



Quand génétique devient optimisation

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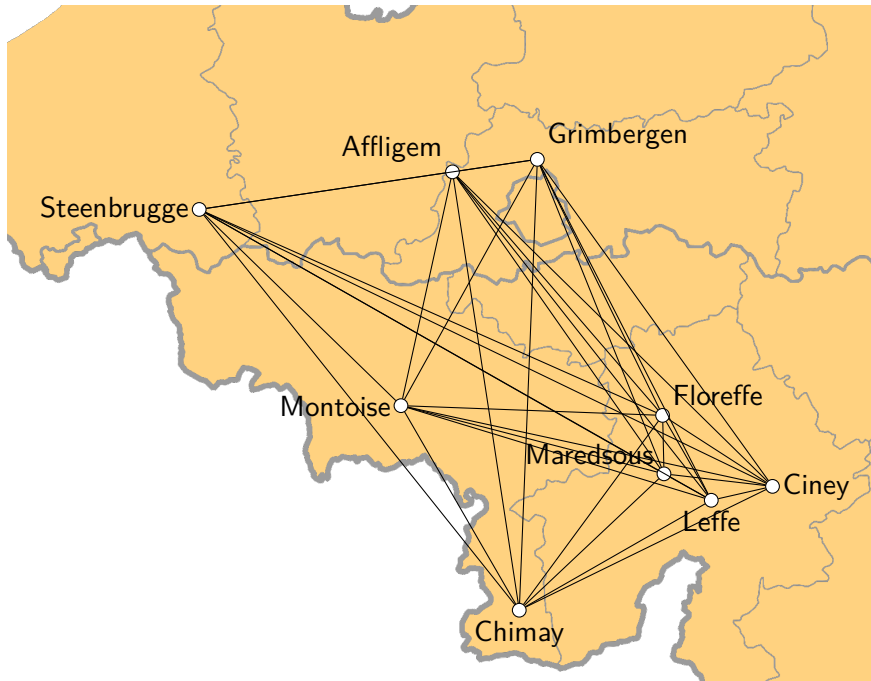
UMONS

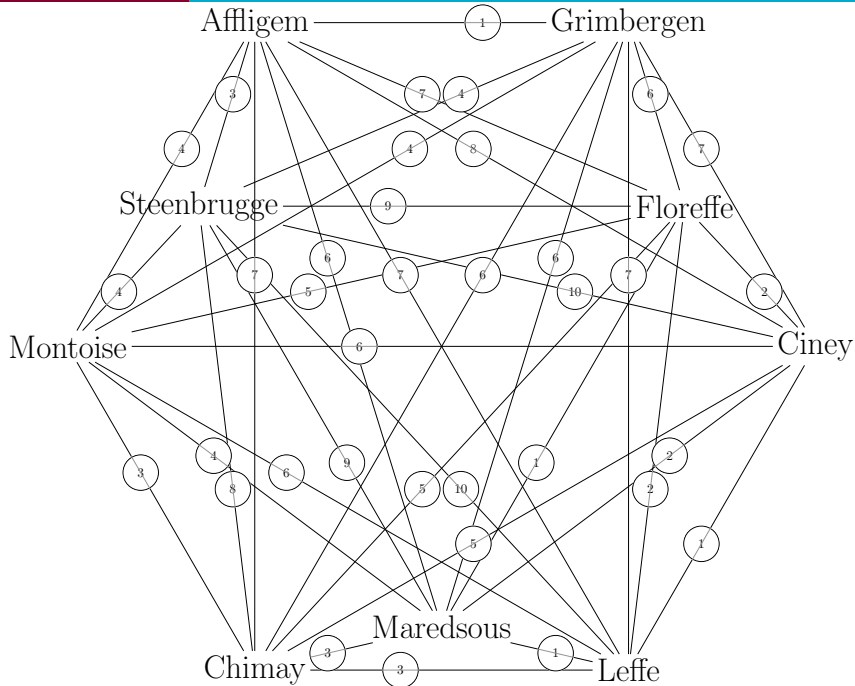


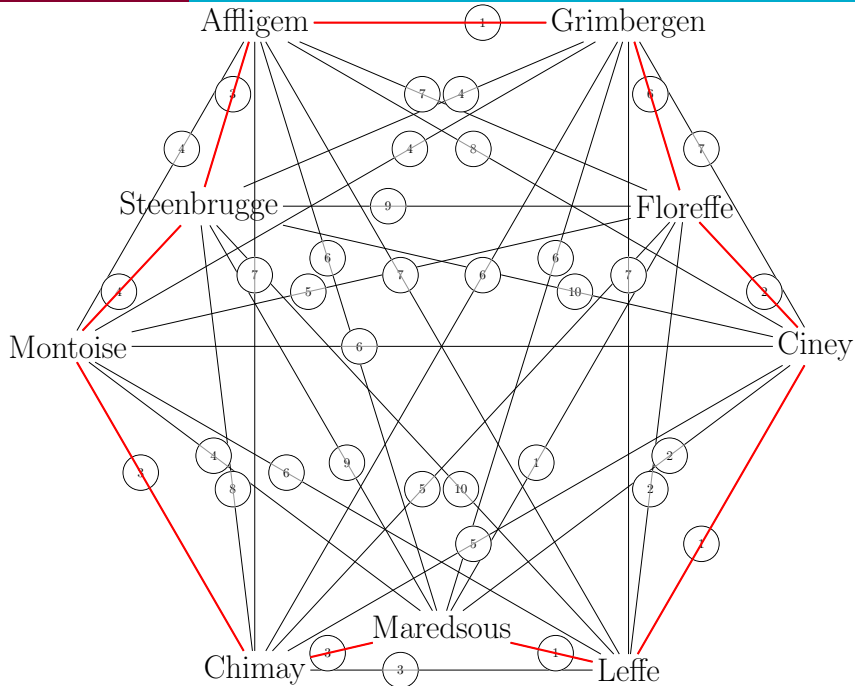
9 septembre 2015







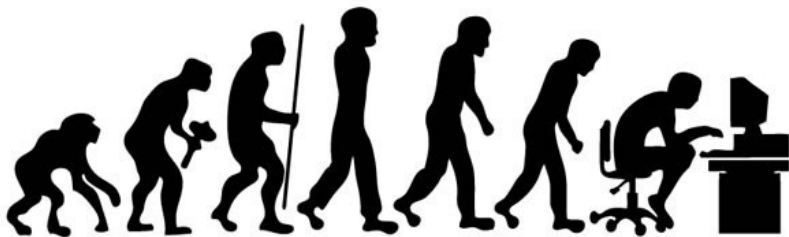




Recherche exhaustive

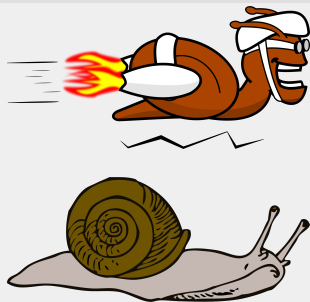
Nombre de tours en fonction du nombre de villes :

- $5 \rightarrow 12$
- $9 \rightarrow 20\,160$
- $10 \rightarrow 181\,440$
- $15 \rightarrow 43\,589\,145\,600$
- $20 \rightarrow 60\,822\,550\,204\,416\,000$
- $42 \rightarrow$
 $16\,726\,263\,306\,581\,903\,554\,085\,031\,026\,720\,375\,832\,576\,000\,000\,000$
- $1\,000 \rightarrow \frac{(1\,000-1)!}{2}$
- $n \rightarrow \frac{(n-1)!}{2}$

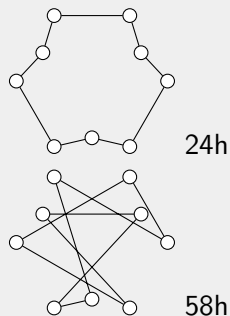


Individus / adaptation à l'environnement

Biologie

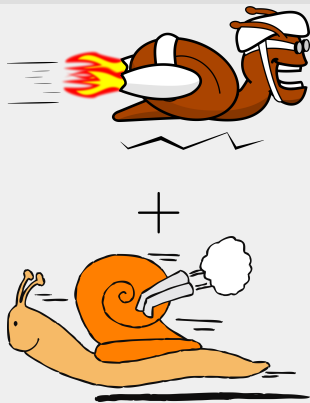


Algorithme génétique

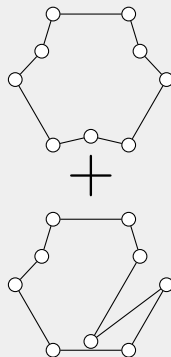


Choix des parents les plus adaptés

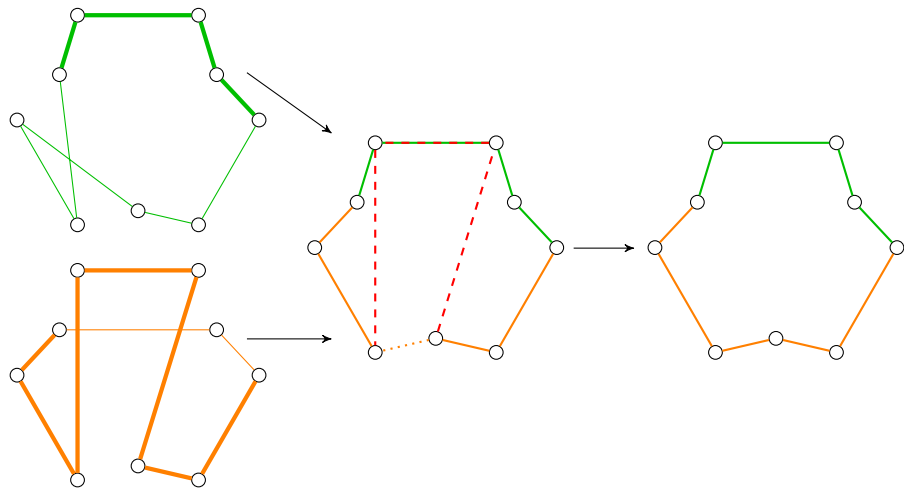
Biologie



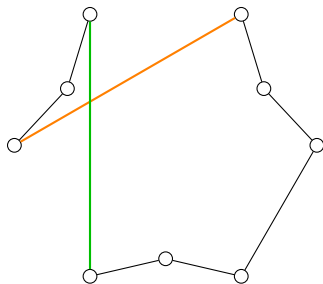
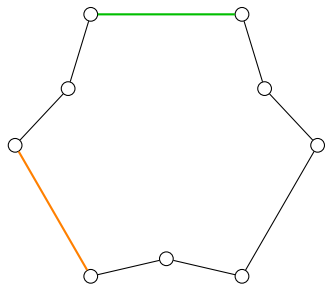
Algorithme génétique



Conception des enfants



Mutations



Sélection naturelle

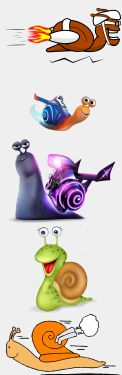
Population



Descendants

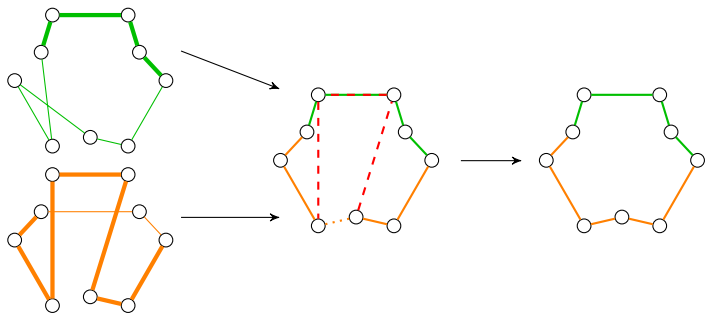


Nouvelle population



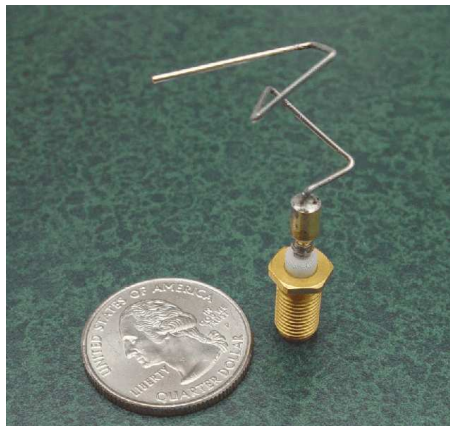
À vous !

- **Sélection** : parents les plus adaptés ;
- **Croisement** : appliqué entre les parents sélectionnés ;

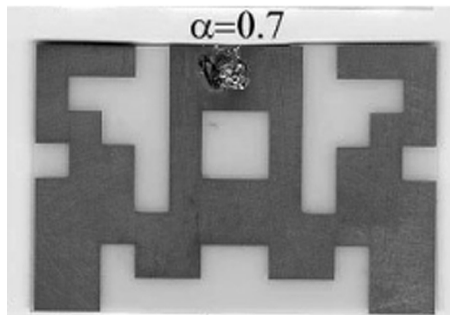


- **Mutation** : appliquée sur un individu ;
- **Sélection** : parents moins bien adaptés remplacés par les descendants.

Optimisation génétique d'antennes

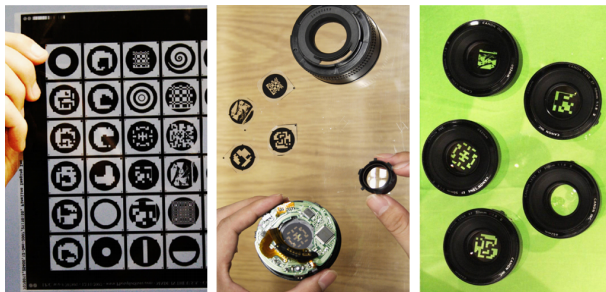


Hornby, Gregory S., et al.
"Automated antenna design with evolutionary algorithms."
AIAA Space. 2006.



Villegas, Frank J., et al.
"A parallel electromagnetic genetic-algorithm optimization
(EGO) application for patch antenna design."
Antennas and Propagation, IEEE Transactions on 52.9 (2004).

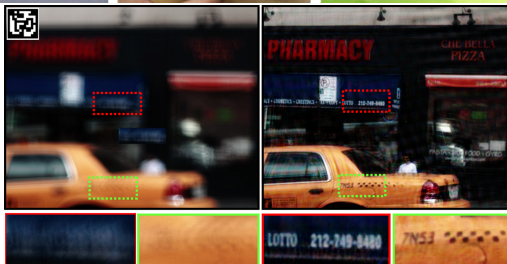
Optimisation génétique d'ouverture de lentille



Zhou, Changyin, and Shree Nayar.

"What are good apertures for defocus deblurring?."

Computational Photography (ICCP), 2009 IEEE International Conference on. IEEE, 2009.



(a) An out-of-focus image captured using the optimized aperture pattern (shown in the left-top corner)

(b) Deblurring result with close-ups