

Differential evolution

Méthodes stochastiques

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Overview: Evolutionary algorithm

Global optimization algorithm

$$\min f(x) : R^n \rightarrow R \quad (1)$$

Black-box optimization

- Ability to handle non-differentiable, nonlinear and multimodal cost functions
- Parallelizability
- Ease of use (few control variables to steer the minimization) These variables should also be robust and easy to choose
- Good convergence properties (consistent convergence to the global minimum in consecutive independent trials)

Algorithm

Algorithm 1: DE pseudo-code

initialize a random population of individuals;

while $iter \leq max\ generations$ **do**

for *individual in population* **do**

mutation;

recombination;

selection;

end

if *stopping criterion* **then**

exit and return best individual ;

else

iter = iter + 1;

end

end

Advantages vs other GA

- good convergence properties
- faster convergence, especially in the more difficult cases
- inherently parallel (speedup)
- requires only few control variables

DE has shown promising results it is still in its infancy and can most probably be improved