Directional Changes Project

Follow up 07/08/2018

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What have I done since last time (30/07)?

- Analysed influence of each parameter for PSO/CSFLA
- Established 5 configurations for each algorithm
- Friedman test / Results analysis

Finding good algorithm configurations

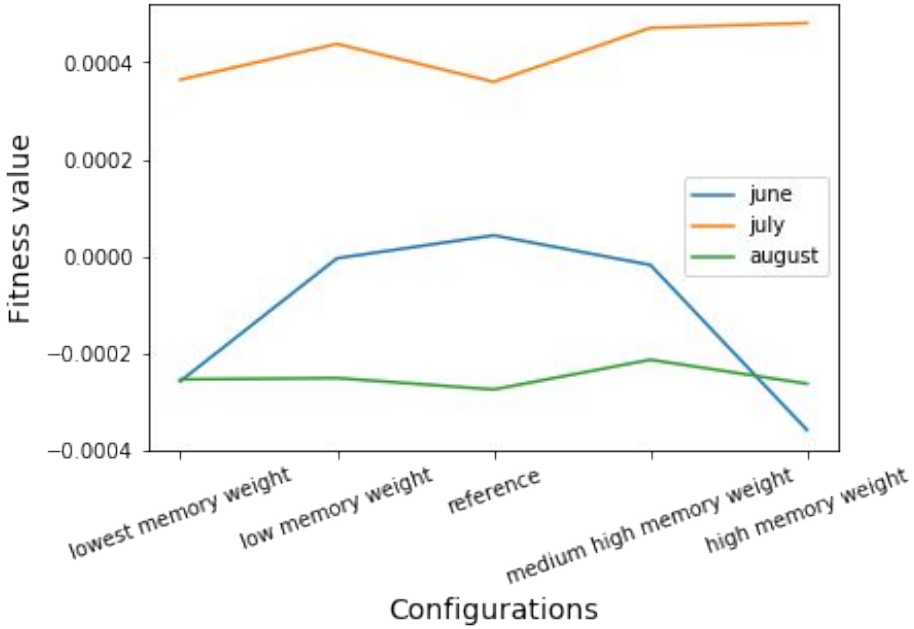
Method I used:

- Establish a reference
- Test (on first 3 months) each parameter independently in 3 to 5 variants and compare to ref.
- If param influences fitness, try to guess why
- Try to make configurations that make the best of each param

PSO configurations

Exploitation

I believe some params perform well because they favor exploitation of local optimum, eg the weight accorded to memory in particle update func.

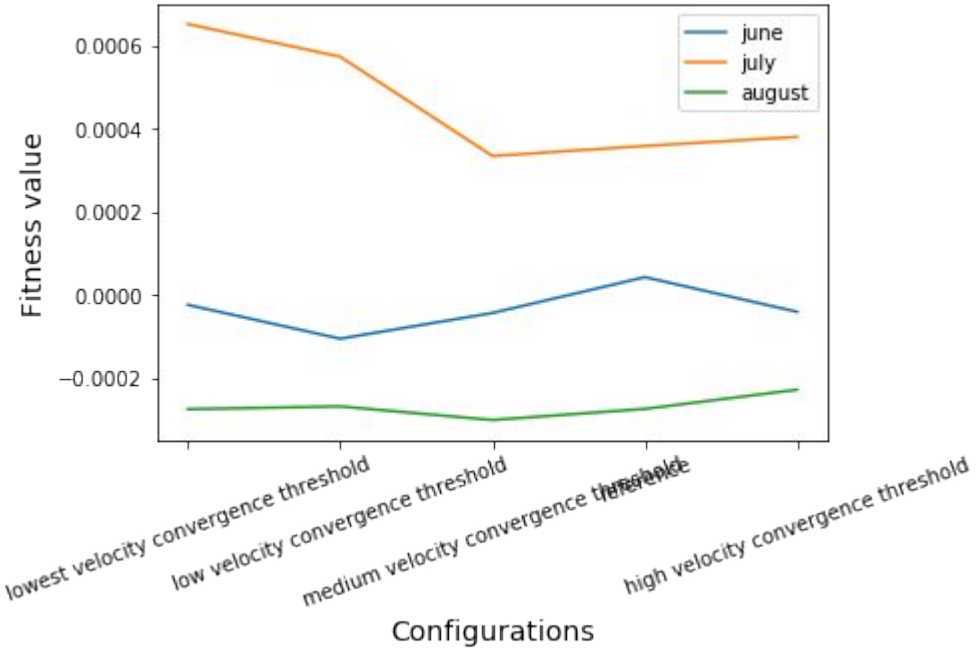


However, a too high memory weight could overfit, because it maximises test fitness too much.

PSO configurations

Exploration

Opposite of exploitation - less optimal, but more general



We can see lower velocity convergence threshold perform better - maybe because the particles are ‘good’ without being ‘too good’ on test data?

PSO configurations

Computation cost

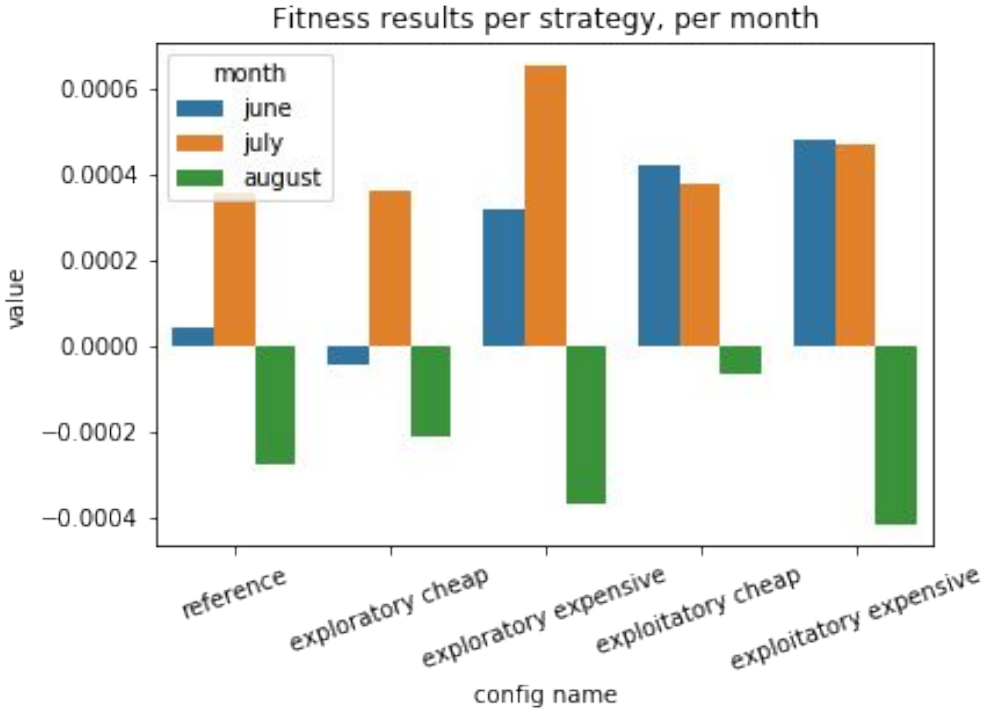
Some exploitatory params also influence computation costs.

Eg: swarm size

PSO configurations sets

I ended up with 5 sets:

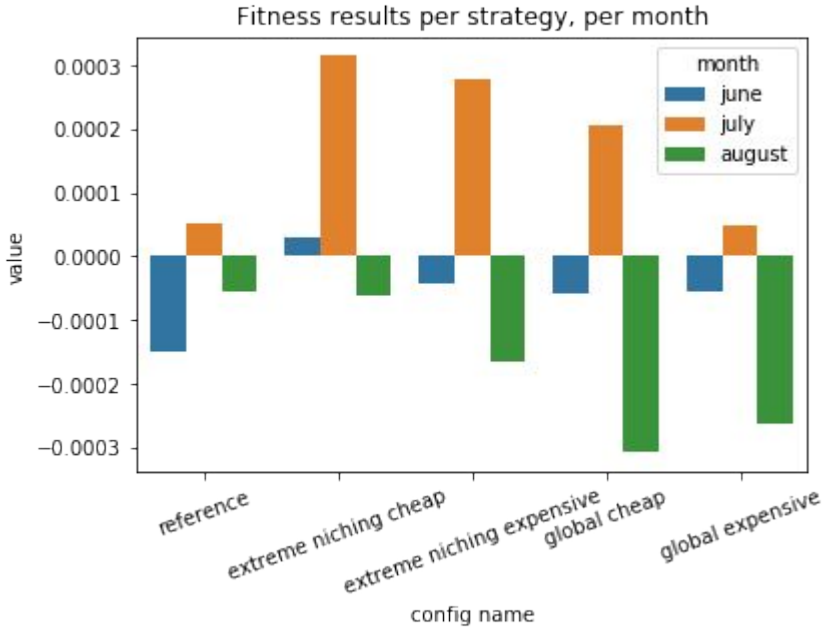
- Reference : every param set at medium value
- Exploratory cheap
- Exploratory expensive
- Exploitatory cheap
- Exploitatory expensive



CSFLA configurations

Same as PSO. There is a difference in that it yields Niches instead of global optimum.

Results don’t seem very promising ...



Possible improvements

- Only on three months of test data
- Assumption that params are independant
- Could have made more configurations for each param

Moment of truth - testing

- Tested on 9 remaining months
- Timed each algorithm config
- Ranked on performance and time

Results - algos ranked by performance

config name	value	performance rank	execution time on 3 months	normalised execution time	execution time rank
extreme niching expensive	-0.000223	1.0	177.83	0.059909	8.0
exploitatory expensive	-0.000234	2.0	1825.04	0.711662	10.0
extreme niching cheap	-0.000238	3.0	125.14	0.039061	6.0
global cheap	-0.000279	4.0	52.38	0.010272	3.0
exploratory cheap	-0.000293	5.0	26.42	0.000000	1.0
pso reference	-0.000309	6.0	84.93	0.023151	5.0
exploratory expensive	-0.000405	7.0	2553.77	1.000000	11.0
csfla reference	-0.000455	8.0	48.00	0.008539	2.0
global expensive	-0.000555	9.0	81.58	0.021825	4.0
ga	-0.000626	10.0	280.03	0.100346	9.0
exploitatory cheap	-0.000742	11.0	172.00	0.057602	7.0

Friedman test interpretation

See pdf

What’s next (?)

- Is my analysis good?
- Start writing?
- More test data?