



Experience with new Soft Computing Concepts for Rating Systems

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Abstract: The changing market situation, which is showing a steady increase in company bankruptcies and the current activities of the Basle Committee on Banking Supervision, require new concepts for the currently used rating approaches in financial institutions. Since traditional soft computing methods like statistical analysis and neural networks are in-capable of including soft factors, that often contribute up to 40% to a correct rating, in their evaluation process RCS AG developed an intelligent rating approach that combines the advantages of several soft computing methods (Scoring; Neural Nets and Fuzzy-Logic). Based on this approach RCS AG builds decision support systems (DSS) for credit risk evaluation that are already in use in some financial institutions in Germany and Switzerland.

1 Introduction

Due to the ongoing recession, banks have had to deal with an substantial increase in defaults on credit contracts over the past years. Therefore financial institutions seek for DSS that help them to obtain a more accurate credit risk evaluation. Since the banks already do have extensive experience with the decreasing risk evaluation capability of existing risk assessment systems a clear idea exists of what the new risk evaluation system should be capable of.

In praxis banks want a variety of different objectives be fulfilled by the credit risk assessment system that cannot be met by pure data driven systems:

- Credit assessment not only based on past data
- Inclusion of qualitative financial standing characteristics
- Realistic combination of all assessment characteristics
- Implementation of a standardised credit evaluation process
- Development of a flexible system structure
- Evaluation of the actual risk connected with a contract
- Comprehensibility of all system-related decisions



2 The Development of Intelligent Credit Risk Assessment Systems

2.1 The lack in available data quality

In praxis the development of credit risk assessment systems is often confronted with past data sets that do not completely satisfy the requirements for a firm risk evaluation of a client. Main factors like management quality and other weak signals (e.g. business environmental changes) cannot be integrated into statistical based risk evaluation systems. Current mathematical and statistical concepts and systems (e.g. Scoring, MDA, Neural Nets, etc.) are only as good as the available data sets available for training (garbage-in/garbage-out syndrom).

2.2 Evaluation of Available Soft Computing Methods

For the development of credit risk assessment systems different so called soft computing methods (MDA, Scoring, Neural Networks or Fuzzy-Logic) can be used. Each of these methods represent different advantages and disadvantages. Statistical methods that form the basis for Scoring Systems as well as Neural Networks retrieve their knowledge mainly from analysing precise data of the past and use learned patterns to judge new customer contracts. In order to obtain an accurate evaluation of a given customer contract however, it is necessary to include predictive qualitative information, e.g. future market developments, into the decision process. The lack in ability on the part of Scoring Systems and Neural Networks to deal with imprecise, uncertain and predictive information that is usually not included within past data sets is therefore a major disadvantage of using these systems. Whilst Neural Networks can easily be adapted to given market changes by retraining them, a time and cost intensive redevelopment process is necessary to change an existing Scoring System. The main backdraft for Neural Networks however, is their incapability to give a precise explanation for a computed result. System users in praxis normally insisted on the transparency of all system decisions. Fuzzy Logic as the third soft computing method does not depend on the quality of available past client data and does allow the development of credit risk assessment systems that can include qualitative credit information (e.g. prognoses, given credit policy; etc.) into their decision knowledge base. Furthermore Fuzzy-Logic based systems can be adapted at any time and within a reasonable time frame to any new requirement and the open system structure guarantees the comprehensibility of any generated system decision. Although Fuzzy-Logic itself cannot be seen as a solution without disadvantages (e.g. an expert capable of expressing his knowledge in detail is needed) it proved to be the best method to fulfil most of the given criteria.



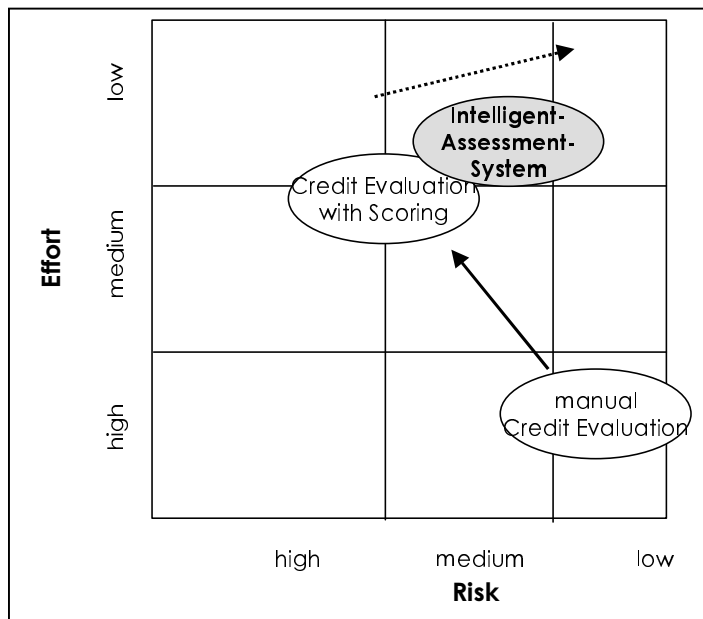
2.3 Hybrid System Structure

Since each of the available soft computing methods represents different advantages RCS AG developed an integrated realisation methodology that uses the individual advantages of each soft computing method. This approach allows the design and realisation of intelligent credit risk assessment systems that are capable to approximate a human decision process (see Graph 1). The used advantages are:

- Scoring** statistical analysis
 of customer portfolio

- Neural Nets** learning capability

- Fuzzy-Logic** flexible and
 comprehensible
 system structure

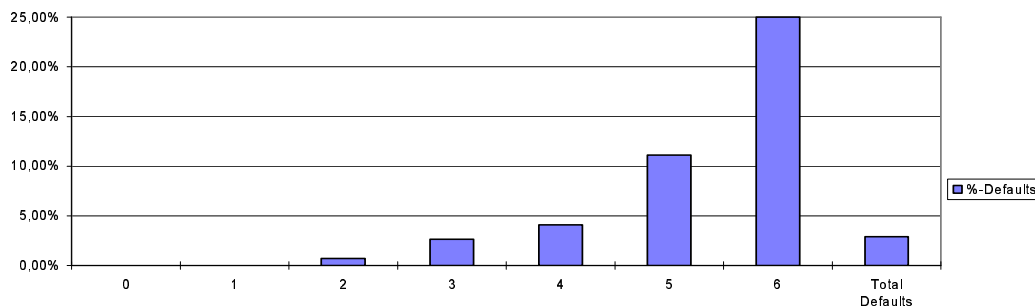


Graph 1: Approximation of human decision process using intelligent systems



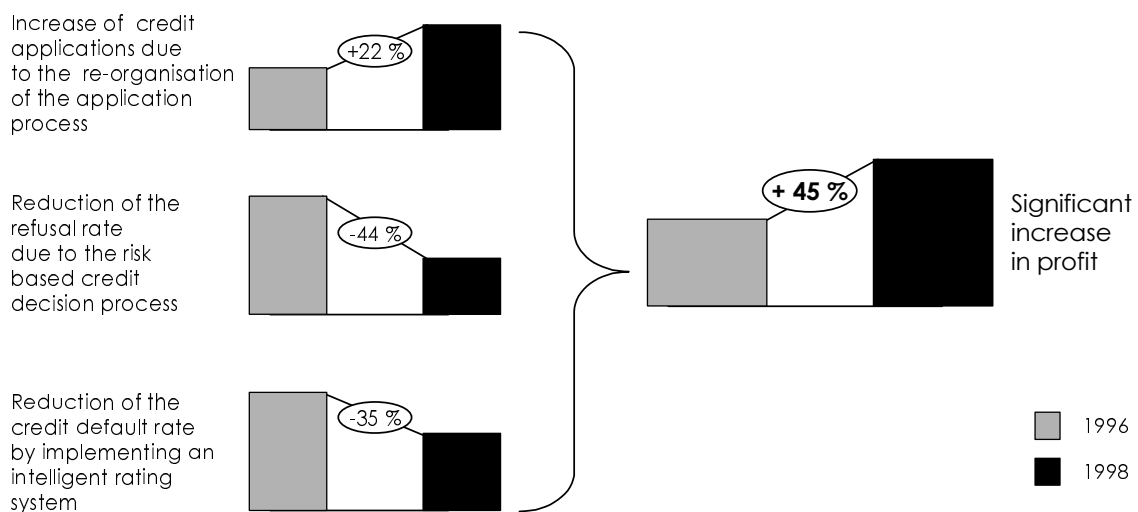
3 Measuring the Performance of the System

Since the first rating system based on the intelligent credit risk assessment approach has been implemented in May 1996 an intensive performance evaluation using real world data could be performed in mid 1999. The following graphs show some of the results of this evaluation process. Graph 5 shows the default rate within each rating class for the corporate customer group. As it shows, the real default rates increase steadily according the computed rating class. These results do not only prove how well the developed system performs but deliver important information for the newly implemented risk based decision process at the bank.



Graph 2: Real default rate per rating class for corporate customers

Graph 3 shows the most important information for the financial institution, since it quantifies the result of the system usage for the bank. During the past three years of system usage, the bank was able to increase its total credit volume by over 22% mainly due to the reduction of the refusal rate by 44%. This was possible due to both, better credit risk assessment by the used rating system and the new risk based credit decision policy of the bank. Although the bank did increase its credit volume the default rate could be reduced by over 35% which led to an increase in profits of almost 45 %.

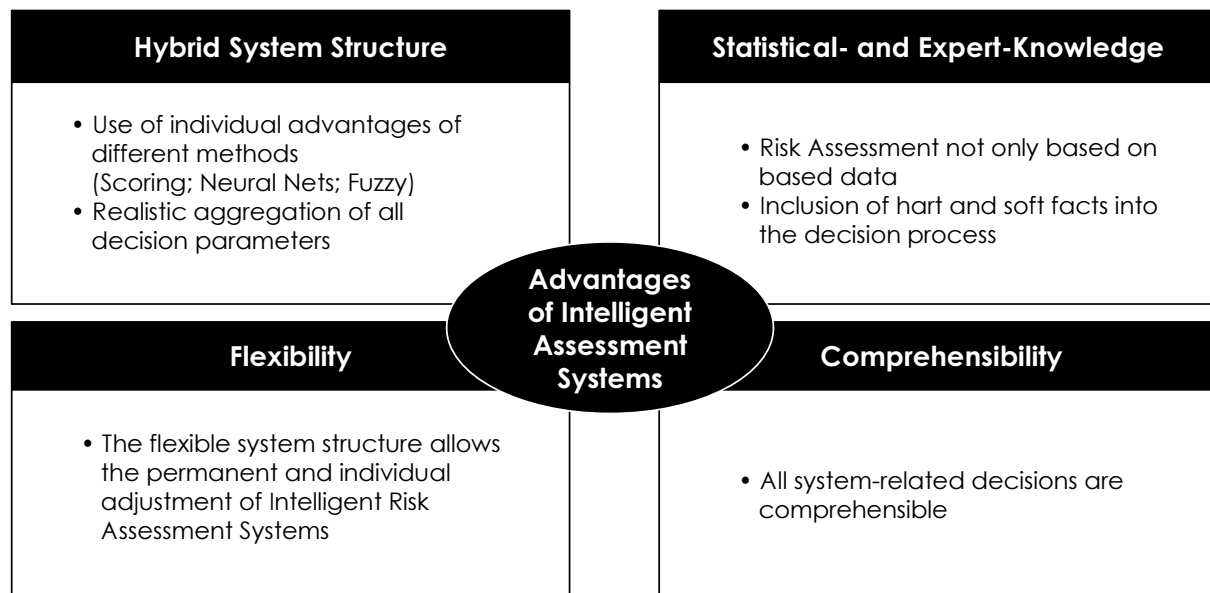


Graph 3: Evaluation results of the implemented intelligent rating system for the bank



4 Conclusion

Intelligent rating systems have proved that they can be seen as an appropriate soft computing method for risk assessment. Additional to the advantage of including uncertain, imprecise and predictive information into the evaluation process, an intelligent rating system allows the development of a creditworthiness evaluation system independent of any past data if necessary. The capability of intelligent rating systems to provide a detailed explanation of a computed rating result proves to be particularly important, not only in terms of later system usage as a decision support system but also for later system acceptance by the users. An Intelligent risk assessment system fulfills a variety of different objectives and succeeds over current system concepts due to its numerous advantages



Graph 4: Advantages of intelligent rating systems



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