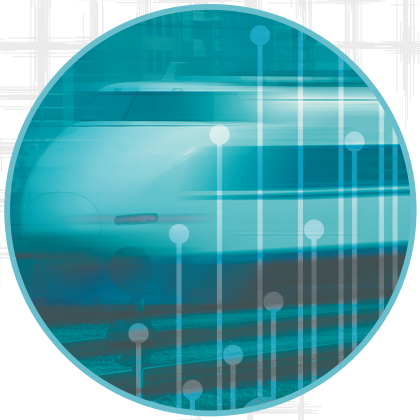
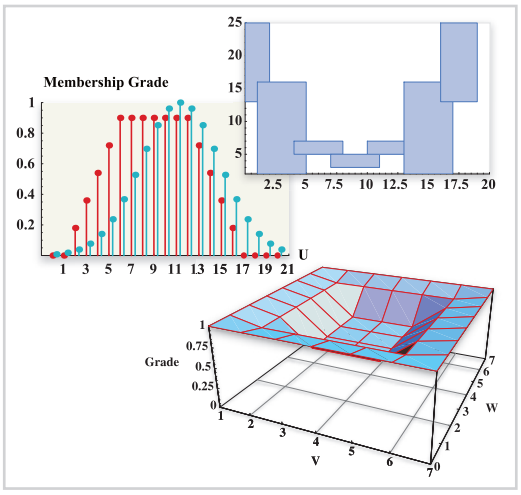


MATHEMATICA®
FUZZY LOGIC

THE MOST FLEXIBLE ENVIRONMENT FOR EXPLORING FUZZY SYSTEMS

Fuzzy Logic brings you an essential set of tools for creating, modifying, and visualizing fuzzy sets and fuzzy logic-based systems with *Mathematica*. The examples in the documentation introduce you to the basic concepts of fuzzy logic and demonstrate how to apply them to your work. The package's built-in functions help you at every stage of the fuzzy logic design process as you define inputs and outputs, create fuzzy set membership functions, manipulate and combine fuzzy sets and relations, apply inferencing functions to system models, and incorporate defuzzification routines. Ready-to-use graphics routines make it easy to visualize defuzzification strategies, fuzzy sets, and fuzzy relations.



Fuzzy Logic provides powerful functions to visualize fuzzy sets and fuzzy relations.

KEY BENEFITS

- Engineers can use *Fuzzy Logic* to research, model, test, and visualize real systems from the most basic to the highly complex.
- Researchers can use the package's comprehensive set of fuzzy logic tools to investigate applications of fuzzy theory and new ideas in the field.
- Educators can use *Fuzzy Logic* to teach concepts, basic theory, and applications of fuzzy logic, using the package alone or as a complement to a class textbook.
- Students can use the examples in the package to help solve a large variety of problems in step-by-step detail.

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

MATHEMATICA® FUZZY LOGIC

Fuzzy Logic capitalizes on the computational power and flexibility of *Mathematica* to help you learn, explore, and apply the underlying concepts of fuzzy logic.

Fuzzy Logic Features

Membership Functions
Triangular, trapezoidal, Gaussian, bell-shaped, double-sided Gaussian, sigmoidal, digital, user-defined

Compositions and Inferencing
Compositions: max-min, max-dot, max-star ▪ Rule-based inferencing for multiple-input/single-output systems with Mamdani, model, and scaled options ▪ Composition-based inferencing

Standard and Parameterized Fuzzy Aggregators
Intersections and unions: min, max, Hamacher, Frank, Yager, Dubois-Prade, Dombi, Yu, Weber ▪ Products and sums: drastic, bounded, algebraic, Einstein, Hamacher ▪ Means: arithmetic, geometric, harmonic, generalized ▪ User-defined aggregators

Fuzzy Operators
Complements: standard, Sugeno, Yager ▪ Defuzzifiers: center of area, mean of max, smallest of max, largest of max, bisector of area ▪ Normalization, concentration, dilation, fuzzy cardinality, subsethood, Hamming distance, level set, alpha cuts

Visualization of Fuzzy Sets and Relations
Discrete, line, and crisp plots of fuzzy sets ▪ Discrete 3D, surface, and wire-frame plots of fuzzy relations ▪ Fuzzy graph ▪ Membership matrices ▪ Defuzzification results

Fuzzy System Modeling and Design Applications

Fuzzy Modeling
System definition ▪ Inferencing ▪ Model building

Fuzzy Logic Control
Fuzzy inputs and outputs ▪ Control surfaces ▪ Linguistic rules ▪ Animated examples

Fuzzy Arithmetic
Fuzzy numbers ▪ Fuzzy addition, subtraction, multiplication, and division

Approximate Reasoning
Linguistic variables ▪ Hedges ▪ Modifiers ▪ Connectives

Łukasiewicz Sets and Logic

Fuzzy C-Means Clustering

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

Fuzzy Logic requires *Mathematica* 5 or later and is available for Windows, Mac OS X, Linux, Unix, and compatible systems.
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:
Neural Networks ▪ *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/fuzzylogic.

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