

Fuzzy Logic

Web Based Inferencing and Visualisation

Craig Knott

With supervision from Professor Jon Garibaldi

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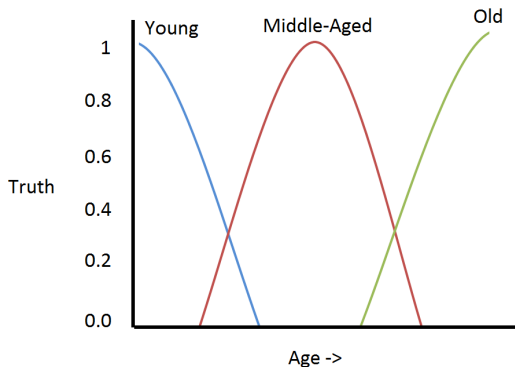
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- Models uncertainty and vagueness

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- No strict truth values
- Models uncertainty and vagueness
- For example, are you “old”

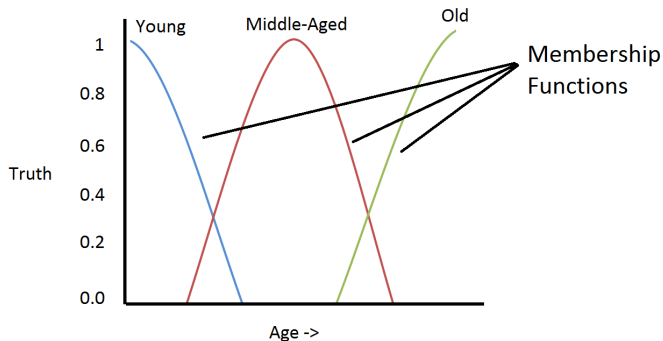
Fuzzy Membership Functions

Fuzzy Input Variable (Set) : Age



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Fuzzy Input Variable (Set) : Age



Similar Systems

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- *fuzzyTECH*

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 - Finding them
 - Downloading/Installation
 - Cost
- Difficult to use
 - Unintuitive interface - command line
 - Poorly maintained
 - Require too much prior knowledge

The Solution

My plan:

The Solution

My plan: *Web-based* system for creating and manipulating fuzzy systems.

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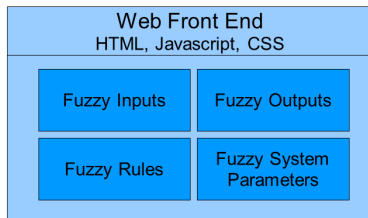
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 - FuzzyToolkitUoN backend
 - Directly use R commands

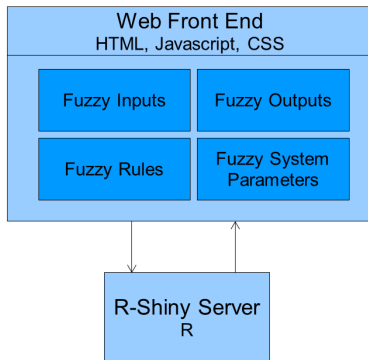
The System Architecture

Web Front End
HTML, Javascript, CSS

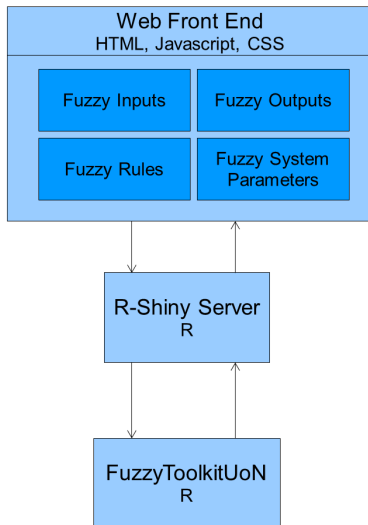
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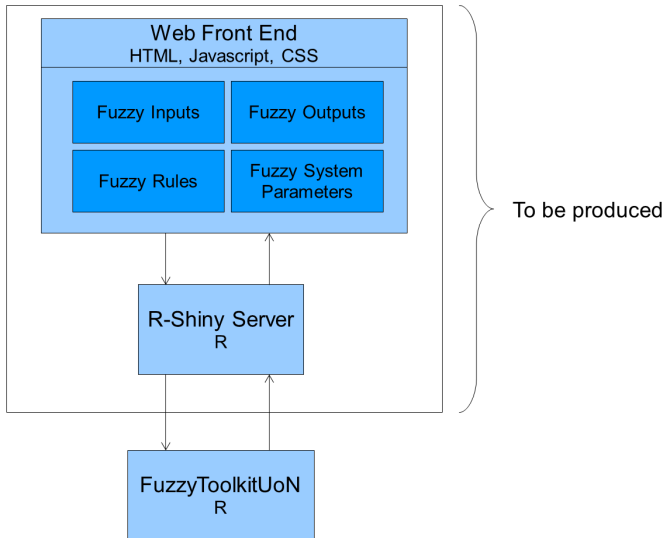
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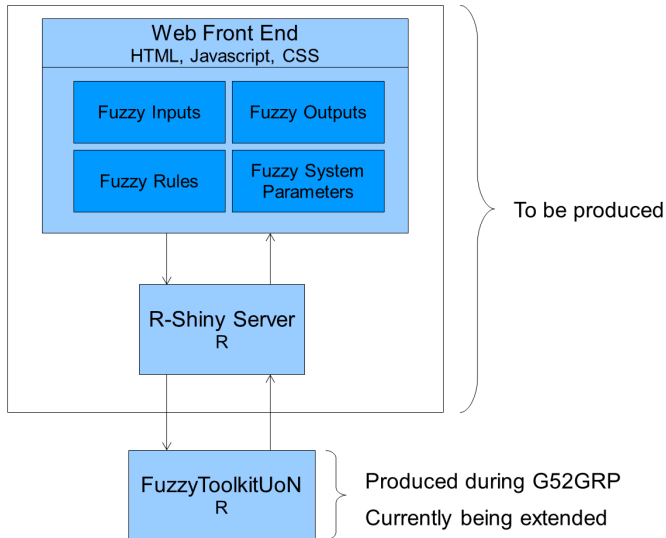
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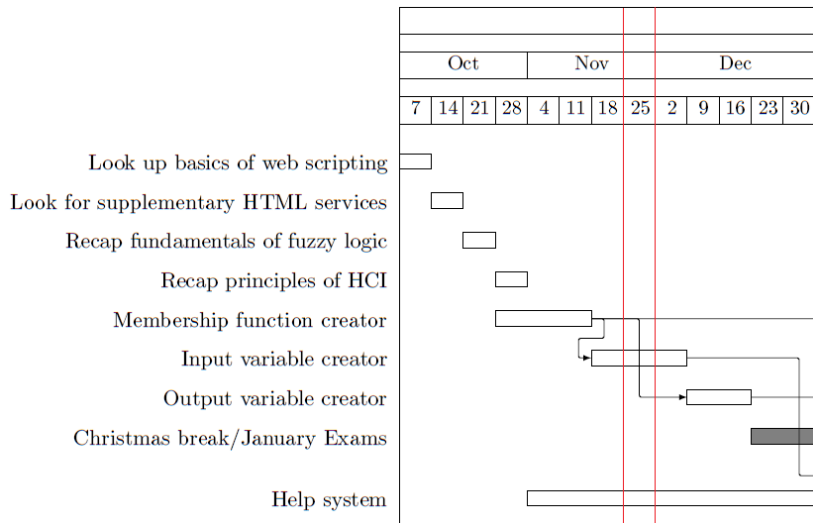
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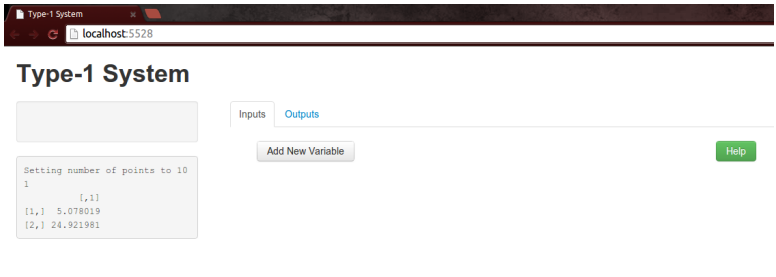
The System Architecture



Proposed Progress



Progress (1)



The screenshot shows a web browser window with the title 'Type-1 System' and the address bar displaying 'localhost:5528'. The main content area has the heading 'Type-1 System'. Below the heading, there is a large empty text input field. To the right of this field are two tabs: 'Inputs' (active) and 'Outputs'. Below the 'Inputs' tab is a button labeled 'Add New Variable'. To the right of the 'Add New Variable' button is a green button labeled 'Help'. Below the input field, there is a code block containing the following text:

```
Setting number of points to 10  
1  
[ ,1]  
[1,] 5.078019  
[2,] 24.921981
```

Progress (2)

The screenshot shows a web browser window titled "Type-1 System" with the address bar displaying "localhost:5528". The main heading is "Type-1 System". Below the heading, there is a large empty text input field. To the right of this field are two tabs: "Inputs" (selected) and "Outputs". Below the tabs is a button labeled "Add New Variable". On the left side, there is a code editor showing the following text:

```
Setting number of points to 10  
1  
[1,1] [1,1]  
[1,1] 5.078019  
[2,1] 24.921981
```

On the right side, there are two variable configuration panels. The first panel is titled "Input Variable 0" and the second is titled "Input Variable 1". Both panels show "Range: 0 to 1" and "Functions: 0". Each panel has "Edit" and "Delete" buttons. A green "Help" button is located at the top right of the variable configuration area.

Progress (3)

The screenshot shows a web browser window with the address bar displaying 'localhost:5528'. The page title is 'Type-1 System'. The interface is divided into several sections:

- Inputs/Outputs:** A tabbed interface with 'Inputs' and 'Outputs' tabs. The 'Inputs' tab is active.
- Add New Variable:** A button to add a new variable.
- Help:** A green button in the top right corner.
- Variable Name:** A text input field containing 'Input Variable 0'.
- Range (min-max):** Two input fields with values '0' and '1'.
- Functions: 0:** A section for defining functions, currently empty.
- Buttons:** 'Add Function' (blue), 'Save and Close' (green), and 'Delete' (red) buttons.
- Input Variable 1:** A section for a second variable, showing 'Range: 0 to 1' and 'Functions: 0' with 'Edit' and 'Delete' buttons.

On the left side, there is a text box containing the following text:

```
Setting number of points to 10  
1  
[1,] 5.078019  
[2,] 24.921981
```

Progress (5)

Add New Variable

Variable Name
Input Variable 0

Range (min-max)
0 1

Functions: 0

Add Function

Input Variable 1
Range: 0 to 1
Functions: 0 Edit Del

Membership Function Creator Help x

Function name

Function type
Gaussian

Parameters
Sigma
Mean
Height

Degree of membership

Range

Close Save changes

Progress (6)

Membership Function Creator

Function name: Middle-Aged

Function type: Gaussian

Parameters:

- Sigma: 1.5
- Mean: 0.5
- Height: 1

Degree of membership

Range

Close Save changes

The background interface shows a variable named 'Input Variable 0' with a range of 0 to 1 and 0 functions defined. A modal window titled 'Membership Function Creator' is open, showing the configuration for a new function named 'Middle-Aged'. The function type is set to 'Gaussian'. The parameters are Sigma: 1.5, Mean: 0.5, and Height: 1. A graph on the right shows a bell curve centered at 0.5 on the 'Range' axis (0.0 to 1.0), with the peak at a 'Degree of membership' of 1.0. The graph is labeled 'Middle-Aged'. At the bottom of the modal, there are 'Close' and 'Save changes' buttons.

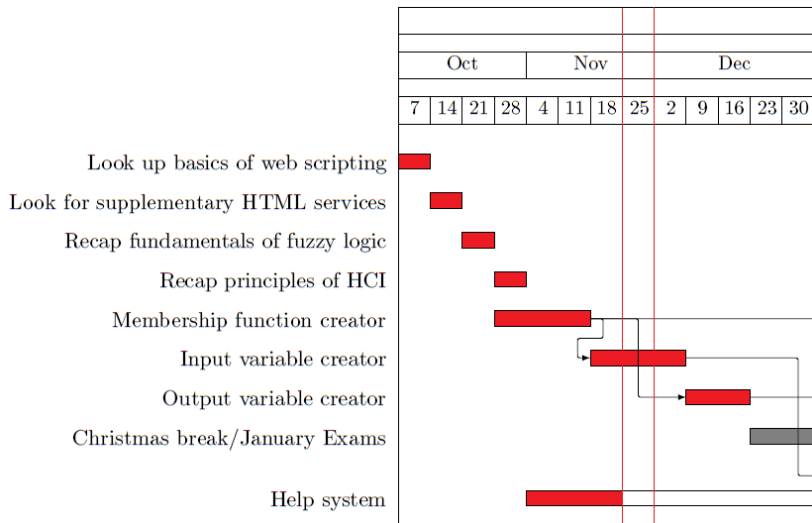
Progress (8)

The screenshot displays the 'Type-1 System' web application running on a browser at localhost:5528. The interface is divided into several sections:

- Header:** 'Type-1 System' and a browser address bar showing 'localhost:5528'.
- Left Panel:** A text box containing the instruction 'Setting number of points to 10' and a list of data points:

```
1  
[1,] 5.078019  
[2,] 24.921981
```
- Main Content Area:**
 - Tabs:** 'Inputs' and 'Outputs', with 'Outputs' currently selected.
 - Buttons:** 'Add New Variable' and 'Help'.
 - Variable Configuration Form:**
 - Variable Name:** 'Input Variable 0'.
 - Range (min-max):** Two input fields with values '0' and '1'.
 - Functions: 1**
 - Table:** A table with columns 'Name' and 'Type'. It contains one entry: 'Middle Aged' with type 'gau'. Below the table are 'Edit' and 'Delete' buttons.
 - Buttons:** 'Add Function', 'Save and Close', and 'Delete'.
- Bottom Panel:** A summary box for 'Input Variable 1' showing 'Range: 0 to 1' and 'Functions: 0', with 'Edit' and 'Delete' buttons.

Actual Progress



Extended Progress

The screenshot shows a web browser window titled "Type-1 System" with the address bar displaying "localhost:5528". The main heading is "Type-1 System". Below the heading, there is a large empty text input field. To the right of this field are two tabs: "Inputs" (highlighted in blue) and "Outputs". Below the "Inputs" tab is a button labeled "Add New Variable". Below the "Outputs" tab is a green button labeled "Help". In the center-right area, there is a box for "Output Variable 0" with the range "Range: 0 to 1" and "Functions: 0". This box contains two buttons: "Edit" (blue) and "Delete" (red). On the left side, below the input field, there is a text area containing the following text:

```
Setting number of points to 10  
1  
      [,1]  
[1,]  5.078019  
[2,] 24.921981
```

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Any Questions?