

# Automating Algorithm Design through Genetic Programming Hyper-Heuristics

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# What does the title mean?

- Reducing the human component in algorithm design
- More work at the beginning, more possibilities
- Genetic programming hyper-heuristics as a method to the madness



<https://scratch.mit.edu/discuss/m/topic/200574/>

# Outline

- 1 Background
- 2 Hyper-heuristics
- 3 Genetic Programming Variants
- 4 Autoconstruction
- 5 Summary

# Outline

1

## Background

- Evolutionary Computation
- Genetic Programming

2

## Hyper-heuristics

3

## Genetic Programming Variants

4

## Autoconstruction

5

## Summary

# Outline

## 1 Background

## 2 Hyper-heuristics

- What they are
- What they aren't
- How they work

## 3 Genetic Programming Variants

## 4 Autoconstruction

## 5 Summary

# Outline

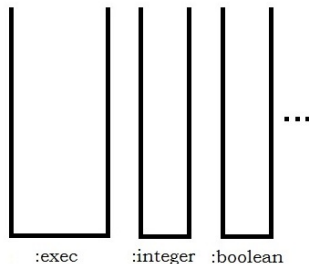
- 1 Background
- 2 Hyper-heuristics
- 3 Genetic Programming Variants**
  - Why they matter
  - Stack-based genetic programming
- 4 Autoconstruction
- 5 Summary

# Stack-based genetic programming

Data-stacks are used for managing input and output of operations.

Programs are represented as linear sequences of literals and instructions. Below is an example of a simple Push program:

```
(1 2 integer_add)
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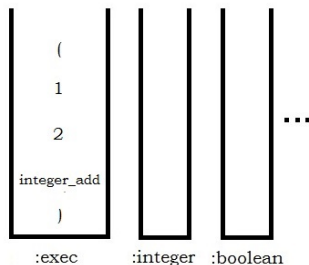


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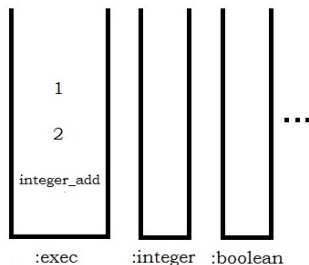


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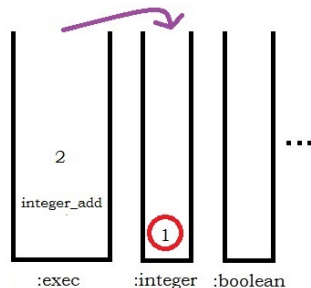


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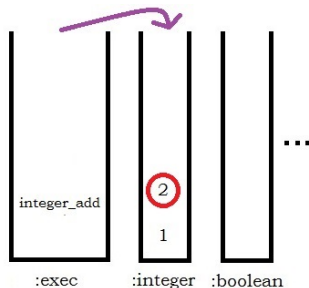


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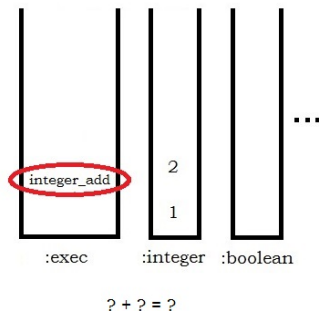


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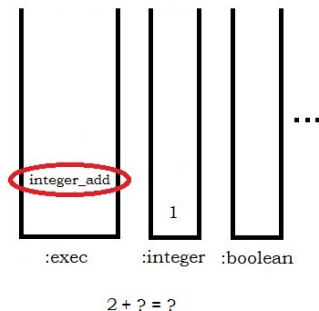


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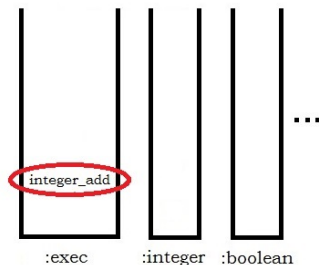


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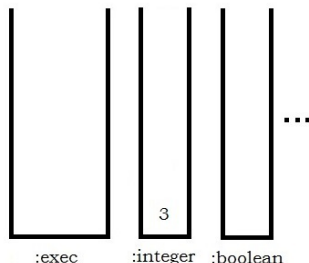
$2 + 1 = 3$

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  - What is it?
  - AutoDoG
  - Evolution is evolving!
  - Results
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