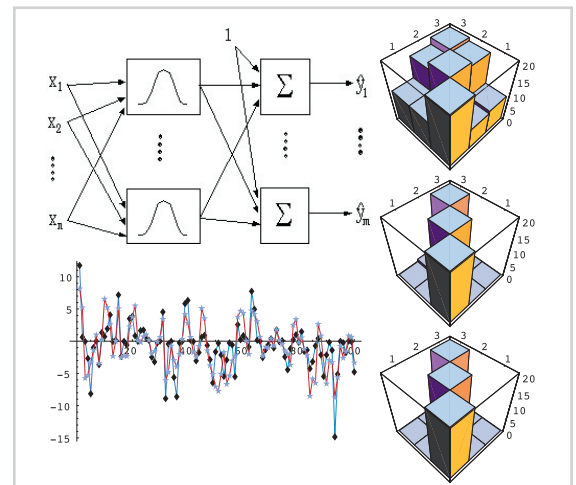


MATHEMATICA[®]

NEURAL NETWORKS

TRAIN AND ANALYZE NEURAL NETWORKS TO FIT YOUR DATA

Neural Networks capitalizes on the computational power and flexibility of *Mathematica* to solve many complex and real-world problems in engineering, science, economics, and finance using neural network models. *Neural Networks* is designed to give professionals and students the tools to train, visualize, and validate neural network models. It supports a comprehensive set of neural network structures and implements state-of-the-art training algorithms while taking full advantage of *Mathematica's* number-crunching and visualization capabilities. It also includes special functions to address typical problems in data analysis, such as function approximation, classification and detection, clustering, nonlinear time series, and nonlinear system identification problems.



Neural Networks offers an easy, convenient, and comprehensive environment in which to analyze neural network models.

KEY BENEFITS

- Professionals and students with little or no background in neural networks will benefit from the comprehensive online tutorial and the large number of examples that demonstrate the use of the different neural network models.
- Experienced neural network users will find *Neural Networks* ideal for exploring and prototyping new training algorithms with a large set of flexible function options and numerous possibilities to modify the provided algorithms.
- Advanced users will also be able to develop their own training algorithms using any commands available in *Mathematica* to further extend the capabilities of the package.

For more information, visit www.wolfram.com/neuralnetworks.

MATHEMATICA[®]

NEURAL NETWORKS

With *Neural Networks* and *Mathematica*, you will have access to a robust modeling environment that will let you test and explore neural network models faster and easier than ever before.

Neural Networks Features

Easy to Use and Learn

Small number of functions constructed so that only the minimum amount of information has to be specified by the user - Well-organized palettes with command templates, options, and links to online documentation - Intelligent initialization algorithms to begin the training with good performance and speed - Extensive documentation including an introduction to neural network theory as well as highly illustrative application examples

Support for Proven Neural Network Paradigms

Support for most of the commonly used neural network structures including radial basis function, feedforward, dynamic, Hopfield, perceptron, vector quantization, unsupervised, and Kohonen networks - Support for advanced training algorithms including Levenberg-Marquardt, Gauss-Newton, and steepest descent, as well as for traditional algorithms including backpropagation with and without momentum - Support for typical neural network applications including function approximation, classification, dynamic systems modeling, time series, auto-associative memory, clustering, and self-organizing maps

Fast and Reliable

Optimization of expressions before numerical evaluation to minimize the number of operations and reduce computational load - `Compile` command to send compiled code directly to *Mathematica* to increase computational speed - Special performance-evaluation functions included to validate and illustrate the quality of a mapping

Powerful Modeling Environment

Visualization tools for viewing network models, the training process, and network performance - Special network object to identify the type of network and list its parameters and properties - Special training record to keep intermediate information from the learning process - Functions equipped with a large number of advanced options to modify and control the training algorithms - Support for neural networks with any number of hidden layers and any number of neurons (hidden neurons) in each layer - Access to all the capabilities of *Mathematica* to prototype new algorithms or to perform further manipulations on neural network structures

General Mathematica Features

Over 1900 built-in functions, including the world's largest collection of advanced algorithms for numeric and symbolic computation, discrete mathematics, statistics, data analysis, graphics, visualization, and general programming

Multi-paradigm symbolic programming language with support for procedural, functional, list-based, object-oriented, and symbolic programming constructs

Automatic precision control and support for exact integers of arbitrary length, rationals, floating-point real and complex numbers, and arbitrary-precision real and complex numbers

User-defined or automatic algorithm selection for optimal performance

Fully programmable 2D and 3D visualization with over 50 built-in plot types

Fully integrated piecewise functions

High-speed numerical linear algebra with performance equal to specialized numeric libraries

High-performance optimization and linear programming functions

Wide-ranging support for sparse matrices

Flexible import and export of over 70 data, image, and sparse matrix formats

Industrial-strength string manipulation

Highly optimized binary data I/O

Built-in universal database connectivity

Integrated web services support

Language bindings to C, Java, .NET, and scripting languages

MathematicaMark[™] benchmarking tool

Toolkit for creating graphical user interfaces

Technical Requirements

Neural Networks requires *Mathematica* 5.0.1 or later and is available for Windows, Mac OS X, Linux, and Unix.

For a more detailed list, see www.wolfram.com/mathematica/platforms.

Related Products

The *Mathematica* Applications Library is a continually expanding collection of software used in conjunction with *Mathematica* to quickly handle specific tasks in engineering, finance, data analysis, and many other technical areas.

Some of the software packages available are:

Fuzzy Logic - *Control System Professional* - *Advanced Numerical Methods* - *Wavelet Explorer* - *Time Series* - *Experimental Data Analyst* - *Digital Image Processing*

Find the latest products and buy online throughout the world at store.wolfram.com. Choose from over 50 technical software products, more than 200 books, *Mathematica* posters, T-shirts, and other items.

For more information, visit www.wolfram.com/neuralnetworks.

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