CSE/ECE 848
Introduction to
Evolutionary Computation

Module 3 - Lecture 15 - Part 6
Learning Classifier Systems Variants

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Difference of Opinion

- Holland's approach: – Learning as iterative adaptation – LCS as a continuous adaptation process of one solution.

- DeJong's approach:– Learning as generational optimization– LCS as a generational optimization process of a set of alternative solutions (like a GA)

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Pittsburgh vs MI Approach

- Each individual encodes an entire problem solution

- Each individual encodes an entire set of rules

- Whole rule sets are evaluated

- Complete competing problem solutions evolve

  - An offline learning system that learns iteratively from sets of problem instances

  - Typically, small rulesets evolve

- One complete problem solution is encoded

- Each individual encodes one single rule

- Rules are evaluated individually

- Rules evolve (competitively)individually

  - An online learning system that learns iteratively from single problem instances

  - Typically, solutions with a larger number of (local) rules evolve

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Shortcomings, LCS

- Bucket brigade tended to not reinforce long rule chains very well. Early rules, essential for performance, got very little

- GA learning was difficult to judge, as are any multi-level learners. Could only judge after time, making progress slow

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Fundamental changes

- Stewart Wilson, 1990's, looked to improve performance of LCS

- Came up with two different approaches to LCS called ZCS and XCS

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Change of system

- Removed the message list. All messages are received from and act against the environment

- Payoff straight from the environment

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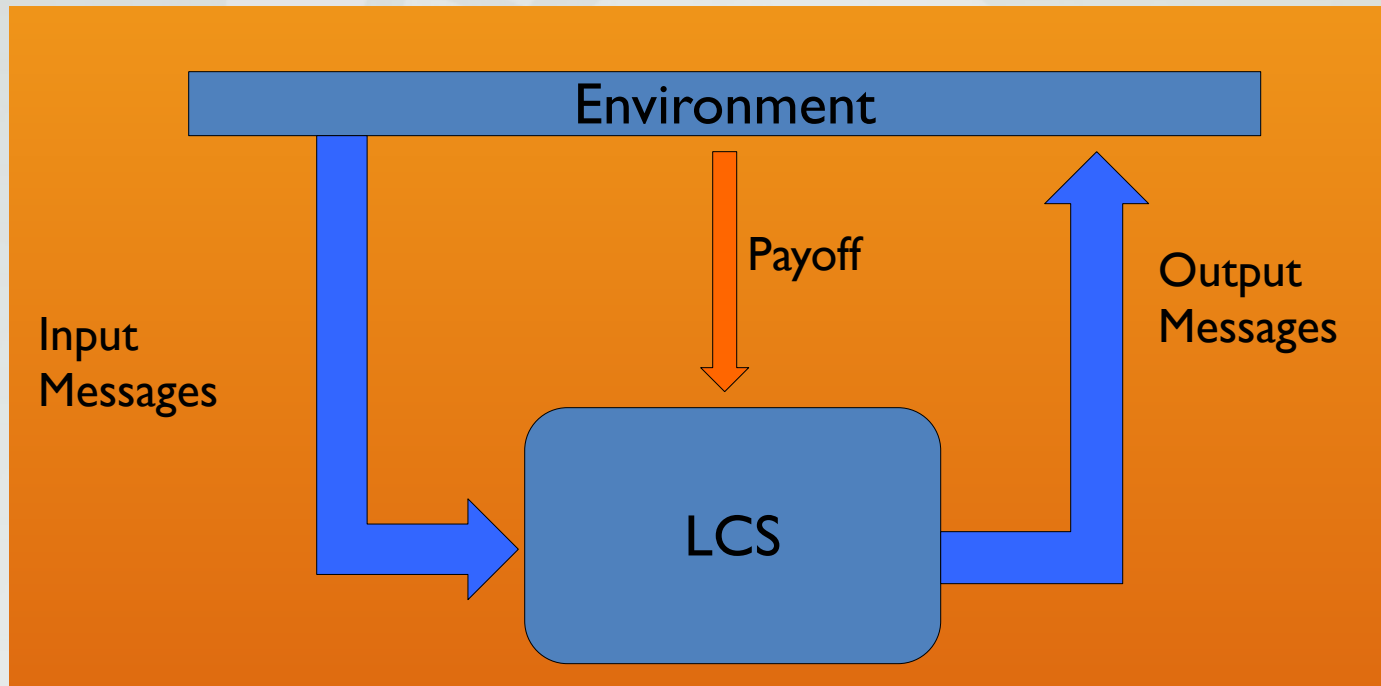
Rules interact with Environment

- Rules interact directly with the environment

- Must designate whether they are effectors or detectors

- Rules still maintain a strength value

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