NeuralWorks® Predict 3.1

Introducing NeuralWorks Predict 3.1

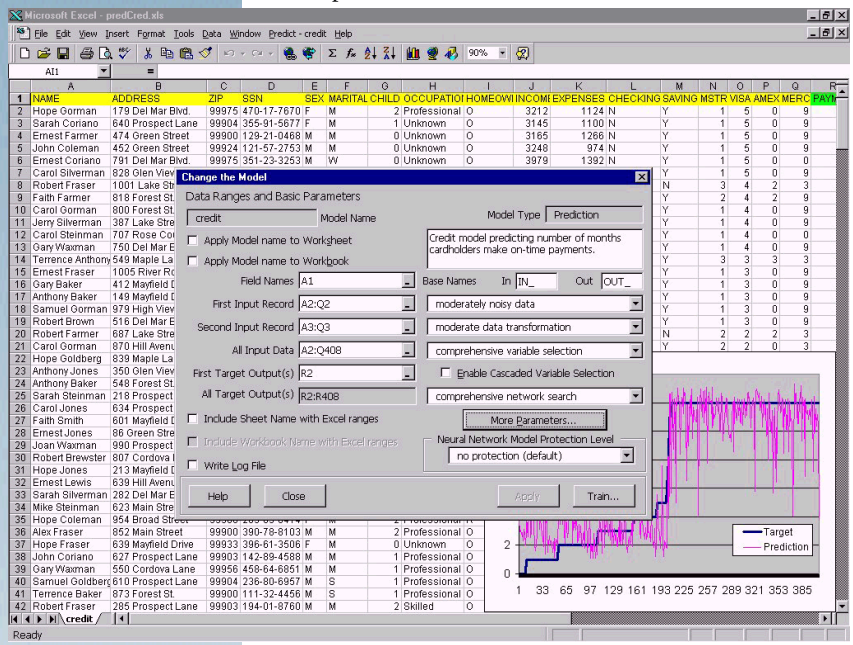
NeuralWorks® *Predict*™ is a complete application development environment for creating and deploying real-time applications for forecasting, modeling, classification and clustering or grouping. This powerful system combines neural network technology with fuzzy logic, statistics and genetic algorithms to find solutions to forecasting, modeling and classification problems automatically. For advanced and expert users, NeuralWorks *Predict* provides direct access and control of automatic features at a very low level.

SCIENTIFIC COMPUTING & INSTRUMENTATION 2003 READERS' CHOICE AWARD

Finalist

Developing Applications Automatically

NeuralWorks *Predict* understands data. NeuralWorks *Predict* captures the experience of NeuralWare's best consultants working on problems from hundreds of customers. It knows how to transform data into forms that maximize the power of neural network techniques. This saves time and also results in better performance.



Predict is being used here to develop a model to predict the number of times a credit applicant will pay their bills on time. Shown are all the parameters necessary to build a model!

NeuralWorks *Predict* clusters data. Clustering (also known as segmentation or partitioning) is the process of analyzing a collection of data records to identify those which are related or associated, based on some measure or metric of "similarity." Even though the attributes that comprise a data record typically vary widely both in type and in the range of values that each attribute can assume, the similarity measure is often characterized as a "distance" in a high dimensional "attribute space."

NeuralWorks *Predict* applies the rigors of statistics to model the real world. The algorithms used in NeuralWorks *Predict* are grounded in statistics. Key concepts such as ridge regression, maximum likelihood and cross-validation are seamlessly integrated with neural techniques. NeuralWorks *Predict* models are statistically based neural models. You can count on them!

NeuralWorks *Predict* models are a hybrid of polynomial regression, fuzzy logic and neural networks. This includes polynomial-neural and fuzzy-neural regression, data distribution compensation, non-parametric outlier detection and transformation, stochastic gradient search and mixed-mode hidden-layer functions (sigmoid, tanh, sine, exponential, linear). NeuralWorks *Predict* picks the right building blocks to build the best solution.

Simple is better. NeuralWorks *Predict* tackles complex problems, identifies the most salient features and builds just the right size model to solve your problem. NeuralWorks *Predict* has been used to sort through thousands of variables. Simple models perform better on new data, are faster and more reliable than more complex models built by trial and error.

Integrated analysis tools are tailored to each type of problem. NeuralWorks *Predict* provides all of the common analysis functions used to evaluate models. This includes standard statistical measures as well as sensitivity analysis.

NeuralWorks *Predict* handles the big problems. The command line version of NeuralWorks *Predict* eliminates the barriers on data set size allowing 4,000 fields. The number of records is only limited by the system's memory.

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Applications

NeuralWorks *Predict* is a powerful yet fully automated platform for solving forecasting, modeling and classification problems over a wide range of industries. Examples of these applications include:

- **Data mining in insurance underwriting.** NeuralWorks *Predict* was used by a major insurance company to seek out 25 key variables from over 700 potential ones. Standard statistical techniques were used on these variables to build predictive models.
- **Mortgage underwriting.** A leading mortgage company uses NeuralWorks *Predict* to evaluate new applications. The Case Based Reasoning Network provides statistical support for network predictions.
- **Warranty claims.** An auto manufacturer uses NeuralWorks *Predict* to identify key variables for predicting which car owners are most likely to make warranty claims.
- **Asset allocation.** NeuralWorks *Predict is* used by the investment division of a bank to improve forward predictions of prices and interest rates for input to an asset allocation program.
- **Bond rating.** A midwest financial institution uses NeuralWorks *Predict* to rate bonds. This has given them a substantive edge in pricing new unrated issues as well as making select investments in publicly traded issues.
- **Trading stock.** A key customer has used NeuralWorks *Predict* to model future price changes in a fortune 500 stock. They have traded based on this and have achieved consistent returns in excess of 80%.

New! The range of applications that can benefit from the new clustering technology in 3.1 is as broad as the range of applications that are appropriate for empirical modeling. Knowing the characteristics of customers whose purchase habits are similar can provide a basis for developing targeted marketing campaigns. Knowing the characteristics of individuals or enterprises whose spending patterns have led to defaulting on loans is a critical element of managing financial exposure and risk. Segmenting scientific or technical data based can lead to valuable insights that aid in understanding and using the data from which the clusters were derived.

Integration with Existing Systems

NeuralWorks *Predict* provides the following deployment options:

- Visual Basic for Excel
- Visual Basic for applications
- Excel function library
- "c/c++" (ANSI as well as K&R)
- FORTRAN-77
- Dynamic link libraries (Windows)
- Static and shared object libraries (UNIX)

NeuralWorks *Predict* can become part of your solution. NeuralWare offers a special OEM version of NeuralWorks *Predict* which can be directly embedded into your Windows 95 or 98, ME, NT, 2000, XP, Linux or UNIX applications. Contact NeuralWare for more details.

System Requirements

On Intel processors, NeuralWorks Predict requires Windows 95 or 98, ME, NT, 2000 or XP; minimum 64 MB memory; 20 MB disk space. Microsoft Excel 97 or later. Contact NeuralWare for details on the Linux and Unix versions supported.

Data Mining with Predict

The driving force behind Data Mining is turning data into knowledge and using that knowledge to make money.

Data → **Knowledge** → **$$$**

- Data Warehouses
- Proprietary Databases
- Commercial Databases

- *Data Visualization*
- *Statistics*
- **Neural Nets**
- **Case Based Reasoning**
- *Rule Induction*

- **On-line DSS**
- **Off-line Analysis**
- *Product Development*

In this instance, knowledge is used in a special way to designate the results of a process which condenses data into a compactform that can be used to predict future behavior. The figure above shows this process and the technologies that are used.

A typical data mining application starts with data. From the data, various visualization techniques are used by the analyst to understand the data, and later explore how a model which captures "knowledge" interacts with the data. The heart of data mining is the mining process itself. In many data mining applications, the goal is to find a way to predict a specific behavior. For example, the behavior might be responding to a specific mail solicitation. A result of this behavior may be the profit on purchases made by each individual respondent. Once the data is condensed into a form of "knowledge", it is used on-line in decision support systems (credit card fraud, loan approval), off-line for analysis (targeted marketing, cross-marketing or in developing new products that will appeal to a particular market segment (market segmentation).

The mining operation itself has several components. In a typical problem, the data miner is faced with dozens or perhaps even thousands of candidate variables. Many of the candidate variables have missing data. Data is mixed: symbolic (marital status), numeric enumerated (SIC code), logical (checking account), continuous (income). The data often comes from a variety of sources: proprietary data, census data, credit agency data. The data needs to be scrubbed. The list of candidate inputs needs to be reduced. NeuralWorks *Predict* solves all of these problems.

The data transformation capability of NeuralWorks *Predict* automatically identifies the type of data and applies the appropriate transformations. Non-parametric outlier detection helps "scrub" continuous data. Missing data and outliers are especially coded in the event that they are important

A genetic algorithm seeks out synergistic sets of variables which work across a range of non-overlapping subsets of alto data. Better still, this entire process is highly automated. Several customers use NeuralWorks *Predict* for this phase of data mining.

The next phase is developing a compact representation of the data, converting it to knowledge. Statistics, neural nets, cage based reasoning and rule induction are the primary techniques used. NeuralWorks *Predict* substantially automates the development of non-linear feed-forward neural networks. It borrows from a variety of statistical techniques applying ridge regression and cross-validation to produce models which capture the important relationships without fitting the noise. The case based reasoning facility of NeuralWorks *Predict* condenses data into "cells" and uses a technique for rapidly matching any input to its cell. Statistics on the nature of the outcomes for each cell are maintained.

In the deployment phase, "knowledge" is put to work. NeuralWorks *Predict* solutions can be deployed through various source code options, dynamically integrated through run-time libraries or other add-ins. In the deployed environment, NeuralWorks Predict provides the tools to analyze network responses. Sensitivity analysis ranks variables on their local impact on the predicted outcome. The Explain functionality evaluates the impact of missing data, as well as impact of inputs as if they were missing. Together, these provide the run-time analysis capabilities necessary to effectively utilize the knowledge captured in a network. NeuralWorks Predict automates and simplifies the extraction of knowledge from data, and the deployment of that knowledge into profitable solutions.

The NeuralWare Advantage

NeuralWare's corporate mission is to enable organizations to easily and cost-effectively capture the expertise of their most experienced personnel and to allow that knowledge to be integrated into powerful, real-time systems that will save time and money while providing consistently reliable results.

NeuralWare was founded in 1987. With 30,000 plus worldwide users, NeuralWare is the leading provider of neural network development environments for scientific, commercial, industrial and government applications. NeuralWare is headquartered in Carnegie, PA (near Pittsburgh).

NeuralWare's Customer Commitment

NeuralWare is committed to providing customers with maximum value through technical innovation, quality products, superior customer support and training, and relationships with leading business partners. Predict 3.1 has also been developed to be readily localized for international markets. Contact NeuralWare to find out if one of our partners has translated Predict to your native language.

NeuralWare Customer Support

Email, fax and telephone technical support is provided by NeuralWare's product support specialists located in Carnegie, PA. On-site product support is available through NeuralWare and through NeuralWare's worldwide network of Distributors, System Integrators and Value-Added Resellers.

NeuralWare Training Courses

NeuralWare offers regularly scheduled training courses at NeuralWare's Training Center located in Carnegie, PA as well as through domestic and international Distributors. For more information about current training schedules, to register for a course or to discuss customer on-site training options, please contact sales@neuralware.com.

NeuralWare Marketing Partners

NeuralWare has agreements with System Integrators, Value-Added Resellers, and Consultants who offer solutions using NeuralWare's software products.

General Information

For technical information on NeuralWare's products and services and quotations on price and availability, contact a member of NeuralWare's staff at the following address:

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