



Quand génétique devient optimisation

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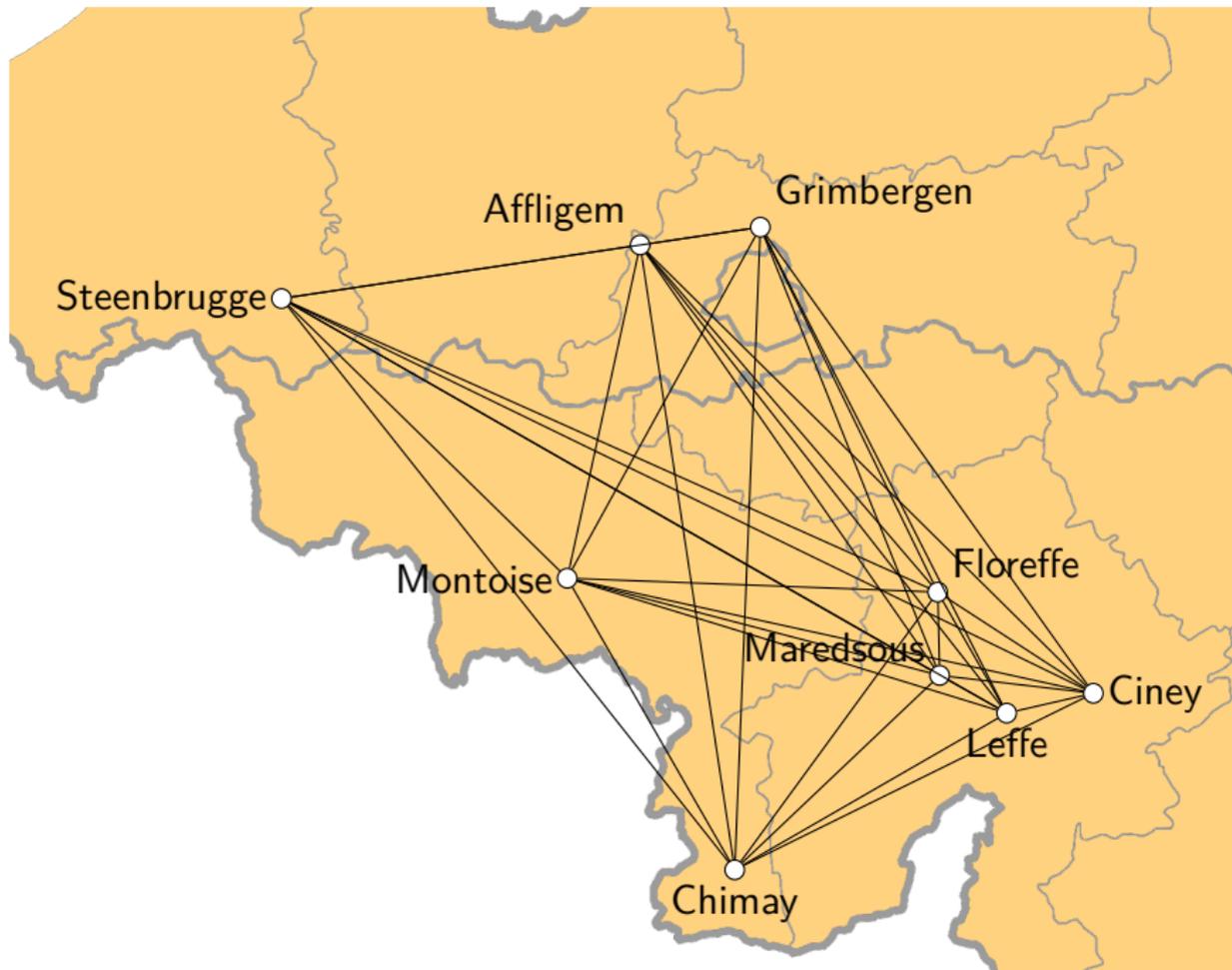
UMONS

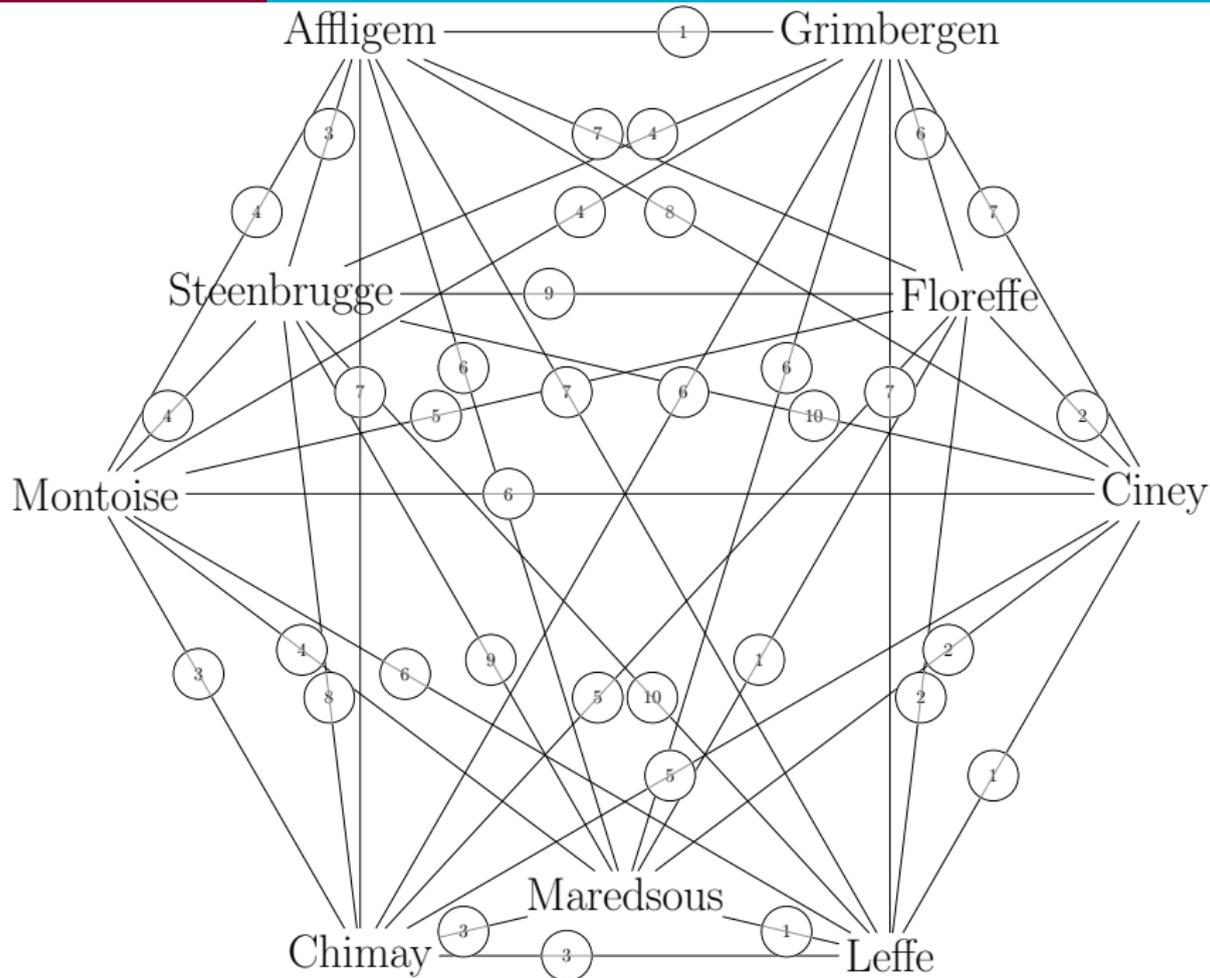


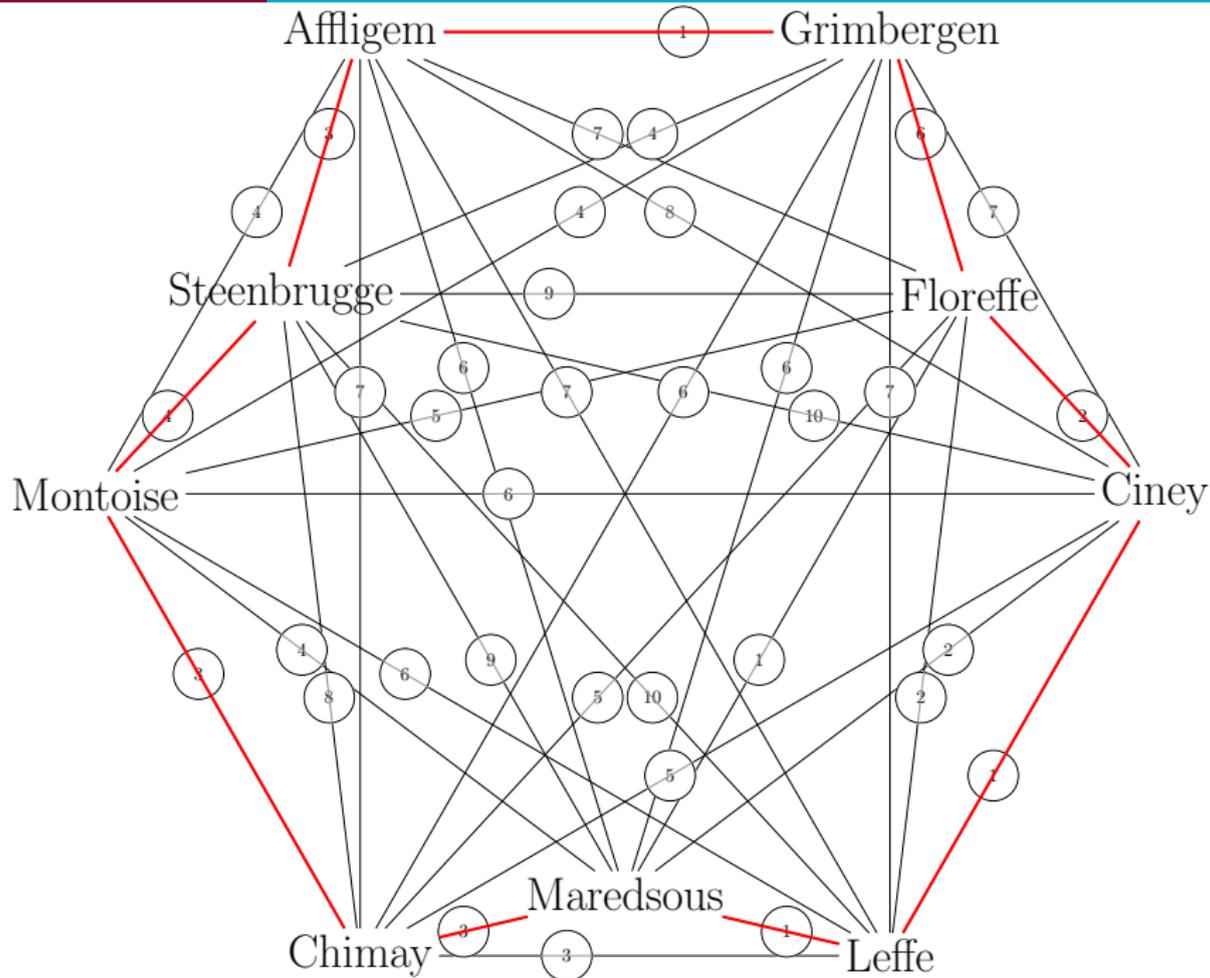
9 septembre 2015







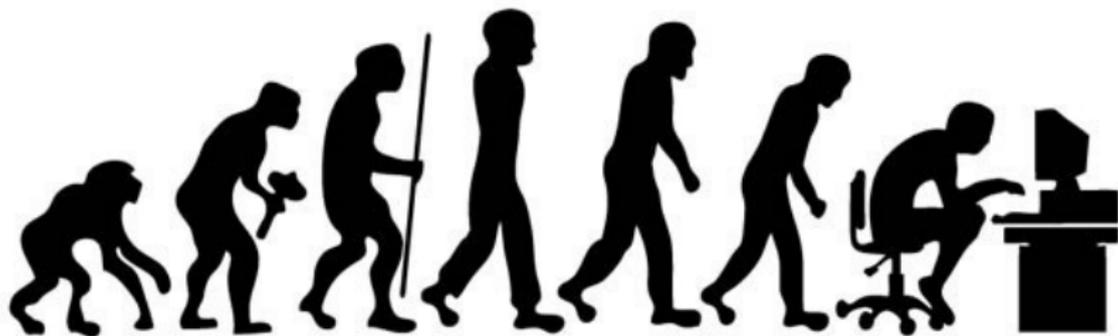




Recherche exhaustive

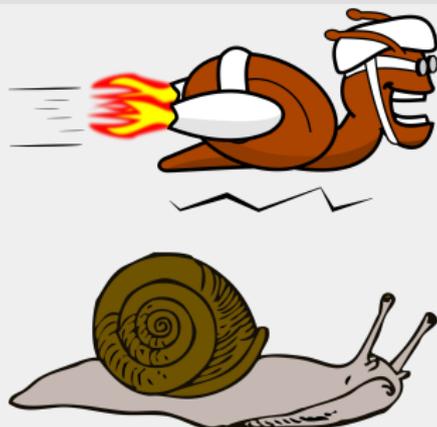
Nombre de tours en fonction du nombre de villes :

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

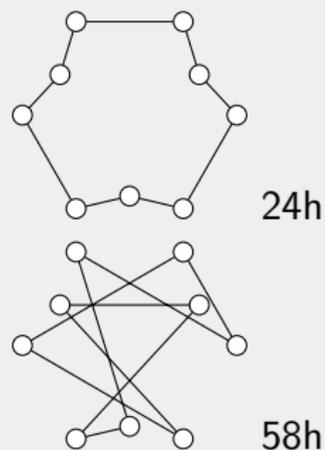


Individus / adaptation à l'environnement

Biologie

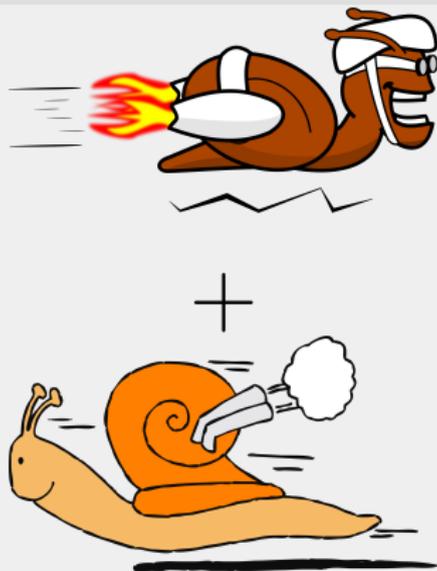


Algorithme génétique

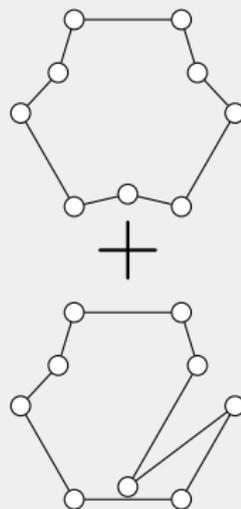


Choix des parents les plus adaptés

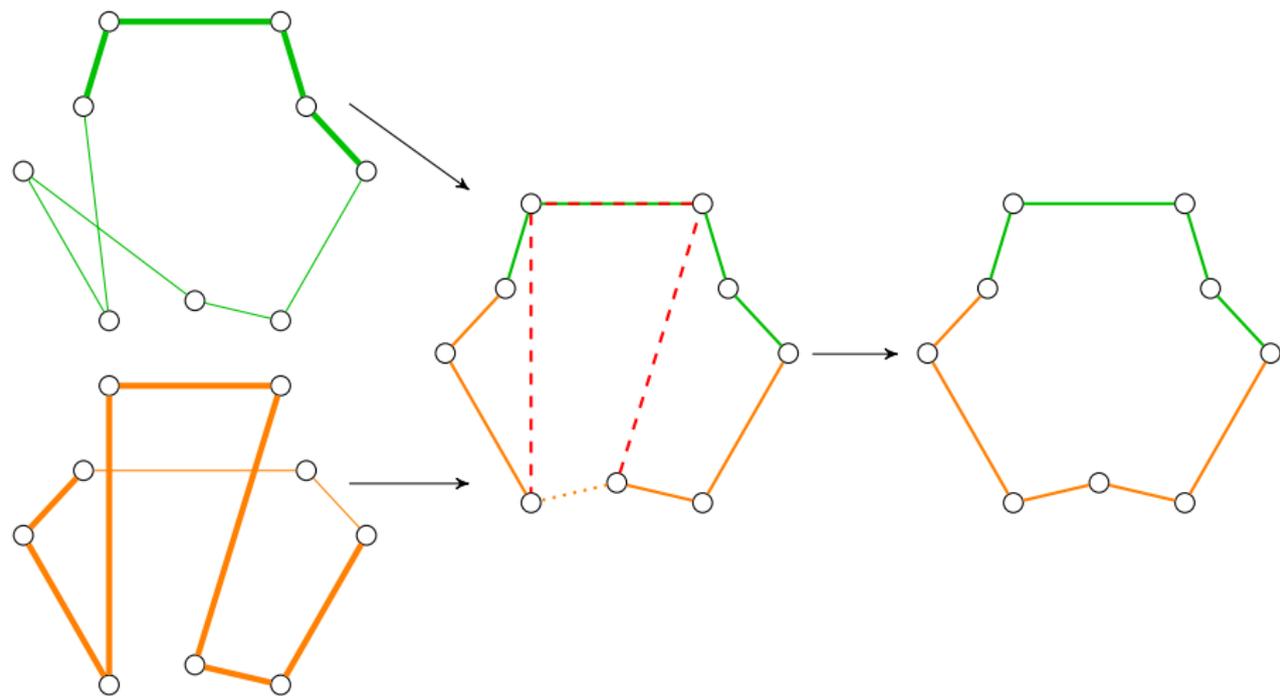
Biologie



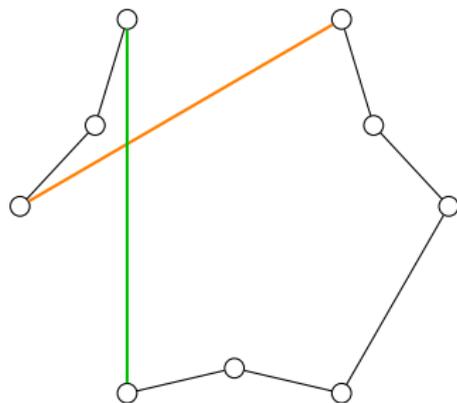
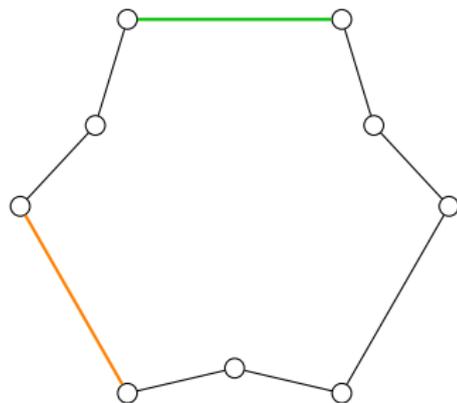
Algorithme génétique



Conception des enfants



Mutations



Sélection naturelle

Population



Descendants

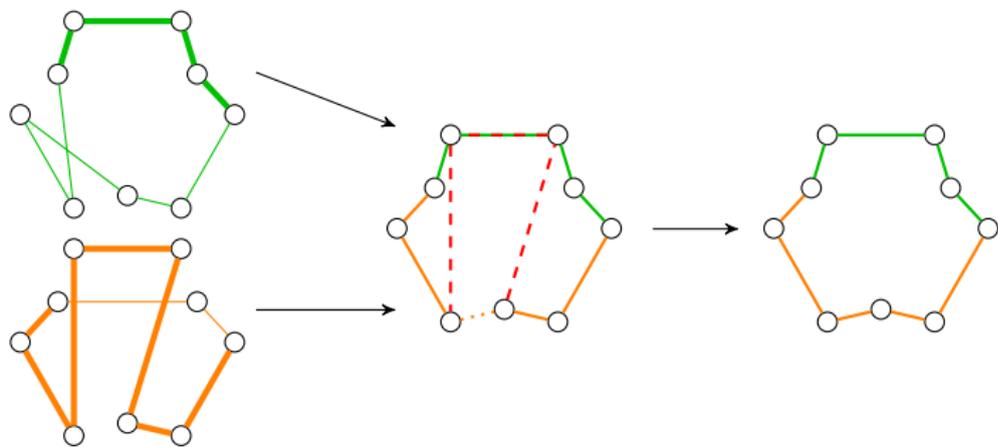


Nouvelle population



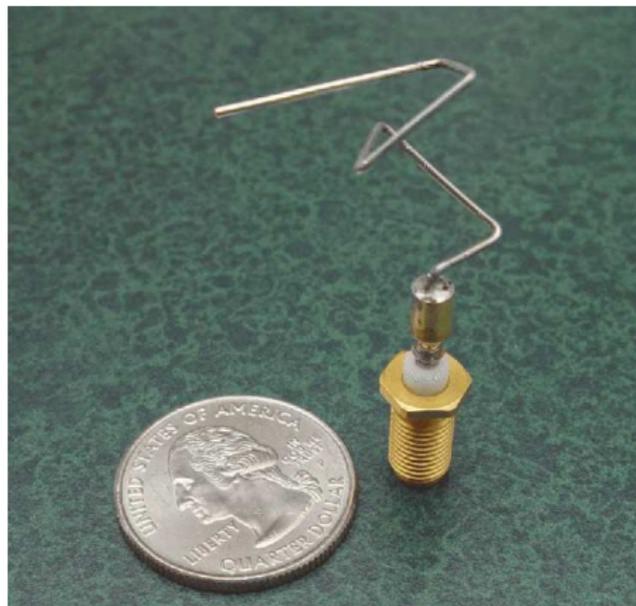
À vous !

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

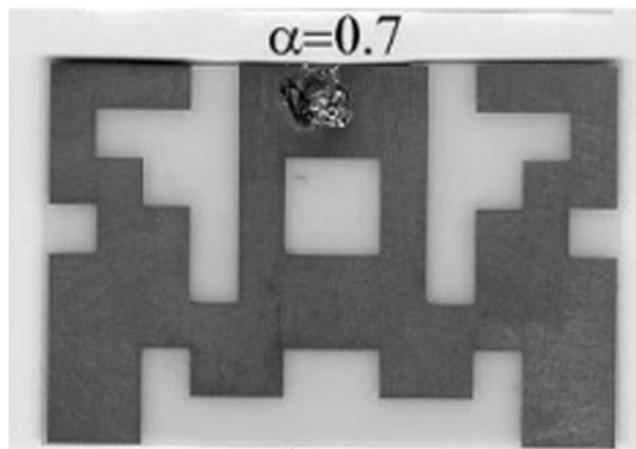


- **Mutation** : appliquée sur un individu ;
- **Sélection** : parents moins bien adaptés remplacés par les descendants.

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).

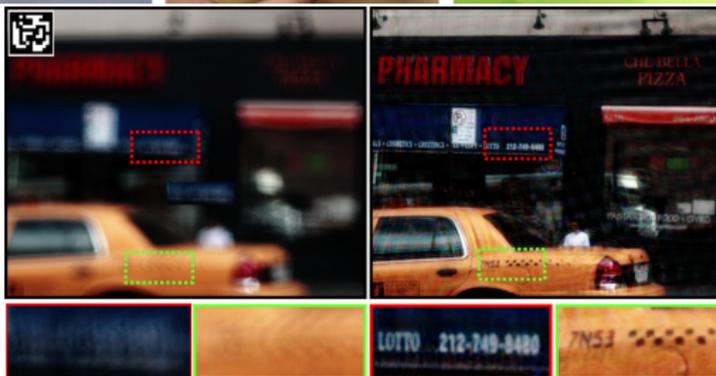
Optimisation génétique d'ouverture de lentille



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