

What is NNMODEL

NNMODEL is a cost effective way of modeling process data, statistical experiments, or historical databases. It can find from simple linear to complex non-linear relationships in empirical data. It is easy to use because it **automatically constructs** mathematical models directly from your data. It enables you to create prototype models quickly and inexpensively.

NNMODEL is designed to help you get maximum benefit from powerful **neural network** modeling techniques without requiring you to learn a complicated software package or statistical language. Thus, you can learn how to use NNMODEL and start solving real world problems within a few hours.

NNMODEL currently contains program modules to:

- Design a statistical experiment - NNMODEL allows you to create a data matrix based on a statistically designed experiment. A designed data matrix will allow you to squeeze the most information from a finite number of observations. The types of designs available are: two level, three level, simplex, star-simplex, central composite and multilevel.
- Keyboard enter, file or clipboard import the data - There are three methods for entering data into NNMODEL: 1) Enter the data directly using the built in data matrix editor, 2) import an ASCII tab or blank delimited file or 3) paste data from the Windows clipboard.
- Run simple statistics and correlation reports - You can generate a report that contains the basic statistics, such as, number of observations, maximum, minimum, average, standard deviation and sum of squares. Or generate a correlation report contains the results Pearson Correlation Coefficients, Probability $> |R|$ under H_0 and $Rho=0 / N$.
- Graphically analyze the raw data - You can view the data graphically using a variety of plotting routines including: trend plot by observation, XY scatter, frequency distribution, 3 dimensional scatter. Thumbnail views of all the data can be printed for the trend, scatter and distribution plots.
- Load historical data into a designed experiment matrix - A designed data matrix can be created as an empty shell and later loaded by the historical data loader. This imposes a designed experiment onto the historical data to better insure any resulting model's long term success. This method also has two side benefits, you get to see how much of the design space is really represented in the data and it generates a smaller training matrix so the training step proceeds faster.
- Advice on missing observations - After historical data has been loaded into a designed experiment the Missing Advisor can be used to suggest trials or treatments to run that would balance the design space. Thus, extracting more information from the data.
- Add equations or calculated columns to the data matrix - Columns of data can be created by defining an equation based on the other columns. A simple equation parser is built into the data matrix editor. Rows of data can be excluded from reports, graphs or models by using an exclude equation.
- Model the data using neural networks - The whole purpose of NNMODEL is to build neural models. A model can be created and trained in just a few minutes.
- Interrogate the model interactively - After a model has been trained you can immediately ask the model to predict using combination of input levels not

seen in the data.

- Analyze the model's performance statistically - A model's performance can be evaluated using standard R square statistics.
- Display the model's predictions graphically including 3D and contour plots - A number of graphs are available for validating a model including: measured vs. predicted, measured overlaid on predicted, residual plots, trends, scatter plots, frequency distributions, XY plots, 3D surface maps and contour plots.
- Test the model on additional external data sets - a test matrix can be loaded from data matrices not originally used to generate the model. This type of testing may be the only way of validating models generated from undesigned data.
- Perform sensitivity analysis - This analysis can show you how sensitive an output variable is to changes made to the inputs. The results are ranked in order with the variables with the most effect at the top of the list.
- Export the neural model as a transportable ASCII file - Trained models can be exported from NNMODEL to any other hardware platform. Neural models can be included with user software by linking with the NNLIB library.
- Data Mining Utility Allows the user to automatically set up a historical data matrix, identify variables as factors, responses or unknown, use full dataset for modeling or select records from the database based on goodness of fit to a multi-level design, pick the best factors for inclusion into the model based on model performance, include or exclude factors for any model based on prior knowledge, report results of search.
- Train neural network from very large data matrix. The version allows an external binary file to be used as the training matrix. To use build the binary file using the "Import Raw File" with the "Create Binary File" radio button checked. The file can then be used during training by checking the "Model / Use Ext Binary File" menu item.
- DDE Interface This allows the user to call pre-trained models from within any program that allows Dynamic Data Exchange. For example, a user could write an Excel macro to load a BEP model, set the inputs from the spread sheet, interrogate the model's prediction(s) and place them back in the spread sheet.