

Evolving Graphs with Cartesian Genetic Programming with Lexicase Selection

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1 Why?

Cartesian Genetic Programming (CGP) is effective in image-processing.

It's central to keep the graph size as small for interpretability.

We introduce an explicit mechanism to control size.

2 What have I done?

We added lexicase selection to CGP.

Function libraries based on OpenCV.

CGP evolves solutions based on performance and on the size of such solutions.

CGP with 30 cols and 1 row, $\lambda = 5$, 20000 iterations. Mutation rate: 0.15 for functional nodes and 0.2 for outputs. 10 repetitions.

3 Results

CGP-LEX achieves similar performance to the standard CGP.

CGP-LEX produces smaller graphs.

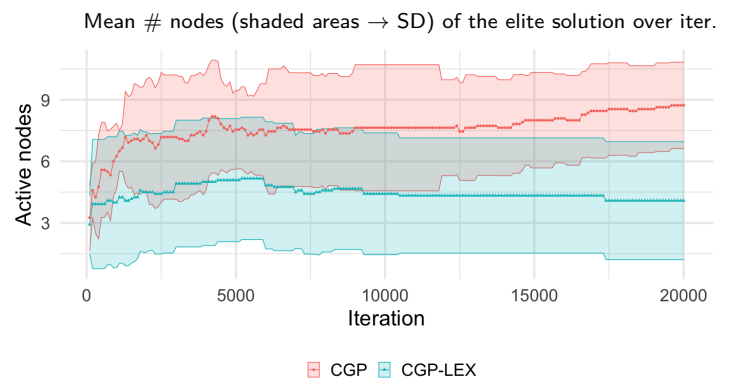
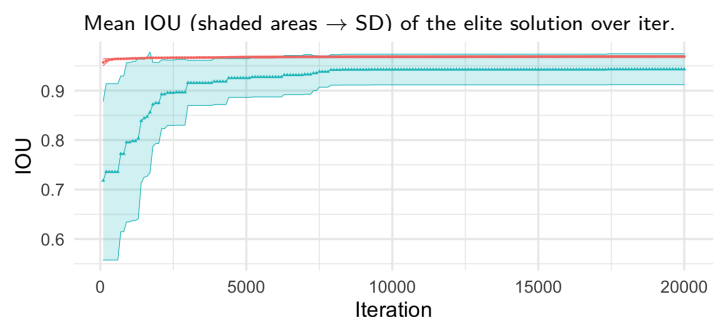
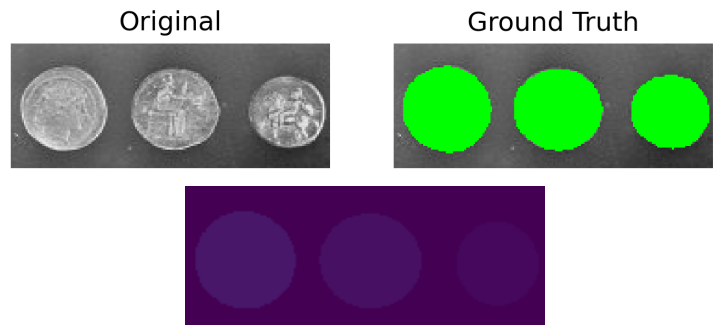
CGP has high potential on exploring small-size programs \rightarrow reinforced by CGP-LEX.

Low diversity values?

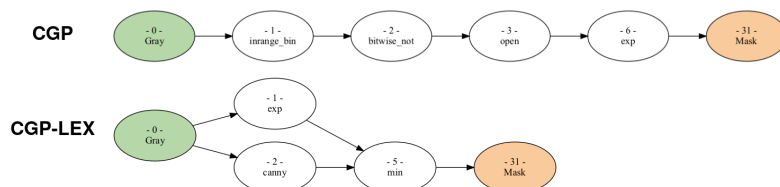
Dataset too simple?

Figures

Coins dataset and an output of a program by CGP-LEX.



Final program by CGP and GCP-LEX.



\leftarrow My page!



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