



DARWIN

Application of Genetic Algorithm to DARWIN Core Design Optimisation

Anže Mihelčič, Luka Snoj

How to make a next step?



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DARWIN's DNA



Genes of fuel region X:

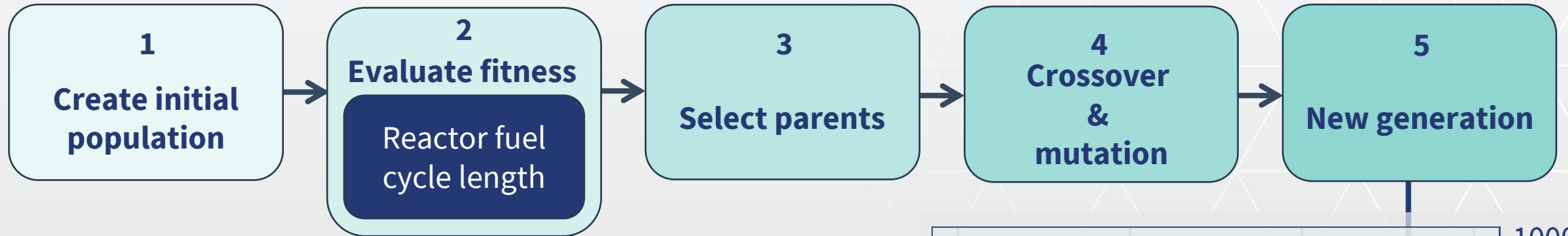
- Fuel type: UO₂, MOX, UZrH, UYH
- U enrichment: [3%, 10%]
- U ratio: [10%, 50%]

4 regions $\rightarrow 4 \times 3 = 12$ genes

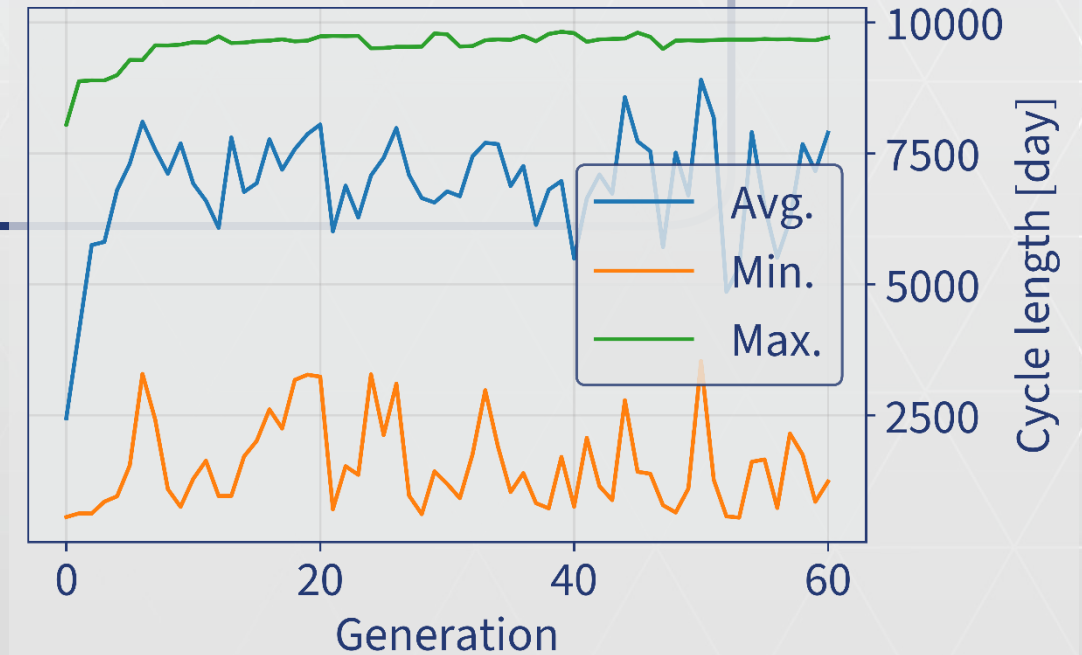
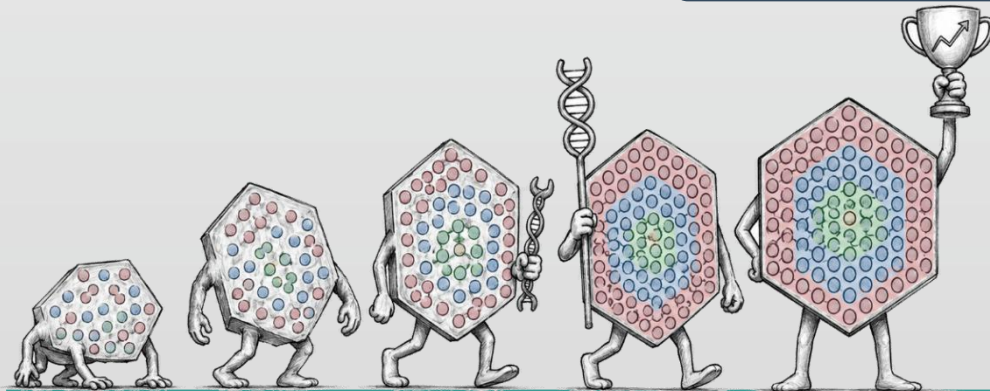
How to choose genes for reactor core to operate the longest?



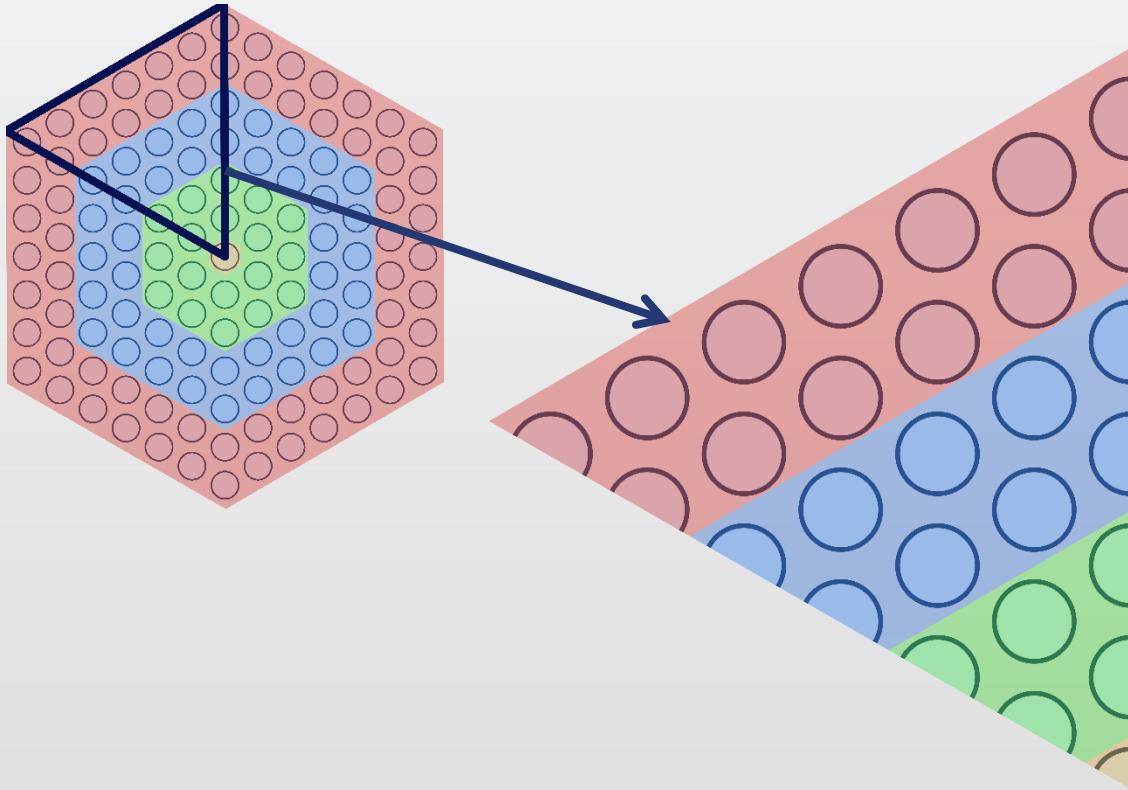
Genetic algorithm



Repeat for M generations



Optimised solution for longest operation of **26.6 years**



Fuel region 1: UO_2 10% U enr.

Fuel region 2: MOX 3.2% U enr. 13.9% of UO_2

Fuel region 3: MOX 4.1% U enr. 41.6% of UO_2

Fuel region 4: UZrH 8.8% U enr. 20.3% of U



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Thank you for your attention.