

A New Implementation of Mathematical Models With Metaheuristic Algorithms For Business Intelligence

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Abstract: Business intelligence (BI), is an Unique term that refers to a variety of software applications, it is used to analyse an organization's raw data for intelligent decision making. BI as a discipline is made up of some related performance, including online analytical processing, querying, data mining, and reporting and the techniques include multidimensional analyses, mathematical projection, modelling, ad-hoc queries and 'canned' reporting. The main concept of BI is a fact-based decision making and the result must be single version of the truth. The main function of BI systems is to afford decision makers with tools and methodologies that permit them to make effective and timely decisions.

Keywords: Business Intelligence, Decision making, Optimization techniques, Genetic Algorithm, Ant Colony Optimization, Artificial Bear Optimization.

I. INTRODUCTION

Decisions can be classified in terms of methods are Stagnant Decision making and Dynamic decision making. With the help of mathematical models and algorithms, it is really potential to analyze a large number of alternative actions, attain more exact conclusions and achieve efficient and timely decisions. We may conclude that the major advantage obtain from the implementation of the business intelligence system is found in the amplified efficiency of the decision-making process.

II. LITERATURE SURVEY

In a 1958 article, IBM researcher Hans Peter Luhn used the phrase business intelligence. He decides intelligence as: "the ability to apprehend the interrelationships of presented facts in such a way as to guide action towards a desired goal." Business intelligence as it is unstated today is supposed to have developed from the decision support systems which began in the 1960s and developed all through the mid-80s. The study of the survey has been conducted for current BI methodologies and its limitations and expectations. Since it will be reputable with the new methodology to overcome the limitations of existing methodology and fulfill the expectations. In the existing papers, there is NO consistent enterprise-wide BI Methodologies. Still now the business analysts are using Excel and spreadsheet functions. Existing BI tools suffer from a lack of analysis and visualization capabilities. Daily rising the data volumes is a biggest hectic to manage the big data set. Only 10% of BI users are sophisticated enough to utilize a BI Tool. The inconsistency of the respond produced by more than one advanced user is also known as multiple versions of the truth.

III. SCOPE OF THE RESEARCH

In scope of this thesis work, to implement the new optimization techniques to overcome the limitations of

existing optimization techniques and lacking of the understanding behind in the metaheuristic algorithms. The key motivation behind this thesis study was performing the analysis of popular metaheuristic algorithms and comparative study with existing versus new algorithm and validating with Receiver Operating Characteristics (ROC) curve and Intelligence concept is implemented with Back Propagation algorithm for forecasting the customer performance.

IV. OBJECTIVES

The goal of this thesis is to design and develop the new algorithm, to find the optimal customer from the huge set of customer in the current industry. To overcome the challenge behind in the Business intelligence is that to achieve the fact based and single version of the truth in decision making. The optimal customer must be valued and trust worthy, since to avoid the risk in the market. In this thesis, to accomplish the optimal customer is in five stages: Database preparation and Normalize the data in the first stage, Apply the existing metaheuristic algorithms individually is the second stage, Apply the proposed new algorithms in the third stage, Compare and analysis with the existing metaheuristic algorithms with new algorithm is in the fourth stage and Intelligence concept is implemented with Back propagation algorithm in the fifth stage.

V. METHODOLOGIES

In the industry market, through the Direct Sales Team, to avail the open market customer database. The availability of data sets are very huge number in the industry. From that database, Consider the 1000 populations for this thesis investigation. From these populations, to attain the valued optimal population through the Optimization techniques or Metaheuristic algorithms which are inspired by nature will

facilitate to construct the application or tool to attain the optimal state in decision making. To overcome the limitations in the existing algorithms, the new proposed algorithm, Artificial Bear Optimization (ABO) is designed and implemented and the performance is evaluated by area under the curve (AUC) in the ROC curve.

VI. IMPLEMENTATION OF PROPOSED ALGORITHMS

To overcome the real life problems with the complex or irrelevant functionality of existing algorithm and to avoid manual decision making in the industry, to implement the new algorithm with the impression of BEAR's smelling sense.

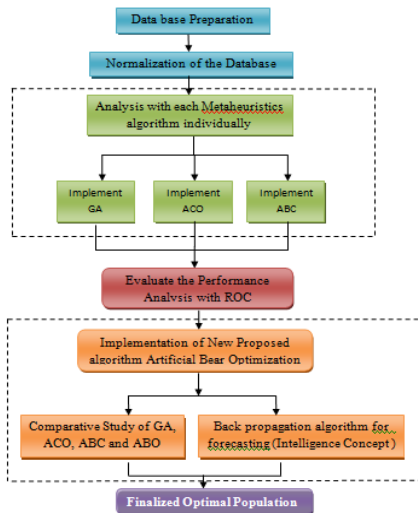


Fig 1 : Flow Chart of Overall Proposed Application

Figure:1 represents the overall application is proposed to find the optimal population. Genetic Algorithm (GA), Ant Colony Optimization (ACO) and Artificial Bee Colony (ABC) algorithms are implemented and find the result data base set and evaluate the performance with Receiver Operating Characteristic (ROC) curve. The new proposed algorithm is implemented. The flow chart representation

for proposed algorithm, Artificial Bear Optimization (ABO) is in Figure 2.

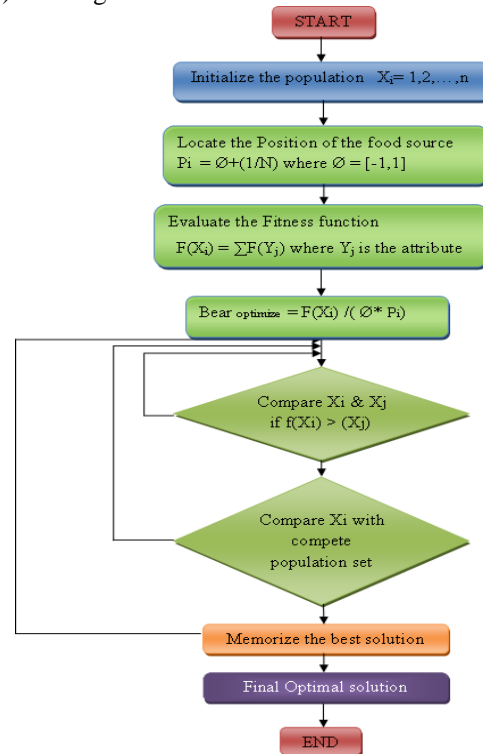


Fig 2: Artificial Bear Optimization: Pseudo code Algorithm

The application is produced with the implementation of algorithms and results will be shown as database and ROC analysis and among algorithms comparative Study is takes place and Intelligence concept is implemented that is forecasting the customer performance with Back Propagation algorithm.

VII. RESULTS

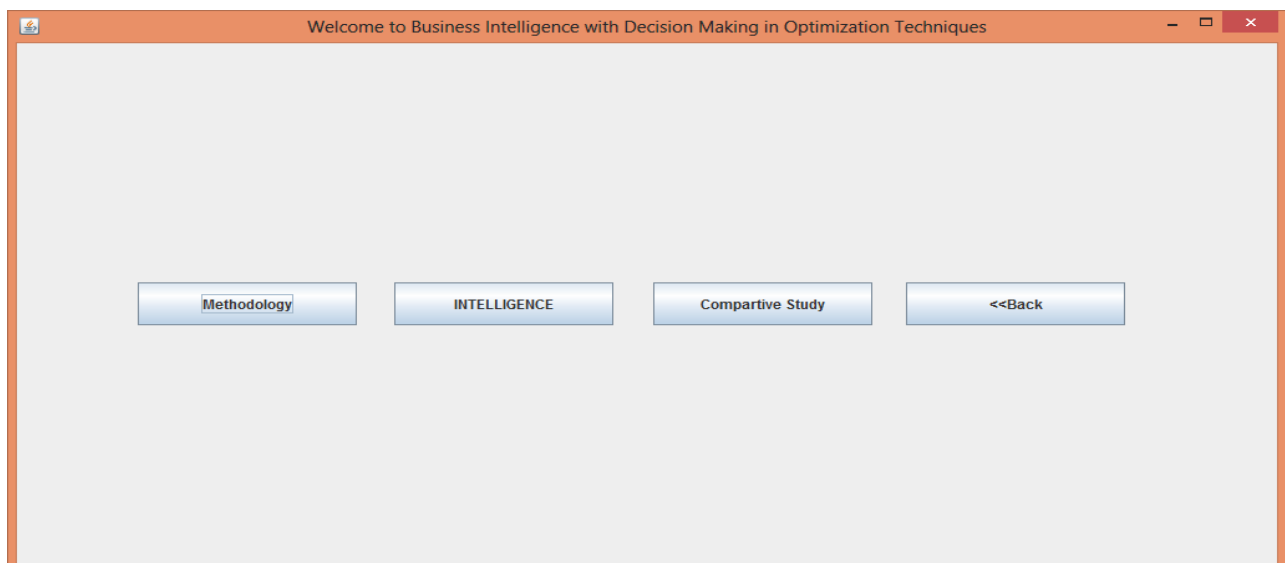


Fig 3: Welcome Screen of the application

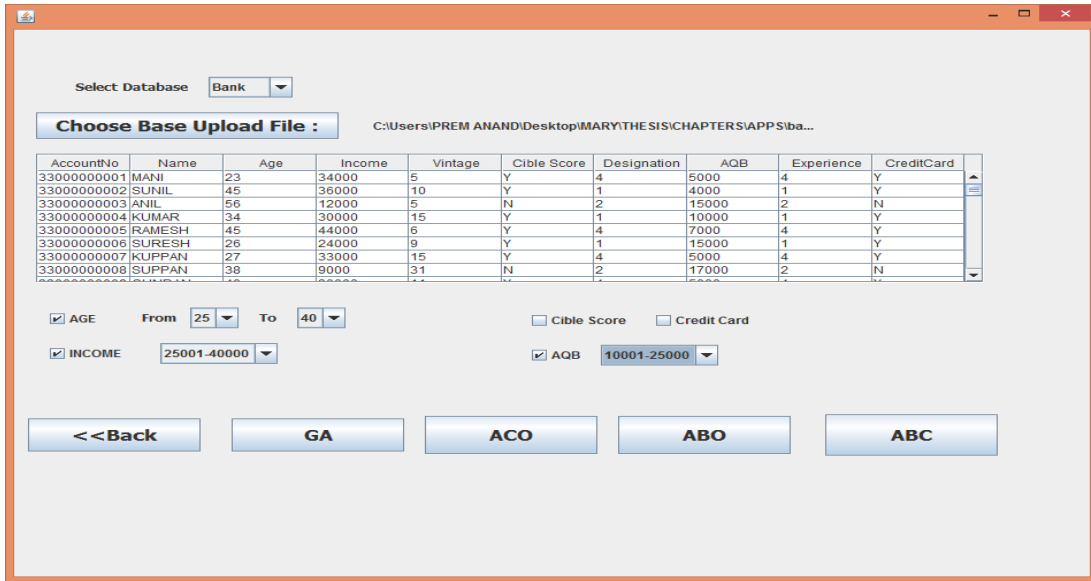


Fig 4: Metaheuristic algorithms (GA,ACO,ABC) with Proposed Algorithm (ABO)

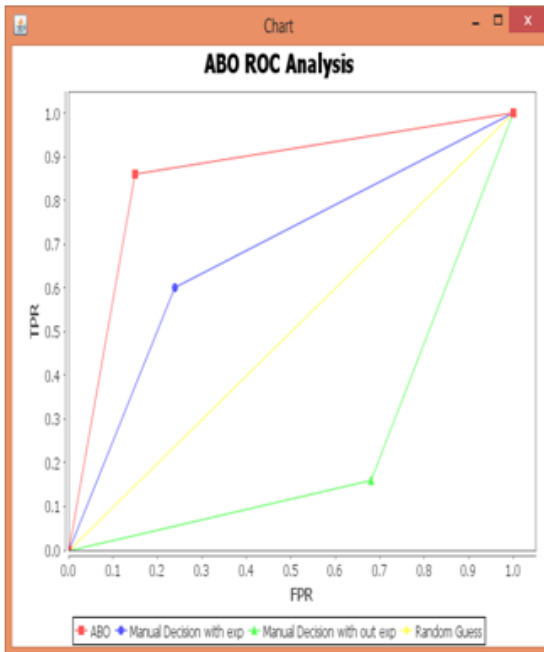


Fig5 : Comparison of ABO with Manual decision making

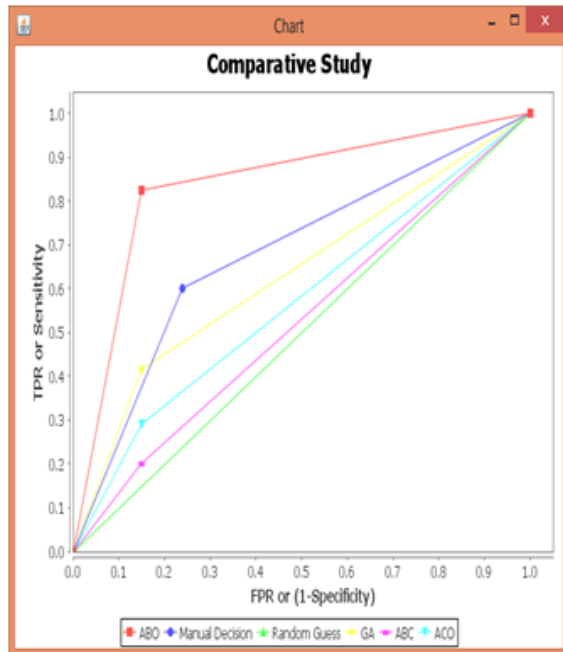


Fig6 : Comparison of ABO with GA , ABC & ACO and Manual decision making

Table1 : Comparative study of ABO with Manual decision making

Analysis variables / Techniques	Manual Decision Making with experience	Manual Decision Making with out experience	Artificial Bear Optimization
True positive	300	80	430
True Negative	380	160	424
False Positive	120	340	76
False Negative	200	420	70
True Positive rate	0.6	0.16	0.86
False Positive rate	0.24	0.68	0.15
Positive predicted value	0.71	0.19	0.85
AZ value	0.68	0.24	0.85

Table2 : Comparison of ABO with GA, ACO,ABC

Analysis variables / Techniques	GA	ACO	ABC	ABO
True positive	233	241	237	374
True Negative	256	264	272	424
False Positive	237	240	225	75
False Negative	274	255	266	127
True Positive rate	0.47	0.48	0.47	0.74
False Positive rate	0.18	0.47	0.45	0.15
Positive predicted value	0.49	0.5	0.51	0.83
AZ value	0.48	0.5	0.5	0.79

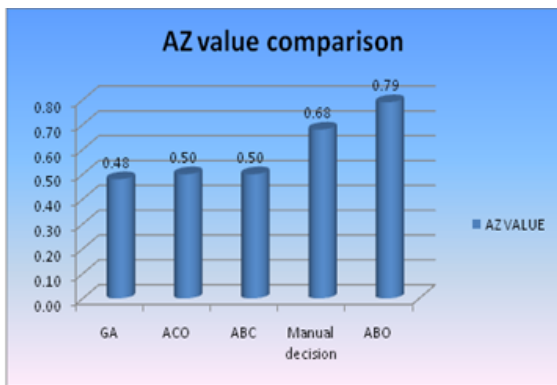


Fig 7: AZ value comparison across the algorithms

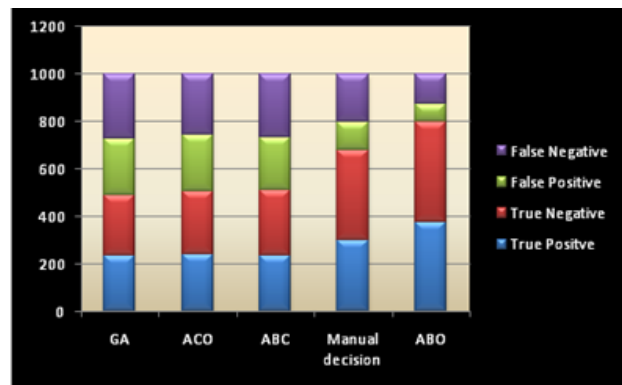


Fig 8: Comparison of the algorithms with ROC attribute

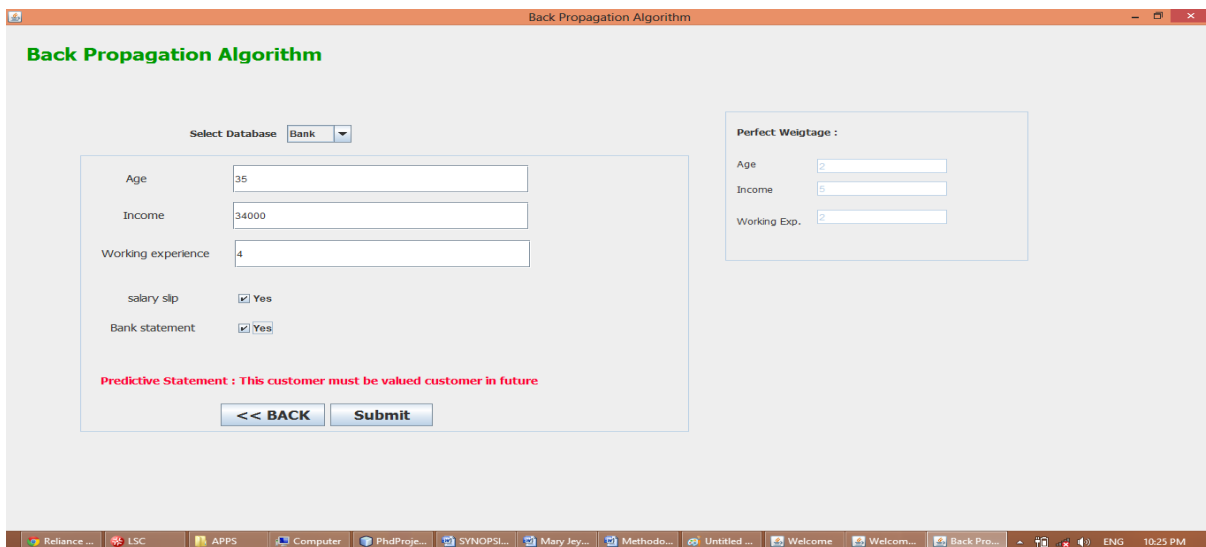


Fig 9: Back Propagation Algorithm for forecasting (Intelligence Concept)

VIII. CONCLUSIONS

In this thesis, Optimization techniques with different algorithms such as GA, ACO & ABC are implemented to achieve the optimal results from the huge set of customers. To avoid the limitations in the existing algorithms, proposed algorithms are implemented that is Artificial Bear Optimization (ABO) and the performance is evaluated by ROC curve with the AZ value.

By bringing discipline to strategic financial modeling, facilitating the approaches of metaheuristic algorithm and forecasting strategies are implemented. The Experimental results shows the understandable view of the manual decision making and various metaheuristics algorithms and the proposal of ABO algorithm. For forecasting the performance of the customer will be analyzed by the Back Propagation algorithm with the weightage strategy of the every attributes. The AZ value

of GA approach produces 0.48, ACO approach produces 0.50, ABC approach produces 0.50, Manual decision making method produces 0.68 and the proposed ABO approach produces 0.79. It was scrutinized that the proposed ABO algorithm bring about well.

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