Preserving Inter-gene Relations during Test Case Generation using Intelligent Evolutionary Operators

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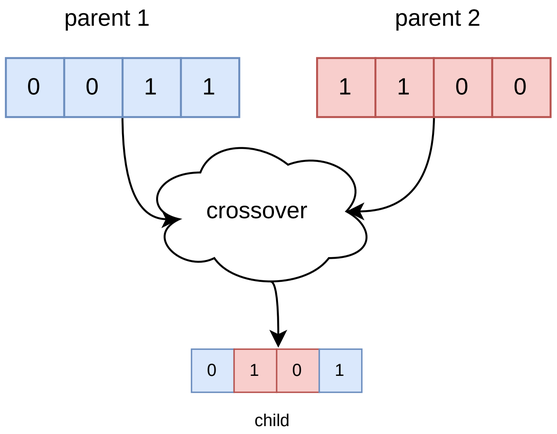
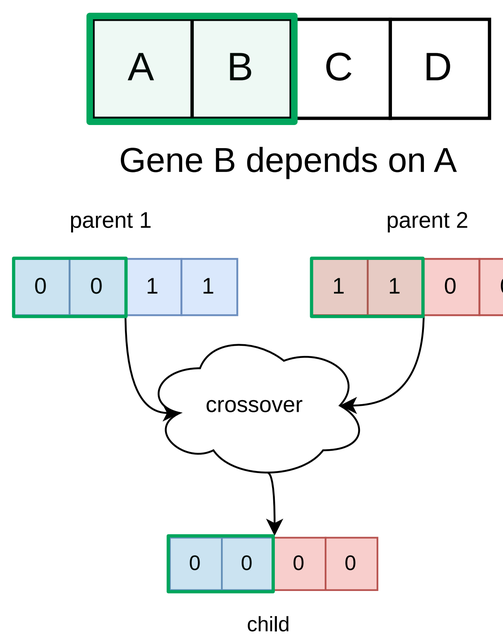
Disruptive Crossover Operators

Random

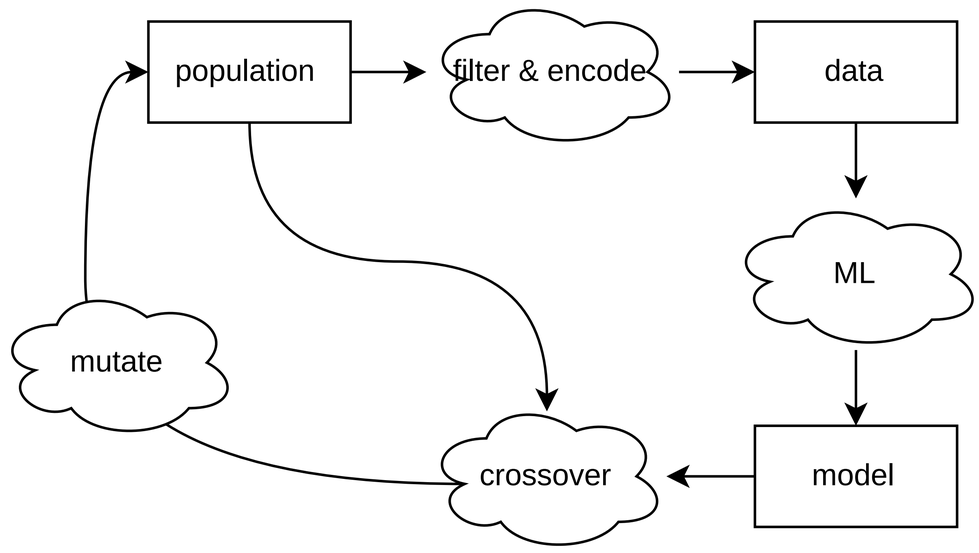


Building Blocks



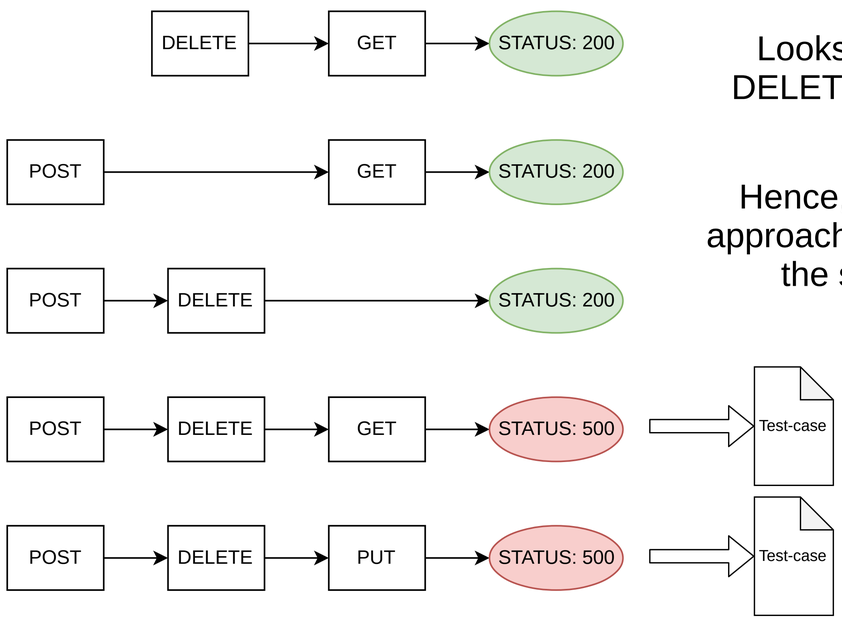
Machine Learning

Process Flow



What type of machine learning creates the most accurate dependency model for generating test-cases?

RESTfull API Testing

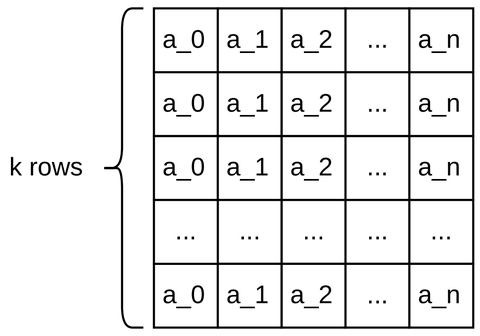


Looks like the POST and DELETE request depend on each-other.

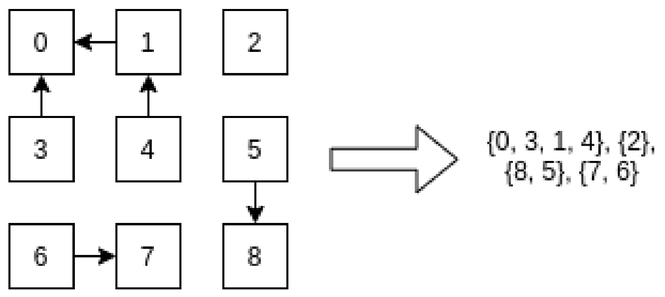
Hence, the building block approach can be beneficial to the search process.

Encoding

n possible actions
k solutions in population



Model to Building Blocks



Progress & Plans

Prerequisites:

- ✓ Population filtering
- ✓ Population encoding

Machine Learning Modules:

- ✓ Linkage Tree learning
- ✓ Learning Bayesian structures with GOMEA
- Other techniques

Variational Operators:

- ✓ Model-based structure crossover
- Model-based input crossover
- Model-based mutation

Experimental setup:

- ✓ One-Point crossover
- ✓ Benchmark problem
- More benchmark problems

Problems & Results

- **Encoding**
  Positional information loss
- **Complexity**
  n actions
  Fitness evaluation: $O(2^n)$

Mode	Standard	GOMEA
Evaluated Tests	554	977
Evaluated Actions	611,2	1256,4
Needed Budget	95%	91%
Covered Targets	54,2	71,8
Line Coverage	4%	6%

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