP = +50 : invested half the period
IP = 0 : never invested

f. Index of Mobility (IM) Calculation:

IM**:=**100*Number_of_Days_Invested/
Number_of_Days_Totals
Rank of variation: 0 to 100

Meaning:
Degree of duration of the operations
IM = +100 : operations of one day only
IM = +50 : operations of two days average
IM = +25 : operations of four days average
IM = +10 : operations of ten days average
IM = +5 : operations of twenty days average
IM = 0 : very long operations

g. Index of Successful Days (ID) Calculation:

ID **:=** 100* Number of days with positive increase of balance/Number of days invested
Rank of variation: 0 to 100

Meaning:
Percentage of days in which the model is able to increase the balance. Given two models with the same profitability, the one with the highest index of successful days can be used with the highest confidence by the investor.

h. Index of Successful Operations (IO) Calculation:

IO**:=**100*Number_positive_operations/
Number_total_operations
Rank of variation: 0 to 100

Meaning:

The percentage of successful operations, gives the average of the prediction security of the model

II. Artificial Intelligence in Finance

a. Introduction

Business sectors ranging from banking and insurance to retail are benefiting from a whole new generation of "intelligent" computing techniques. Successful applications include asset forecasting, credit evaluation, fraud detection, portfolio optimization, customer profiling, risk assessment, economic modeling, sales forecasting and retail outlet location.

The techniques include expert systems, rule induction, fuzzy logic, and neural networks and genetic algorithms, which in many cases are outperforming traditional statistical approaches. Their essential features include the ability to recognize and classify patterns, learning from examples, generalization; logical reasoning from premises, adaptability, and the ability to handle data, which is incomplete, imprecise, and noisy.

b. Background

There are two general classes of artificial intelligence

techniques that have found an application in finance:

- **Expert Systems:** These systems use knowledge-based or rule-based reasoning to make decisions about a market. Typically, a sufficiently large knowledge base of financial expertise is developed and is used to assist a real human trader in making decisions.
- **Neural Networks:** These systems are comprised of a connectionist network and a surrounding body of non-linear techniques, which are used to predict new market data from historical databases. Usually, these systems start with no inherent knowledge of their own, they instead build behaviors that predict the market, by a system of trial and error.

A. Expert System

The purpose of this class of system is, usually, to render intelligent advice to an investor, by consulting an internal knowledge base. A good example of this is a system called Acc+SPRINN.

Specification: Acc+SPRINN would know to bring up charts of that stock and currency index. It also could apply simple rules to a chart, and make some form of recommendation, usually a simple buy/hold/sell advisement based on the movement of certain figures in accordance with pre-defined rules

The system was generally characterized as a success by its reviewers and, however, despite its success, some difficulties did arise, many of which are indicative of larger problems with AI systems in the investment business.

Acc+SPRINN's development team had some initial hurdles developing a user interface that was strong enough to hold the interest of traders with differing styles. In addition, when it was first introduced, traders were very skeptical of the system although it had worked well for months on a "dry run." This reluctance illustrates a peculiar characteristic of AI in the investment business that seems ubiquitous: despite a system's success using previous or realistic data, traders will almost always refuse to accept it as a tool until it proves itself on-line with real market situations.

Limitation: In general, in finance, expert systems are limited to producing data that must later be interpreted by humans.

B. Neural Network Modeling

The most promising application of artificial intelligence in finance is the use of neural networks. In this class of utilization, a neural network attempts to predict stock values and make portfolio decisions.

This type of modeling differs from the other applications that have been discussed in several ways:

- The various models are strictly quantitative – the work is based on a hope that there is some underlying pattern or demonstrable stochastic relationship between various market indicators and stock returns that, when discovered, can be exploited.
- The models are usually generalized to the point where human qualitative judgments are completely removed from the predictions, thus eliminating any biases that might be incorrect.

This is a stark contrast to the agent or expert system models, which attempt to quantify what is already known about the market – neural networks try to rediscover these relationships.

The thrust of economic AI research largely ignores the classical efficient market theory, in favor of the idea that extrapolation of past data can be an effective way to trace future value.

Although questionable in a highly reversible market, the central belief is that stock returns follow different patterns in different circumstances. The hope of this tact is that if nothing has undermined the past's ability to predict the future, it should be possible to construct a statistical model to produce accurate predictions of future stock performance from existing historical data. The general methodology is to compile sufficiently large library of past patterns into a database, and apply a non-linear pattern recognition system to identify previously seen fluctuations as they newly arise in the market. Typically, a neural network is used as the pattern recognizer.

Neural networks are well suited to the application of time-series prediction because they can improve their performance on a particular task by trial and error. In addition, while they are mathematically complex, their implementation is simple and somewhat abstract. Unfortunately, neural networks have a tendency to over-fit the data, and, if not properly tuned, can spuriously react to coincidental patterns. With the application of a fuzzy logic decision-maker that rates the decisiveness of a given prediction, this brittleness can be suppressed. In addition, a common way to "tune" a neural network is to evolve it through a genetic algorithm whose selection criteria are the effectiveness of the network as a predictor.

Due to industry skepticism the majority of AI systems that have been developed to take a very conservative angle in their actual implementations. AI techniques are as a special option to existing systems. The research has also concluded that most financial data needs to be pre-processed in some way before being used in neural networks, and they typically use regressions or differences to filter their data so the network more effectively uses it. To deal with the aforementioned difficulties inherent in neural networks themselves, the actual forecasting systems breed the nets with genetic algorithms that start with a random population and select parents with the greatest percentage of correct decisions.

The final judgment on neural networks is difficult to develop. As mentioned before, no one is talking about how successful such systems really are. But neural systems are certainly out there, and there are a number of firms, like NTS and PanAgora that specialise in bringing AI systems into existing quantitative asset models. There may be something to be said for computer trading in general - because the biases a computer develops are entirely empirical to the data, they are in some ways immune to falsely acquired human judgments. Then again, since it is hard to tell exactly why a neural net makes the decisions it does, it is possible that over time the network will simply stop working as new situations arise. Clearly the next several years will show the ultimate value of these systems as they become more popular in the market and new techniques are developed for using them.

III. Conclusion

The discussion of AI in finance has generally indicated that artificial intelligence techniques are only partially useful to most applications in finance. Most systems still require a great deal of heuristic knowledge, which must be provided by experts who already understand many of the market's nuances. For the expert systems, this knowledge comes in the form of rules and knowledge bases. In neural network applications, it must be provided in the pre-processing and interpretation phases. It seems that such systems are best used as supplements to an existing team of experts instead of on their own, and hence, they are more in the realm of statistical tools than "Artificially Intelligent" agents. Nevertheless, they are powerful techniques and as our development of them progresses, it is likely that they will find greater and greater utilization on Wall Street.

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