IMSL™
C# Numerical Library

Advanced Analytics for Microsoft® .NET Applications

> *"Because the IMSL C# Library is so easy to use, our Chief Engineer was able to rewrite our application in a week. This task would have taken a couple of months to complete if he rewrote the application himself. More important, using a commercial library freed him up to work on new technology and product development."*
>
> Jeff Prevost
> Product Development Manager
> Injury Sciences

High Performance Business Analytics Made Easy

Using the IMSL C# Library, applications built on the .NET Framework provide more powerful business analytics than ever before. The IMSL C# Library delivers a new level of embeddable and scalable analytics capability to Visual Studio users that was once only found in traditional high performance computing environments.

The advanced mathematical, statistical, and finance algorithms found in the IMSL C# Library are written in 100% C#. This offers C# and VB.NET developers seamless accessibility to analytics capabilities in the integrated .NET environment with the highest degree of programming productivity and ease of use with Visual Studio.

APPLICATIONS

- Bioinformatics and Life Sciences
- Fraud Detection
- Risk Management and Portfolio Optimization in Finance and Insurance
- Energy Consumption Analysis
- Customer and Market Visual Data Analysis
- Manufacturing Yield Analysis, Process Control

- Marketing Upsell
- R&D Analytical Tools for Data Analysis and Product Optimization
- Extending Analysis and Visualization Capabilities for ISVs
    - Business Intelligence
    - Databases
    - Supply Chain

Neural Networks for Data Mining and True Predictive Analytics

The IMSL C# Library includes both neural network forecasting and classification technology that adds to the broad selection of existing data mining, modeling and prediction technologies available across the IMSL Family of products.

Neural network technology mimics human problem-solving processes by applying knowledge gained from historical data to new problems and fine-tunes the forecasting accuracy over time. With this ability, businesses can extract information such as historical cost data and apply this to the neural network to forecast future costs with increasing degrees of accuracy.

The IMSL C# Library neural network implementation utilizes a feed-forward network engine, which is especially suited for forecasting as well as binary and multi-classification problems.

Optimized for

Microsoft®
Visual Studio .net

IMSL™
C# Numerical Library

Visual Numerics®

WHAT'S NEW IN VERSION 4.0

- **Classification Neural Network engines for Binary and Multi-Classification**
  ....
- **2D Charting**
  ....
- **New High Performance Linear Programming Optimizer**
  ....
- **New random number generator using the Mersenne Twister algorithm**

| INPUT LAYER | HIDDEN LAYER 1 | HIDDEN LAYER 2 | OUTPUT LAYER |
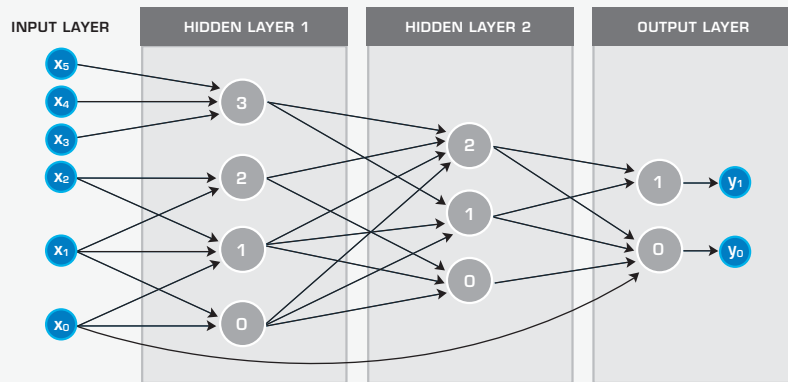
Multi-Layered Feed-Forward Network with 3 Layers and 2 Outputs

Linear Programming Optimization Robustness and Performance

Performance results for the IMSL C# Library are comparable to a leading Fortran-based dense LP solver. Studies using 91 dense LP problems from Netlib produced the following robustness results.

Problems Solved for Dense LP Solvers

A leading dense LP solver

IMSL C# Library

| 0 | 20 | 40 | 60 | 80 | 100 | % of Problems Solved |
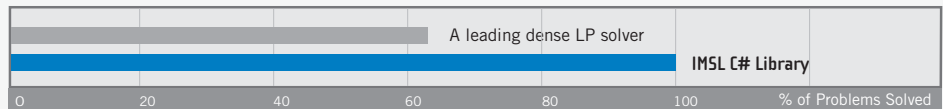
IMSL C# Library solves 100% of sample Netlib problems.

Mathematical, Statistical and Charting Functionality

Math Functionality	Statistics Functionality	Charting Functionality	Data Mining Functionality
Linear Systems	Basic & Non-parametric Statistics	Function and Spline	Neural Network Engines
Eigensystem Analysis	Time Series and Forecasting	Line, Pie, Scatter Bar, & Box	Neural Network Data Pre-processors
Interpolation & Approximation	Tests of Goodness of Fit	Polar, Area, Contour, & Histogram	…and much more
Nonlinear Equations	Regression	Date and Time Support	
Optimization	Multivariate Analysis	Fully Interactive Capabilities	
Finance & Bond Calculations	Probability Distribution Functions	High-Low-Close	
Differential Equations	Random Number Distributions	Heat Map	
…and much more	…and much more	Dendrogram	
		…and much more	

Expert Professional Services

Augment development productivity by utilizing Visual Numerics' Professional Services team to help find the best solution to any problem and deliver the support needed to ensure continued success. The highly-skilled technical experts in Visual Numerics' Professional Services organization collaborate with customers to identify specific application requirements at the initial phase of every project. Visual Numerics' consultants provide all levels of support from custom algorithm development to helping customers better understand their analysis and visualization needs. Customers can rely on Visual Numerics' technical expertise and dedicated, hands-on help to achieve the highest return on investment.

Visual Numerics®

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