DEVELOPMENT OF AN ENHANCED INFORMATION SYSTEM FOR CREDIT RISK EVALUATION

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ABSTRACT
Credit risk refers to that a borrower may not repay a loan and that the lender may lose the principal of the interest associated with it, also it is the probability of non -repayment of bank financial facilities granted to investors. If the credit risk decreased banks will be more successful in performing their duties and have greater effect on economic growth of the country, credit rating of customers and identify good and bad customers, helps banks lend to their good payers and hereby the reduce probability or non-repayment. Banks face problems such as the probability of non-repayment of received loans at the due date, liquidity of bank due to lack of capital, non-performing loans and bad debts, and decrease in loan fund of the bank. The objectives of this study is to enhance credit risk evaluation using ANN , to automate the credit approval process using the banks credit scoring model and to develop software to assess the credit risk for individuals and their credit worthiness. The result will displayed individual loan status and amount of loan have important effect in identify classification criteria for good customer from bad in Nigeria banks. The Methodology adopted in this project work was structured system Analysis and Design Methodology (SSADM). Credit risk evaluation system using artificial neural network will be developed using the programming language, Php and MySQL (WAMPP Local – host Server) was used as the database platform, it is a server/client system, its query data and save changes, Programmers find it easy to learn and manipulate, they are used basically to create a relational database structure, its platform is independent having high speed on LINUX server and helps to build large and complex web applications.

KEYWORDS: Credit Risk, Evaluation, Neural Network, loan, Banks.

1. INTRODUCTION

The banking industry has been known for its intermediary role in providing financial assistance (credit) needed in the economy. This role of financial intermediation is carried out in so many ways. First to be mentioned is the granting of loans and advances to customers which constitutes the major part of banking lending. Apart from loans and advances, other forms of bank credits like bond issued banks for and on behalf of their customers. In providing credits or for business venture, banks should as a matter as important take all necessary steps to ensure that advances are granted to those customers who can and will make judicious use loans so that repayment will not become a problem. Therefore credit must be made to people who are capable for utilizing it well and repaying back the loan at its maturity date. Affairs at banks can be explained by reference to the fact that "loan and advances are the large single item in the asset structure of Nigeria commercial banks; it also constitutes the major source at the operating income at banks and also the most profitable for the employment of bank funds. Credits are granted based on a judgmental concept using past experiences of the credit officers which in most cases are not objective and accurate because, some of the problems faced by financial institution includes but not limited to

(i) Non - performing (loans) and bad debts

(ii) Reduction in capital base due to non-payment of loans
(iii) Liquidity of bank due to lack of capital
(iv) Decrease in loan fund of the bank

The main aim of this study is to enhanced credit risk evaluation model using artificial neural networks model. In order to achieve this aim, the specific objective of this study is:
To enhanced credit risk evaluation using ANN and to automate the credit approval process using the banks credit scoring model.

2. LITERATURE REVIEW

Banks are profit-making organizations performing as intermediaries connecting borrowers and lenders in bringing temporarily available resources from business and individual customers as well as providing loans for those in need of financial support (Uwuigbe, 2013; Drigă, 2012). Commercial Banks play a vital role in developing economies like Nigeria. Bank lending is very crucial for it make possible the financing of agricultural, industrial and commercial activities of the country. Commercial Banks are entrusted with the funds of depositors. These funds are generally used by banks for their business. The fund belongs to the customers so a programme must exist for management of these funds. The programme must constantly address three basic objectives: liquidity, safety and income. Successful credit risk calls for proper balancing of all these three. Liquidity enables the banks to meet loan demands of their valuable and long established customers who enjoy good credit standing. The second objective being safety is to avoid undue risk since banks meet responsibility of protecting the deposit entrusted to them. Proper and prudent managing of banks creates and enhances customer confidence. The third being income/profitability which is aimed at growth and expansion to meet repayment of interest charges on debt, to achieve the objective of maximizing wealth of shareholders and to survive competition in the banking industry (Bakpo, 2008; Uwuigbe, 2011).

Atiya (2001) introduced a unique set of data that includes monthly and annual information on borrowers; this helps the banks to monitor commercial borrowers operating loans. Once loans are disbursed, the monitoring process begins. The purpose of loan monitoring is to identify as soon as possible any changes in the borrower's financial condition or performance that impact, or may impact, the borrower's capacity to repay the outstanding loan(s) to the bank as agreed.According to (Matoussi & Abdelmoula, 2009) if, a bank faces good customers, it will definitely have more power in lending loans and thus, increasing in profit will occur. But if bank faces bad customers who don't repay loans in due date, it will likely go bankrupt.

According to (Iwedi, and Onuegbu, 2014).Credit Risk analysis in today's financial markets is one of important factor that could be applied with neural networks.

The paper Bakpo (2008) introduces a neural network approach to perform discriminates analysis in business research. Using bank default data, the neural approach is compared with linear classifier. Empirical results show that neural model is a promising method of evaluating bank conditions in terms of predictive accuracy, adaptability and robustness. Credit rating is one of technical factor in credit risk evaluation (Khashman, 2010). The aim of credit rating is to categorize the applicants into two groups; applicants with good credit and applicants with bad credit (Ghodselahi&Amirmadhi, 2011). Artificial Neural Networks (ANN), play an increasingly important role in financial applications for such tasks as prediction, pattern recognition, classification, decision tree ,data mining ,and time series forecasting.

According to Anderson (2007) He said using credit scoring system is a based on addition, or subtraction of statistical extraction number of points relating to the applicants score given to the predictor variables. Also it gives a chance to the advance to improve customer service and the

retentions of sound customers, Emuoyibofarhe et al., (2003). They were one of the first authors to argue that credit-risk evaluation system should focus more on providing explanations for why

customers default instead of merely trying to develop score cards which accurately distinguish good customers from bad customers. According to Onyiwa (2001) He said that financial institution deals with various financial activities associated with bonds, debentures, stock, loans, risk diversification, insurance, hedging retirement planning, investment, portfolio management and other types of related functions. With the help of their function, the financial institutions transfer money or funds to various tiers of economy and this play a significant role in acting upon the domestic and international economic scenario.
They use decision trees in credit scoring, they use variable for decision making outcome

2.1 Concept of Credit Risk

Credit is the ability of a customer to obtain goods or services before payment, based on the trust that the payment will be made in the future. Also it means receiving something of value now and promising to pay for it later, often with a finance charge added by the lender. Credit risk refers means the probability of non-repayment of bank financial facilities granted to investors. Also it can be the risk that a borrower may not repay a loan and that the lender may lose the principal of the loan or the interest associated with it. The credit risk has long been an important and widely studied topic in banking. For lots of commercial banks, the credit risk remains the most important and difficult risk to manage and evaluate .One of the most important decision problems that require delicate care is granting of loans by a financial institution (bank or home Loan business).

Loan applicants can be categorized into good applicants and bad applicants. Good applicants are the applicants that are worthy of giving loans based on their very high probability of returning at the stipulated time, while bad applicants are those ones that should be rejected due to the small probability of the applicants ever returning the loan. Angelini (2008)

2.2 Credit Rating

Credit rating is an evaluation of the credit risk of a prospective debtor (an individual, a business, company or a government), predicting their ability to pay back the debt, and an implicit forecast of the likelihood of the debtor defaulting. The credit rating represents an evaluation of a credit rating agency of the qualitative and quantitative information for the prospective debtor, including information provided by the prospective debtor and other non-public information obtained by the credit rating agency's analysts. Credit reporting (or credit score) – is a subset of credit rating – it is a numeric evaluation of an individual's credit worthiness, which is done by a credit bureau or consumer credit reporting agency. Credit rating is one of technical factor in credit risk evaluation (Khashman, 2010). The aim of credit rating is to categorize the applicants into two groups; applicants with good credit and applicants with bad credit (Ghodselahi&Amirmadhi, 2011). ANN model, Multilayer feed forward networks are a class of universal approximation (Hornik, Stinchcombe, & White, 1989).

3. SYSTEM METHODOLOGY

The Methodology adopted in this project work was structured system Analysis and Design Methodology (SSADM). Credit risk evaluation system using artificial neural network will be developed using the programming language PhpAdmin and MySQL (WAMPP Local – host Server) was used as the database platform, it is a server/client system, its query data and save changes, Programmers find it easy to learn and manipulate, they are used basically to create a

relational database structure, its platform is independent having high speed on LINUX server and helps to build large and complex web applications. The program is also accommodative to all

admin' particulars. The program performs data validation to make sure that it detects any fault when lending loan out.

3.1 ProposedSystem and Implementation

The proposed system is an automated system that uses artificial neural network model to observe which customer that is credit worthy. The variables we are using for the credit scoring are dependent and independent variables. Dependent variables are as follows: good or bad customers, in this study we select good customers as person who can repays his /her loan at the due date, this can determined by not displaying Customer name in Missed payment list and the bad customer is a person who cannot repay loan as when due date, this can determine by displaying Customer name in the missed payment list. While, independent variable will evaluate the degree of influence in that of dependent variables on the classification power of ANN model, the independent variables are like income value, job, collateral values, loan, borrower, add new applicant, payment. So by using the software it will help to save the financial institutions from the problem structure and the losses of huge amount of money they encountered, thereby minimizing losses and optimize profits.

3.2 System Implementation

In producing the computer program from the system specification, client's procedures are programmed and complied and then tested for logical correctness using dummy data. After being tested individually the program was tested as a complete system. This describes the way in which the system has been designed to work and its implementation. The objective of this project is to design and implement a credit risk evaluation system using artificial neural networks model.

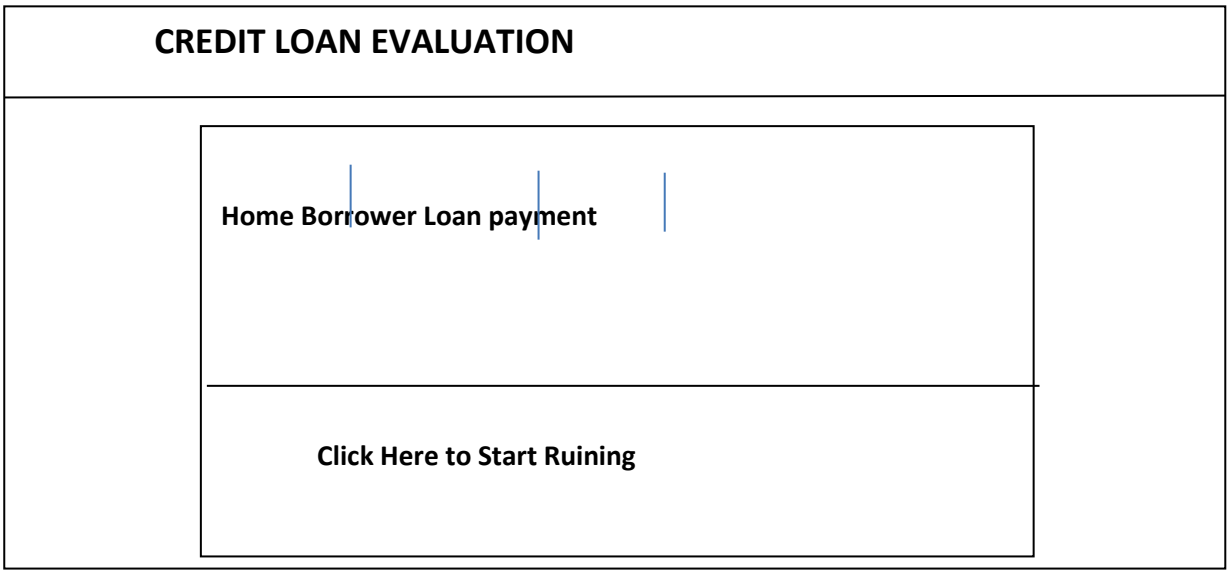

Figure 1: System Main Menu

This is the main menu where a user can switch to all the modules in the system. The control Centre/main menu contains the following:.

- **Home**. This is the menu that display all the menus for software to run

- **Borrower menu:** This menu has two submenus, which are the borrower list and Add borrower submenu. When add borrower is selected, a user can now add a new record with the customers' details to register for collection of loan. Also when "borrower list" is being selected the list of customers' displays. That's where all the customers' names registered in bank saved.
- **Loan menu:** This menu has submenus, which are loan list, loan summary, loan types and loan calculator submenu. When loan list is selected, a user can view which the customers that collected loans. When loan summary is selected, it gives the loan summary. The loan type gives the type of loans available
- **Payments menu:** This menu has two submenus, which are the incoming and received submenu. When incoming is menu selected, a list of incoming payments is displayed. When the received menu is selected, the loans repayment list id displayed.
- **Logout menu:** This menu logouts out a user from the system.

4. RESULT AND DISCUSION

This study was to develop credit risk rating system (Loan granting system) based upon data collected from a large financial institute, using Artificial Neural Networks and its Model. Banking institutions have proven to be not only important for promoting economic growth, but also to be prone to experiencing trouble. The most troublesome issue that they can face is the loss of customers trust, the growth of non- performing loans can destroy this trust. A clear definition of criteria for the classification of good and bad clients and treatment of these variables were the measures taken in this study, aiming to optimize result and minimize errors, Also Using ANN is slightly better than other models built in the past.

Meanwhile, Results of this study show that individual loan status and amount of loan have most important effect in identifying classification criteria of good customers and bad customers and also status of customer's bank account, history of customer relationship with bank and received services have least important effect. It means that bank managers and policy makers should focus on number of times that customers have received loans from bank and each time, how much was the amount of loan. Also result indicates that the credit risk evaluation model (ANN) presented is promising and reasonable.This strategy reduces risk of non-repayments and increases the bank's profit.

5. CONCLUSION

This research work is focused on enhanced credit risk evaluating model using Artificial Neural Network to solve credit risk problem in financial institutions or banks. While the problem of loan granting is general to all financial institutions, banks are directly involved. Therefore, a well-managed credit risk rating systems promote bank safety and soundness by facilitating informed decision making. Enhanced Artificial Neural Networks rating system that is been utilized in this study. Humans are not good at evaluating loan application together with the fact that Nigeria is full of corruption, tribalism, necessitates the need for robust knowledge tools usingneural networks for the suitability of the banks and Nigeria economy.This allows bank management and examiners to monitor changes and trend in risk levels .the process also allows bank management to manage risk to optimize return.

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