



Taking the complexity out of risk management

SAS used by the department of Applied Economic Sciences at Katholieke Universiteit Leuven

"How sure are we that customers will be able to repay their debts on time?" Financial institutions ask themselves this question hundreds of times a day. It's usually a tough decision to make, and it is rarely an easy question to answer. Bart Baesens has developed a powerful but easy to use credit risk analysis model to assist decision makers. A PhD candidate in the data mining group headed by Professor Jan Vanthienen of the faculty of Applied Economic Sciences at the Katholieke Universiteit Leuven (KUL), Baesens' choice of software for credit risk analysis was SAS.

A single wrong decision about granting a loan can cause a bank or other financial institution to lose a lot of money. The person making these decisions needs to be able to explain the reasoning behind every decision: gut feeling is not good enough. So every financial institution in the world wants a reliable method to calculate risks and base decisions on the basis of sound knowledge. There are systems that provide this capability, but they are usually very complex tools, not very well adapted for use in day-to-day commercial activity.

"An intelligent credit scoring system has to be both accurate and comprehensible," says Baesens. He used SAS Enterprise Miner and SAS/STAT to build an easy-to-use credit risk decision table based on real-life data provided by a major Benelux financial

institution. Enterprise Miner includes a large number of advanced training algorithms for developing neural networks, complex mathematical models loosely based on the functioning of the human brain. Neural networks can be highly effective in finding patterns in large amounts of data, and are well suited for developing accurate credit scoring systems. Essentially, the neural network is "trained" using historic data where the outcome of the loan is known, in order to find factors common to good-risk and bad-risk customers. So it is important that the data is first pre-processed to remove discrepancies and ensure complete accuracy. The performance of the neural network is then calculated to determine its likely accuracy in predicting future outcomes. Several models, using different algorithms, are typically developed to arrive at the optimum solution. The conclusions can be applied to score future applicants for credit.

Academics like Baesens who are interested in finding simple solutions that can be applied in real-world situations have often found neural networks more accurate and easier to apply than other classification techniques such as logistic regression, discriminant analysis and decision trees.





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Bart Baesens

PhD candidate, Katholieke Universiteit Leuven

Enterprise Miner in particular simplifies the process of building a credit-scoring model by visualizing the information, usually in the form of a flow chart. “The ability to model complex algorithms and the simple graphical user interface were the main reasons we chose SAS for credit risk analysis,” says Baesens. “Taken together, these capabilities mean you can build very powerful applications in SAS.”

The final goal of the project was to draw up a clear rule set that could be used in business. “The complexity of a mathematical model is too great to allow frequent, efficient use,” says Baesens. “By contrast a compact and clear decision table facilitates both fast and correct decisions. It also enables the credit manager to explain the decision to the customer easily.”

For the financial institution, it is not only a decision about whether to grant the loan. It’s also quite important to know at what point in time the customer might run into difficulties in reimbursing the loan. This is called “survival analysis” and is a crucial factor in the final decision. Survival analysis facilitates the setting of parameters such as the loan duration and the maximum credit limit. It makes debt provisioning and behaviour monitoring possible.

According to Baesens, SAS/STAT is among the most powerful software available for survival analysis. He is planning more research before publishing his findings in this area.

However his work has already found a variety of potential applications, including the prediction of the probability of company bankruptcy, the calculation of customer lifetime value (enabling financial institutions to take a broader view of risk than simply a one-off transaction, basing decisions on the likely profitability of a customer over a lifetime) and customer retention (the likelihood that a person or company will remain a customer). Baesens is also interested in fraud detection, a key business issue for the banking sector.

All of these application areas can have an impact on a bank’s annual net income running into millions of euros. But it all starts with a gifted investigator using sophisticated software to untangle huge volumes of data, finding the factors that will determine the likely risk and profit associated with a customer and a transaction.



SAS World Headquarters
and SAS Americas
SAS Campus Drive
Cary, NC 27513 USA
Tel: (919) 677 8000
Fax: (919) 677 4444
U.S. & Canada sales:
(800) 727 0025

SAS Europe, Middle East & Africa
P.O. Box 10 53 40
Neuenheimer Landstr. 28-30
D-69043 Heidelberg, Germany
Tel: (49) 6221 416-0
Fax: (49) 6221 474850

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