FisPro was developed by Cemagref and INRA for a regional project in Languedoc-Roussillon, France (Cost 2000-12). The industrial partner was the cave « La Malepère », Arzens, Aude.

Fispro@supagro.inra.fr

An open source software for fuzzy inference system design and optimization

Fuzzy Inference Systems
When human expertise is essential
When data are imprecise
When mathematical modeling is incomplete

Transparent models
To extract knowledge from data
To build aggregate variables
To handle a symbolic output (risk level)
To manage transition between models

Portable
It runs on most hardware and software platforms

Located
The interface is available in four languages

Documented
User documentation, quick start guide, learning guide, programmer documentation

Open source
The source code is provided so that it can be extended and improved

http://www.inra.fr/Internet/Departements/MIA/M/fispro/indexen.html
FisPro offers the possibility to create fuzzy inference systems and to use them for reasoning purposes, especially for simulating a physical or biological system. Fuzzy inference systems are based on fuzzy rules, which have a good capability for managing progressive phenomena.

FisPro implementation provides tools for hand design of fuzzy systems from the expert knowledge available in a given area, but experience is essential. This approach is illustrated by an example given in the user guide “Quickstart with FisPro.”

FisPro also allows the design of a fuzzy inference system from the numerical data related to the problem under study. Many automatic tuning methods unfortunately lead to black box systems. In this context, the user is isolated from the fuzzy system reasoning. This approach is the main advantage of the software. Some examples are given in this work to illustrate how the software can be used.

Both approaches, expert rule design and automatic induction, can be combined to create more complete and better performing systems. FisPro offers educational tools that illustrate the reasoning mechanism, and other tools to measure the system accuracy on datasets.

Grape price in function of the degree and the plot yield

Easy to understand rules using natural language: «If degree is average and yield is low then price is average».

Inference mechanism

The price is 82.89 for a degree equal to 11.55 and a yield equal to 62 q/ha. The degree is both “Average” and “High”, the yield is “Low”, only rules 2 and 4 are relevant and will be used in the inference.

The output results from an interpolation between the rule conclusions: Average price and High price.

Partitions of input variables

Fuzzy set resulting from rule 2 and rule 5 aggregation

The price is 82.89 for a degree equal to 11.55 and a yield equal to 62 q/ha. The degree is both “Average” and “High”, the yield is “Low”, only rules 2 and 4 are relevant and will be used in the inference.

The output results from an interpolation between the rule conclusions: Average price and High price.

Partitions of input variables

Fuzzy set resulting from rule 2 and rule 5 aggregation

The price is 82.89 for a degree equal to 11.55 and a yield equal to 62 q/ha. The degree is both “Average” and “High”, the yield is “Low”, only rules 2 and 4 are relevant and will be used in the inference.

The output results from an interpolation between the rule conclusions: Average price and High price.