Embedding Artificial Intelligence and Soft Computing in general purpose programming languages

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Plan of presentation

- Problem
- Aim
- Intelligent software
- Examples
Computer languages

Scientific perspective

Matlab
Scilab
(C)Lisp
Clips
Prolog
Others

Programming perspective

... C/C++
Java
Ruby
Python
PHP
RIA
Why

- Popular in the research community
- Specialized languages
- Many libraries/toolkits and examples are available
Why not

- Specialized
- High price
- Simple or no GUI
- No networking
- Research not production languages
- CES (Numb3rs)
The aim of this tutorial

- Promote other programming languages and technologies
- Show the benefits of software based on technologies
Important features

- Scientific libraries
- Dynamic languages
- Prototyping
- Visual design (graphical programming)
More important part of AI software

Knowledge Models
Rules
Graphs
Product

Researchers -> Proxy

Proxy
Programmers
Marketing
Sales

Customers

Embedding Artificial Intelligence and Soft Computing in general purpose programming languages
Software quality factors

Efficiency
Security
Testability
Maintainability

Usability
Levels of programming languages

Easiness

IV level

III level

II level

I level

Universality

Universality

Embedding Artificial Intelligence and Soft Computing in general purpose programming languages
Software production

Research

Development

Idea

Technology X

Replanning & redesign

Technology Y

Product
Examples

I

Desktop

II

Server

III

Client

Embedding Artificial Intelligence and Soft Computing in
general purpose programming languages
Problem I

Perform machine learning task:

- Iris
- kNN

Java + Java-ML
Problem I

Java:
• Highly popular
• Many libraries
• Portable
• GUI
• Networking
• Look&Feel
Problem II

Web service with soft computing capabilities:

• Welch&Bishop filtering problem
• Graphical presentation of the results

Python + SciPy
Problem II

**Figure 3-1.** The first simulation: \( R = (0.1)^2 = 0.01 \). The true value of the random constant \( x = -0.37727 \) is given by the solid line, the noisy measurements by the cross marks, and the filter estimate by the remaining curve.

Welch&Bishop
Problem II

Python:
• Highly popular
• Prototyping
• GUI
• Networking
• Dynamic language
• Portable
• Multiple targets
Problem III

Particle Swarm Optimisation:

- Animated
- On client machine

Flex (ActionScript)
Problem III

Flex (but applies to the other RIAs):

• Web solutions
• Prototyping
• GUI
• Portable
• Easy to use
Choose a language/technology that suits your problem.

Do not solve the problem in some way only because that suits your language/technology.
Idea

Prepare AI&SC programming benchmarks and compare:

- Speed
- Easiness
- Efficiency
Tutorial will be available at www.pietruszkiewicz.info