



# Fuzzy logic

## Matlab Fuzzy Logic Toolbox

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# Introduction

**MATLAB Fuzzy Logic Toolbox facilitates the development & simulation of fuzzy-logic systems using:**

- graphical user interface (GUI) tools
- command line functionality
- simulations with Simulink / Fuzzy Logic Toolbox blockset

**The tool can be used for building, testing and simulating**

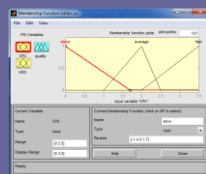
- Fuzzy Expert Systems
- Adaptive Neuro-Fuzzy Inference Systems (ANFIS)

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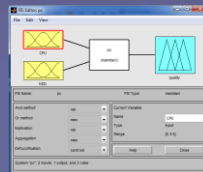
## Graphical User Interface Tools

- There are five primary GUI tools for building, editing, and observing fuzzy inference systems in the Fuzzy Logic Toolbox:

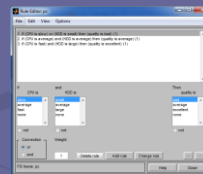
Membership Function Editor



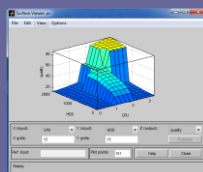
FIS Editor



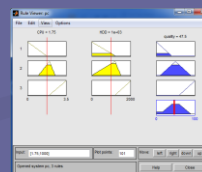
Rule Editor



Surface Viewer



Rule Viewer



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# Graphical User Interface Tools

## Fuzzy Inference System (FIS) Editor

The screenshot shows the FIS Editor window with the following components highlighted by red circles and callouts:

- FIS structure display (number & names of input and output variables, engine type):** The top section shows a diagram with input variables 'CPU' and 'HDD' connected to a fuzzy inference engine 'pc (mamdani)', which is connected to an output variable 'quality'.
- Adjust fuzzy engine methods:** The bottom-left section contains dropdown menus for 'And method' (min), 'Or method' (max), 'Implication' (min), 'Aggregation' (max), and 'Defuzzification' (centroid).
- Edit names of input and output variables:** The bottom-right section shows the 'Current Variable' settings for 'CPU', including its 'Name', 'Type' (input), and 'Range' ([0 3.5]).

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# Graphical User Interface Tools

## Membership Function Editor

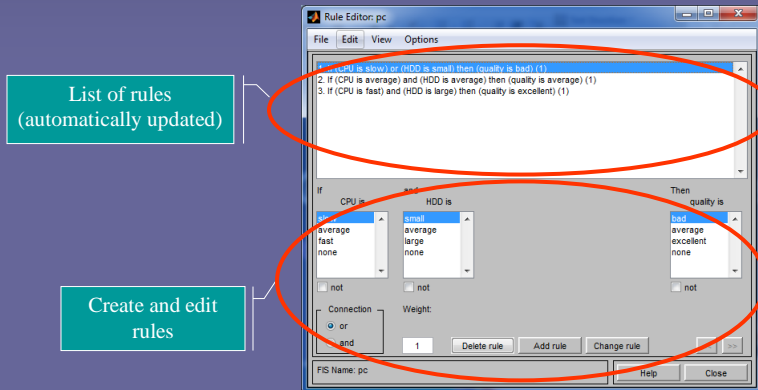
The screenshot shows the Membership Function Editor window with the following components highlighted by red circles and callouts:

- Select & edit attributes of membership function:** The top section shows a plot of the 'average' membership function for the 'CPU' variable. The plot has three points: 'slow' at 0, 'average' at 1, and 'fast' at 3.5.
- Display & edit universe of current variable:** The bottom-left section shows the 'Current Variable' settings for 'CPU', including its 'Name', 'Type' (input), and 'Range' ([0 3.5]).
- Name & edit parameters of membership function:** The bottom-right section shows the 'Current Membership Function' settings, including the 'Name' (slow), 'Type' (trimf), and 'Parameters' ([-1.4 0 1.7]).

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# Graphical User Interface Tools

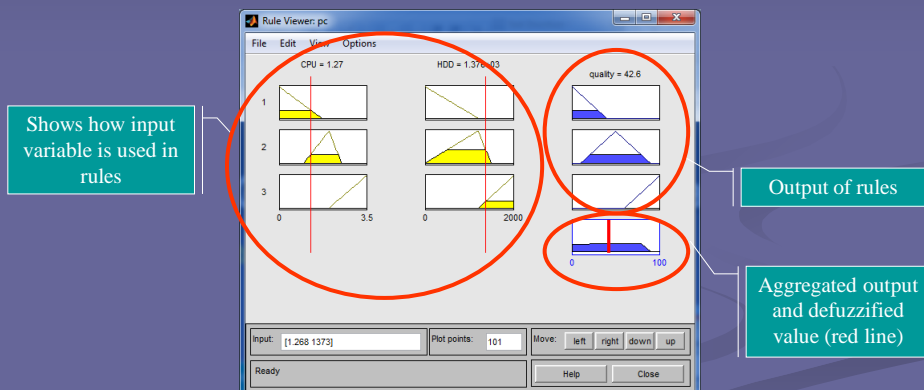
## Rule Editor



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# Graphical User Interface Tools

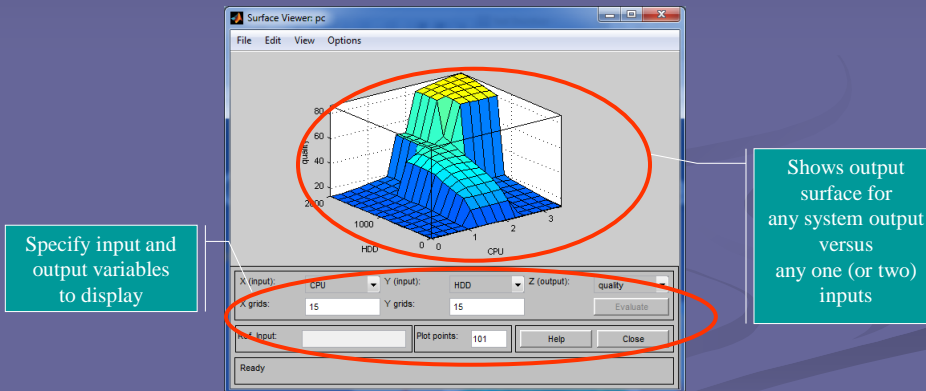
## Rule Viewer



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# Graphical User Interface Tools

## Surface Viewer

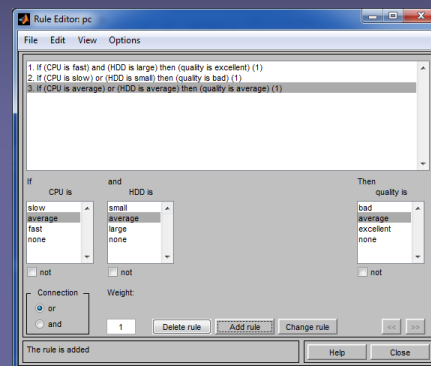


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## Example: PC (Configuration Evaluator)

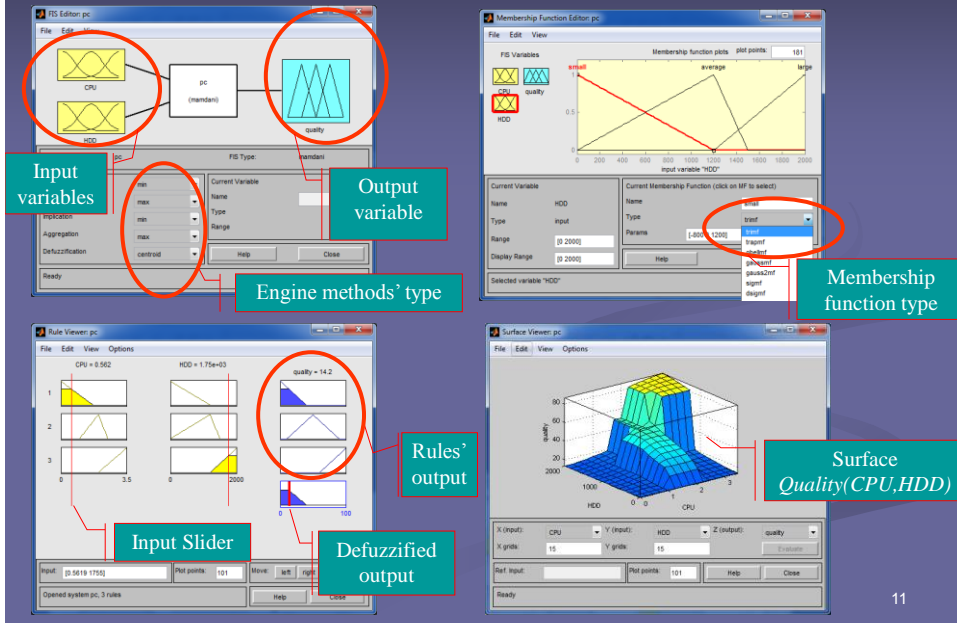
Rules resembling human reasoning:

1. if **CPU** is **FAST** and **HDD** is **LARGE**  
then **QUALITY** is **EXCELLENT**
2. If **CPU** is **SLOW** or **HDD** is **SMALL**  
then **QUALITY** is **BAD**
3. If **CPU** is **AVERAGE** and **HDD** is **AVERAGE**  
then **QUALITY** is **AVERAGE**



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## Example: PC (Configuration Evaluator)



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