

***In The Name of Allah***  
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***Study report on the FuzzyLite***

➤ FuzzyLite [1]

The FuzzyLite Libraries for Fuzzy Logic Control

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❖ **Introduction**

QtFuzzyLite 6 is (very likely) the best application available to easily design and directly operate fuzzy logic controllers in real time.

fuzzylite is a free and open-source fuzzy logic control library programmed in C++ for multiple platforms (e.g., Windows, Linux, Mac, iOS).

jfuzzylite is the equivalent fuzzylite library for Java and Android platforms.

❖ **License of the FuzzyLite Libraries**

The FuzzyLite Libraries, namely fuzzylite 6.0 and jfuzzylite 6.0, are licensed under the GNU General Public License (GPL) 3.0 and under a paid license for commercial purposes. If you are using them under the GPL license, please consider purchasing a license of QtFuzzyLite to support the development of the libraries. If you want a commercial license of fuzzylite and jfuzzylite, please contact [sales@fuzzylite.com](mailto:sales@fuzzylite.com).

❖ **Features**

The FuzzyLite Libraries have the following features:

1. Controllers: Mamdani, Takagi-Sugeno, Larsen, Tsukamoto, Inverse Tsukamoto, Hybrids
2. Linguistic terms: (4) Basic: triangle, trapezoid, rectangle, discrete.
3. Extended: bell, cosine, gaussian, gaussian product, pi-shape, sigmoid difference, sigmoid product, spike.
4. Edges: binary, concave, ramp, sigmoid, s-shape, z-shape.
5. Functions: constant, linear, function.
6. Activation methods: general, proportional, threshold, first, last, lowest, highest.

7. Conjunction and Implication (T-Norms): minimum, algebraic product, bounded difference, drastic product, einstein product, hamacher product, nilpotent minimum, function.
8. Disjunction and Aggregation (S-Norms): maximum, algebraic sum, bounded sum, drastic sum, einstein sum, hamacher sum, nilpotent maximum, normalized sum, unbounded sum, function.
9. Defuzzifiers: (5) Integral: centroid, bisector, smallest of maximum, largest of maximum, mean of maximum.
10. Weighted: weighted average, weighted sum.
11. Hedges: any, not, extremely, seldom, somewhat, very, function.
12. Importers: FuzzyLite Language fll, Fuzzy Inference System fis, Fuzzy Control Language fcl.
13. Exporters: C++, Java, FuzzyLite Language fll, FuzzyLite Dataset fld, R script, Fuzzy Inference System fis, Fuzzy Control Language fcl.

(30+) Examples of Mamdani, Takagi-Sugeno, Tsukamoto, and Hybrid controllers from fuzzylite, Octave, and Matlab, each included in the following formats: C++, Java, fll, fld, R, fis, and fcl.

In addition, you can easily :

- Create your own classes inheriting from fuzzylite, register them in the factories, and incorporate them to operate in fuzzylite.
- Utilize multiple rule blocks within a single engine, each containing any number of (possibly weighted) rule, and different conjunction, disjunction and activation operators.
- Write inference rules just naturally, e.g., "if obstacle is left then steer is right".
- Return a default output value, lock the output values to be within specific ranges, lock the previous valid output value when no rules are activated.
- Explore the function space of your controller.
- Utilize the entire library across multiple threads as it is thread-safe.
- Download the sources, documentation, and binaries for the major platforms in the Downloads tab.

#### ❖ Videos

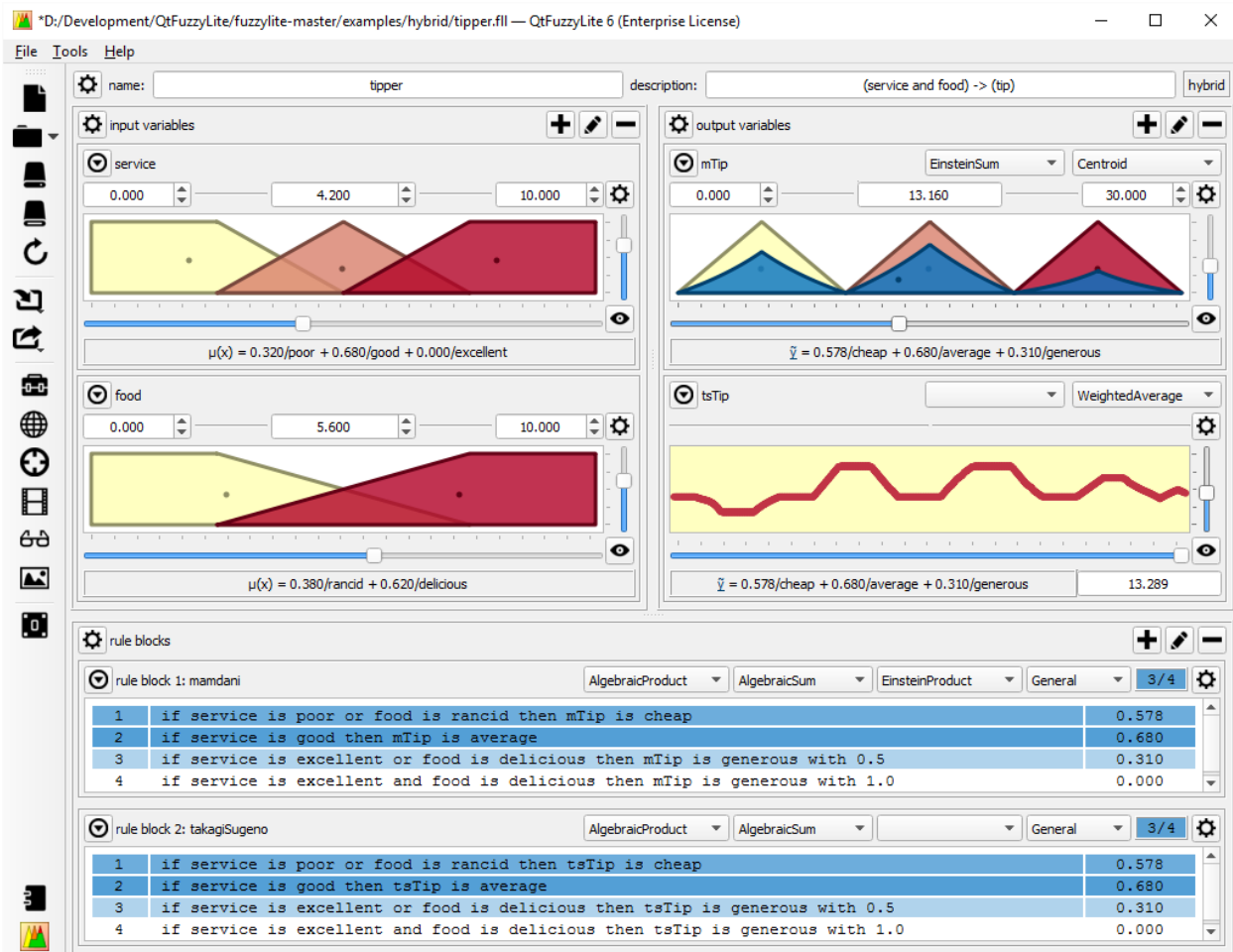
- tutorial on fuzzylite <sup>[ii]</sup>
- tutorial on qtfuzzylite <sup>[iii]</sup>
- example of fuzzylite in real time <sup>[iv]</sup>

## ❖ Current Version

(20/03/2017) QtFuzzyLite 6 for Windows, Linux, and MacOSX

(20/03/2017) fuzzylite 6.0 for C++

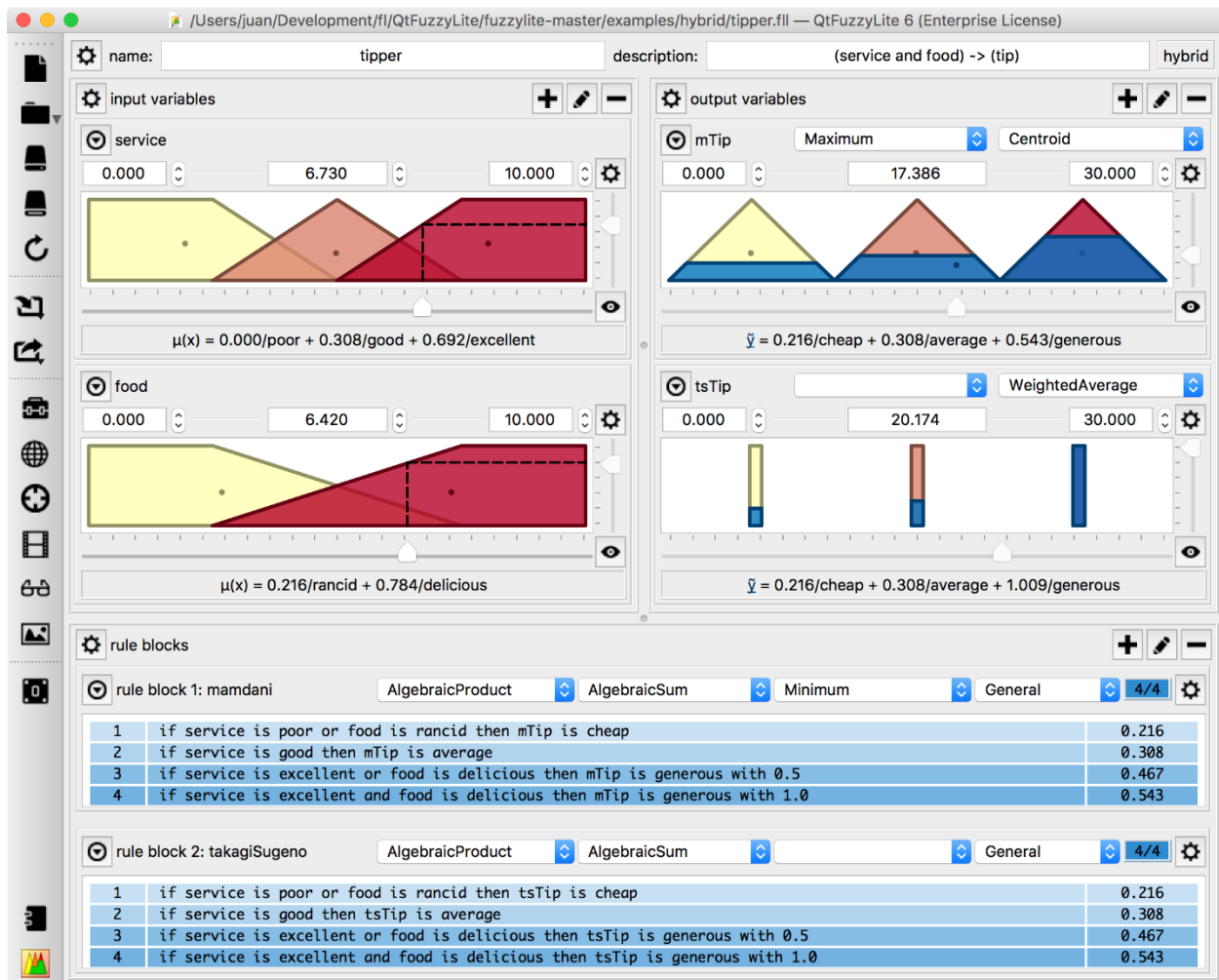
(20/03/2017) jfuzzylite 6.0 for Java and Android



QtFuzzyLite 6 for Windows [v]



QtFuzzyLite 6 for Linux [vi]



QtFuzzyLite 6 for MacOSX [vii]

## Refrence

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- [<sup>i</sup>] <https://www.fuzzylite.com/>
- [<sup>ii</sup>] <https://youtu.be/rSAIWPyA34>
- [<sup>iii</sup>] <https://youtu.be/8UQghVz8N9A>
- [<sup>iv</sup>] [https://youtu.be/YOKk8G\\_5aRA](https://youtu.be/YOKk8G_5aRA)
- [<sup>v</sup>] <https://www.fuzzylite.com/wp-content/uploads/2014/07/Windows-101.png>
- [<sup>vi</sup>] <https://www.fuzzylite.com/wp-content/uploads/2014/07/Ubuntu-1510.png>
- [<sup>vii</sup>] <https://www.fuzzylite.com/wp-content/uploads/2014/07/MacOS-Sierra.png>