ATNoSFERES: a Model for Evolutive Agent Behaviors

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Ethological approach towards adaptive MAS

- focus on behavior design & selection
- strong influence of the environment (situatedness)

Model requirements

- automatic design of adaptive agents behaviors
- Darwinian evolution as design mechanism
- multi-level organization
Overview of evolutionary approaches

Genetic Algorithms
(Holland)

- Parameters for a predefined behavior

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+ Continuity genotype - phenotype
- Poor expressive power

Genetic Programming
(Koza)

+ Automatic behavior design
- Strong dependencies between nodes
The ATNoSFERES model Agent architecture

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\[ \text{bitstring} \]

\[ \text{Translation} \]

\[ \text{tokens} \]

\[ \text{Interpretation} \]

\[ \text{graph (ATN)} \]
The ATNoSFERES model Multi-agent architecture

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Properties of the model

• No hypothesis regarding cognitive abilities
• Any genotype produces a consistent behavior
• Continuity genotype $\Leftrightarrow$ phenotype
• High expressive power in behaviors

• Validation by experiments
• Adaptation of behavior-building strategies
Perspectives

• « Composite Agent » encapsulating a MAS
  • multi-level organization
  • multi-level specification
• Metabolic regulation of behaviors

• Experiments on predator/prey issues
• Experiments on real robots (MICRobES Project: http://miriad.lip6.fr/microbes)