THE ULTIMATE BEGINNERS GUIDE TO GENETIC ALGORITHMS IN PYTHON

EXPERT ACADEMY

COURSE CONTENT

- Part 1: Genetic algorithms from scratch
  - Transport of products
  - Fitness function, crossover, mutation, population, individual, selecting the best individuals, integration with MySql
- Part 2: Libraries for genetic algorithms
  - Transport of product and fligth schedule
  - DEAP (Distributed Evolutionary Algorithms in Python)
  - MLROSe

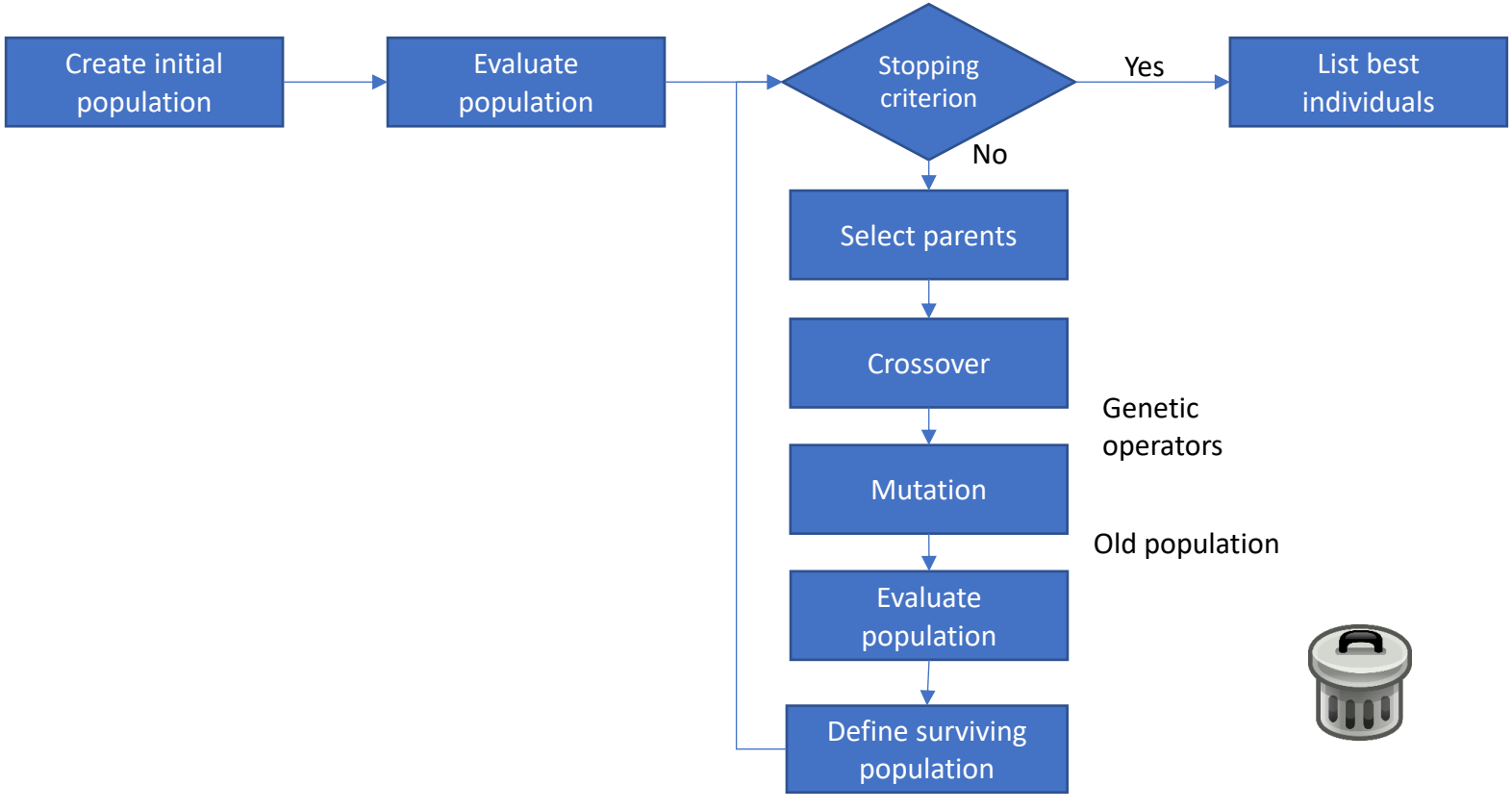
PLAN OF ATTACK – GENETIC ALGORITHM FROM SCRATCH

1. Evolutionary and genetic algorithms
2. Fitness function
3. Crossover
4. Mutation
5. Population
6. Individuals
7. Selecting the best individuals
8. Genetic algorithms with MySql

EVOLUTIONARY ALGORITHS VS GENETIC ALGORITHMS

- Evolutionary algorithms
  - Computational Models of Natural Evolution Processes
  - Simulation of species evolution
  - Survival of the fittest
  - Self organization, adaptive behavior
  - Genectic algorithms
    - Branch of Evolutionary Algorithms
    - Better and better solutions based on the evolution of previous generations

GENETIC ALGORITHMS



Refrigerator A
0.751 m³
999,90

Notebook A
0.00350 m³
2.499,90

Microwave C
0.0319 m³
299,29

Notebook C
0.527 m³
3.999,00

Cell phone
0.0000899 m³
2.199,12

Ventilator
0.496 m³
199,90

Refrigerator B
0.635 m³
849,00

TV 55’
0.400 m³
4.346,99

Microwave A
0.0424 m³
308,66

Refrigerator C
0.870 m³
1.199,89

TV 50’
0.290 m³
3.999,90

TV 42’
0.200 m³
2.999,90

Microwave B
0.0544 m³
429,90

Notebook B
0.498 m³
1.999,90

Maximum capacity: 3 m³
Total: 4.79 m³

INDIVIDUAL

- Individuals represent the solutions
- A set of individuals make up a population
- The chromosome represents a solution

0 1 0 0 1 1 0 1 0 0 1 0 1 0

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FITNESS FUNCTIONS

- Quality measurement to find out how the chromosome solves the problem
- Whether it is an acceptable solution and can be used for evolution

0 1 0 0 1 1 0 1 0 0 1 0 1 0

Total: 10,856.48
Cubic meters: 1.76

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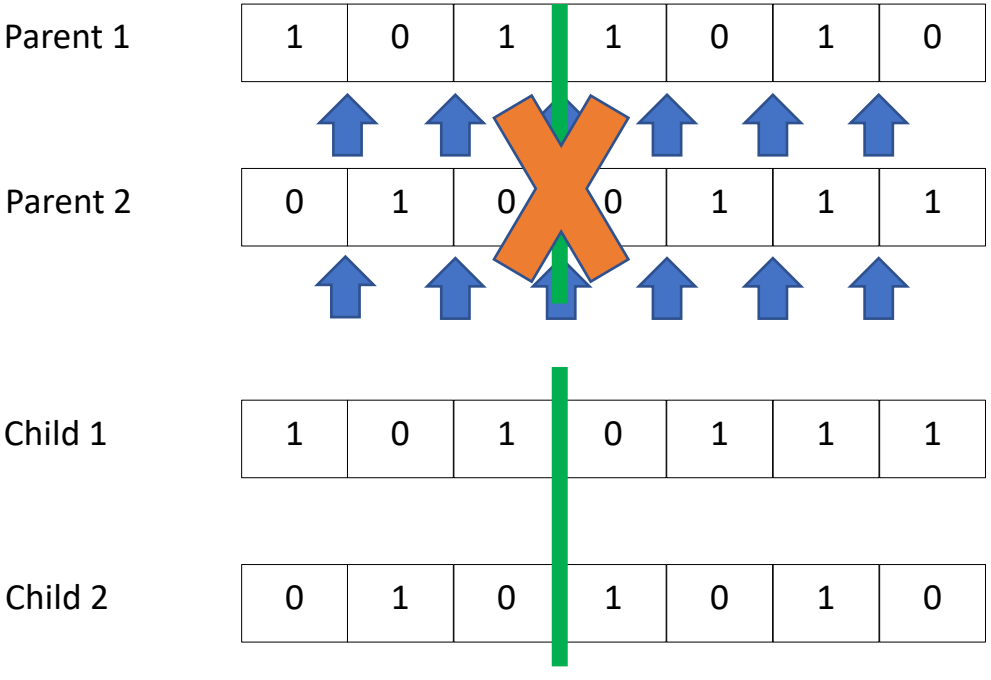
CROSSOVER (ONE POINT)

- It combines pieces of the chromosome of two parents, generating more fit children
- The population tends to evolve
- Create diversity

CROSSOVER (ONE POINT)



Gene

MUTATION

- Mutation creates diversity by randomly changing genes of the chromosomes
- It is applied less frequently than crossover
- It changes the genes according to a probability

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1	0	1	1	0	1	0

POPULATION

Individual 1

0 0 1 0 0 1 0 1 1 1 1 0 0 0

Individual 2

1 0 0 1 1 1 1 0 0 1 0 0 1 0

Individual 3

0 1 1 1 1 1 0 0 0 0 0 0 0 0

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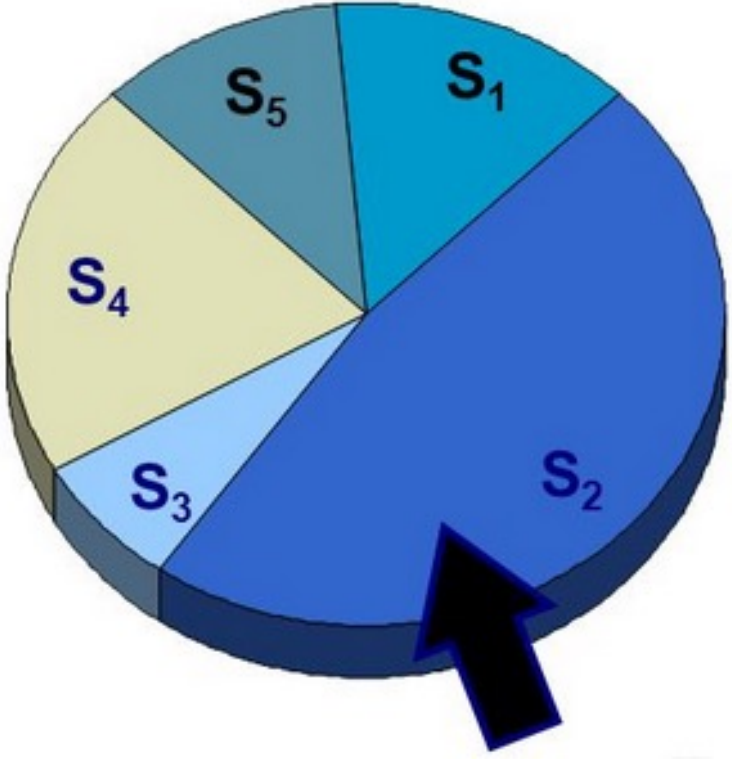
SELECTING THE INDIVIDUALS



PLAN OF ATTACK – LIBRARIES FOR GENETIC ALGORITHMS

1. DEAP (Distributed Evolutionary Algorithms in Python)
2. MLROSe
3. Transport of products
4. Flight schedule

FLIGHT SCHEDULE