

# Sources for Type-2 Fuzzy Set and Computing With Words Software

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## Notes:

(1) To be included herein, this must be software that is accessible to anyone, can be used as is, and is documented so that the code can be understood (or linked to an article).

(2) The content of this document is a work in progress. **If you are the author of software that you feel should be added to this list, please send the reference to it to me formatted as below, and I will add it to this Supplementary Material when it is next updated. My e-mail address is: [mendel@sipi.usc.edu](mailto:mendel@sipi.usc.edu).**

## I. TYPE-2 FUZZY SETS AND SYSTEMS SOFTWARE

As of the writing of this paper (August 2018), the following sources are available<sup>1</sup> for T2 fuzzy sets and systems software:

1. A free open source<sup>2</sup> MATLAB<sup>®</sup>/SIMULINK<sup>®</sup> Toolbox for interval type-2 fuzzy logic systems. It can be accessed at: <http://web.itu.edu.tr/kumbasart/type2fuzzy.htm>. Its developers are Ahmet Taskin and Tufan Kumbasar.
2. Functions for Interval Type-2 Fuzzy Logic Systems: It is MATLAB<sup>®</sup> based, free and can be accessed at: <https://www.mathworks.com/matlabcentral/fileexchange/29006-functions-for-interval-type-2-fuzzy-logic-systems>. Its developer is Dongrui Wu.
3. Juzzy, a free, open-source, Java based library for the design and implementation of type-1, interval and general type-2 sets and system-based applications. It can be accessed at: <http://lucidresearch.org/software>. Its developer is Christian Wagner.
4. Type-2 fuzzy logic software (a collection of m-files for MATLAB<sup>®</sup> that includes m-files for type-1 fuzzy systems): It is free and can be accessed at: <http://sipi.usc.edu/~mendel/> (go to Publications/Software/Software/I agree to these conditions). Its developers are: Nilesh Karnik, Qilian Liang, Feilong Liu, Dongrui Wu, Jhiin Joo, Minshen Hao, and Jerry M. Mendel. The following folders are useful: Type-Reduction, Interval Type-2 FLSs and General Type-2 FLSs.
5. The MathWorks FL Toolbox now includes m-files for: Type-2 fuzzy inference systems, Interval type-2 Mamdani fuzzy inference system, Interval type-2 Sugeno fuzzy inference system, Fuzzy PID control with type-2 FIS, and Predict chaotic time series using type-2 FIS.

## II. COMPUTING WITH WORDS SOFTWARE

### A. Linguistic Summarization

None available.

### B. The 2-Tuple Linguistic Model

As of the writing of this paper (August 2018), FLINTSTONES (Fuzzy LINGuisTic DeciSion TOols eNhacemEnt Suite) is available. It has been developed using Java as the programming language, is free, and can be accessed at: <http://sinbad2.ujaen.es/flintstones>. A user's guide is in preparation. Chapter 8 of Martinez, L., R. M. Rodriguez and F. Herrera, *The 2-tuple Linguistic Model: Computing with Words in Decision Making*, Springer, Cham, Switzerland, 2015, which is 22 pages is good reading about this software package.

<sup>1</sup> There also is other proprietary software that is being used by researchers, but, even though it is used, mentioned, described and referenced in articles, it is not available to others.

<sup>2</sup> MATLAB and SIMULINK are registered trademarks of The MathWorks.

### **C. Perceptual Computer**

As of the writing of this paper (August 2018), the following source is available for Perceptual Computer software:

Mendel, J. M. and D. Wu, *Perceptual Computing: Aiding People in Making Subjective Judgments*, Wiley-IEEE Press, Hoboken, 2010. MATLAB software is available for Chapters 2–10 of this book. It is free and can be accessed at: <http://sipi.usc.edu/~mendel/> (go to Publications/Software/Software/I agree to these conditions). It is in the folder, entitled “Perceptual Computing Book Programs”. Its developer is Dongrui Wu.