Report 5 - Data Mining ID2222

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During this report an implementation of Jabeja[1] will be discussed. In the task 1, a simple lineal implementation will be analyzed. In the task 2, an annealing implementation to avoid local optima will be discussed according to Katrina Ellison Geltman[2]. In the task 3 a simple improvement for the jabeja algorithm to minimize the cuts will be discussed.

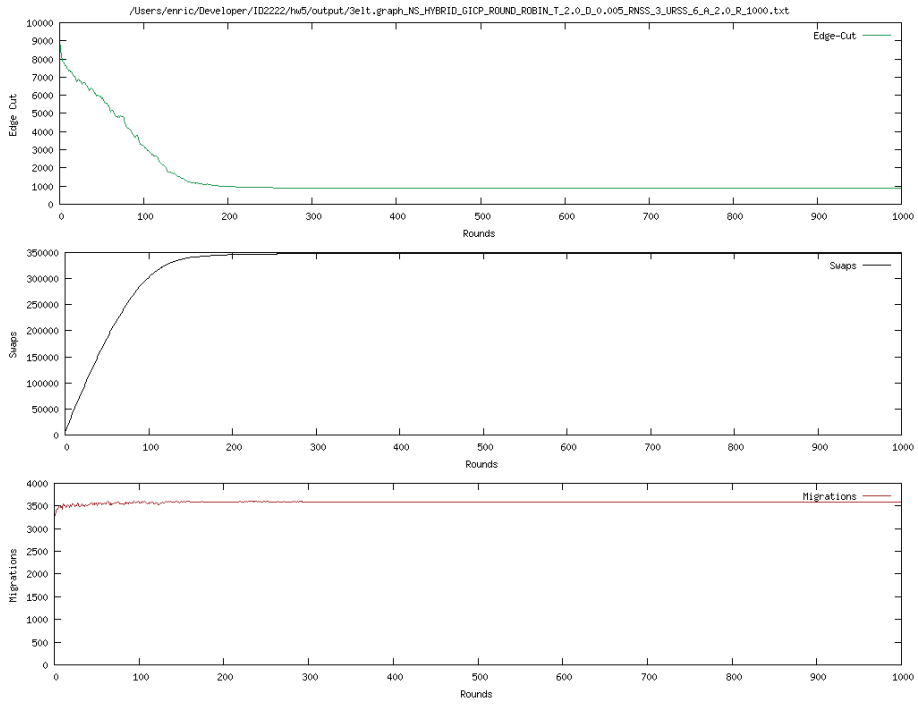
Task 1

Graph	Node Policy	Edge-Cut	Swaps	Migrations
3elt	LOCAL	3208	481018	3518
3elt	HYBRID	866	348204	3596
Add20	LOCAL	3399	1300607	1593
Add20	HYBRID	1743	723575	1799
Facebook	LOCAL	185394	7054113	47673
Facebook	HYBRID			

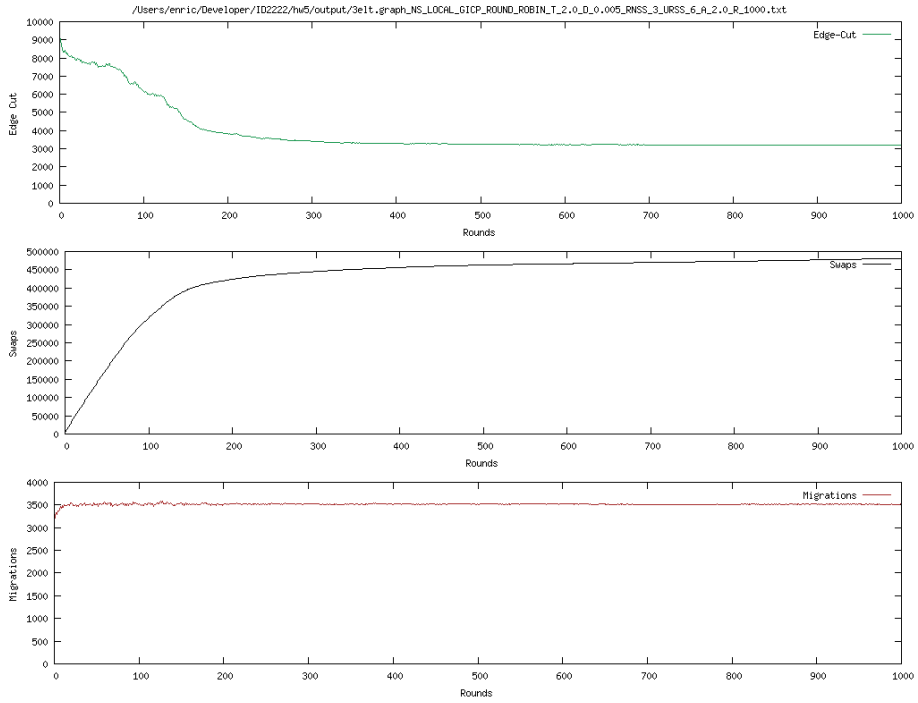
In this task 1 in the cases the parameters, unless specified in the table or elsewhere, have been alpha=2.0 and delta=0.005. All the other parameters are the default ones.

[1] https://payberah.github.io/files/download/papers/jabeja.pdf

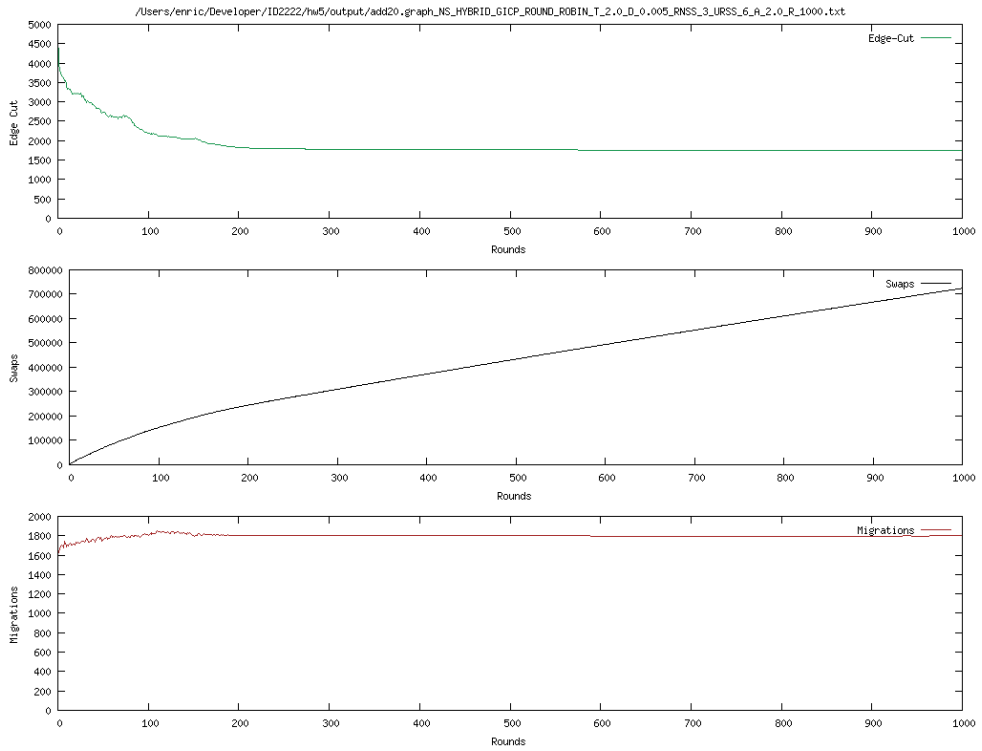
[2] http://katrinaeg.com/simulated-annealing.html



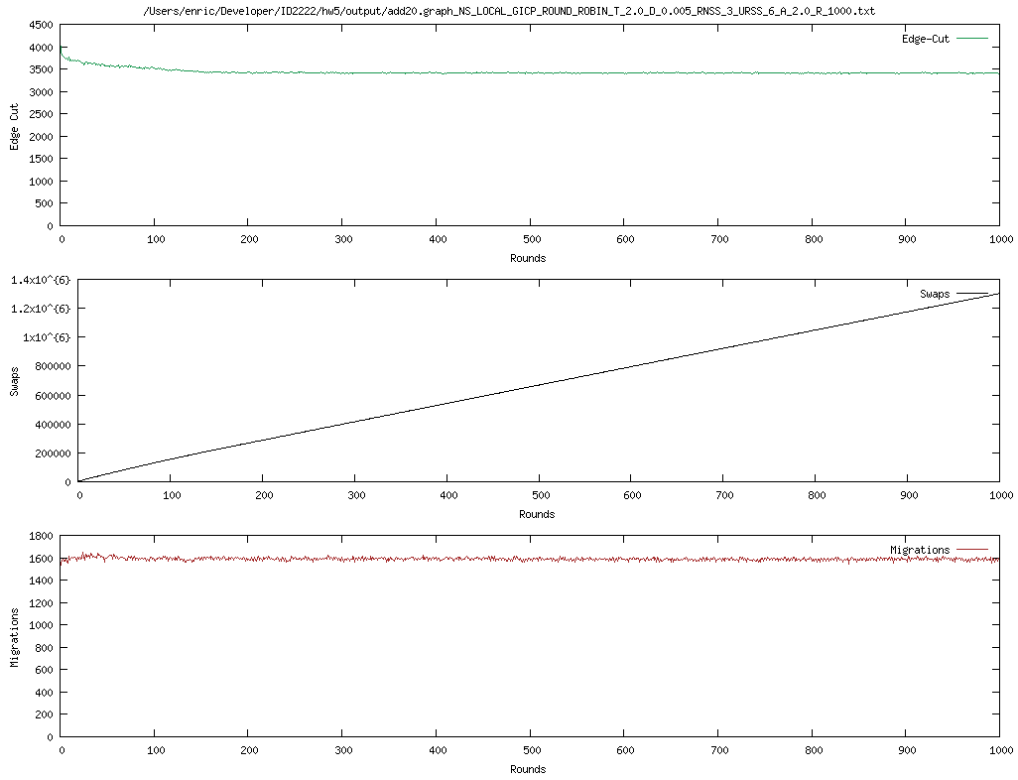
3elt Graph in HYBRID Node Policy



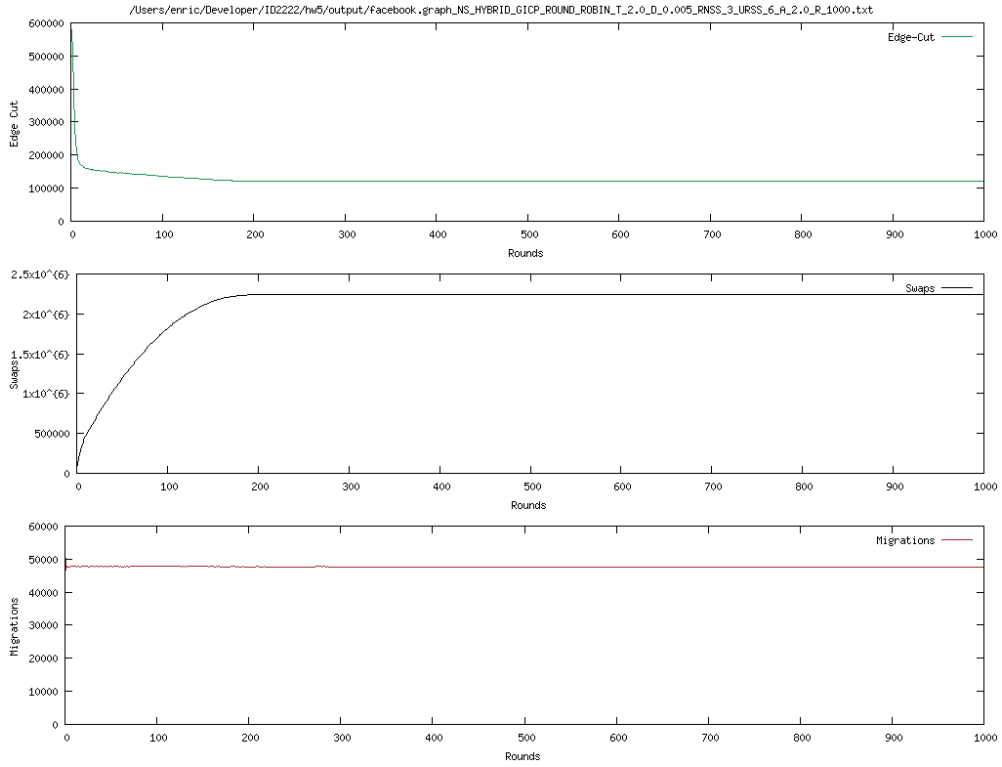
3elt Graph in LOCAL Node Policy



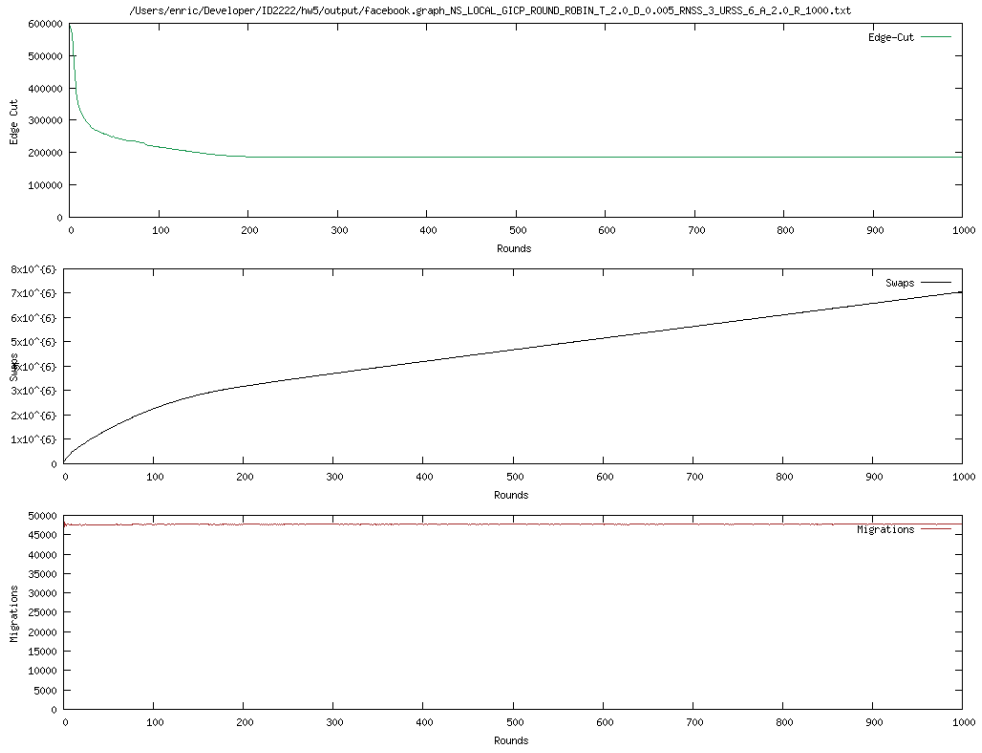
Add20 Graph with HYBRID Node Policy



Add20 Graph with LOCAL Node Policy



Facebook graph with HYBRID Node Policy



Facebook graph with LOCAL Node Policy

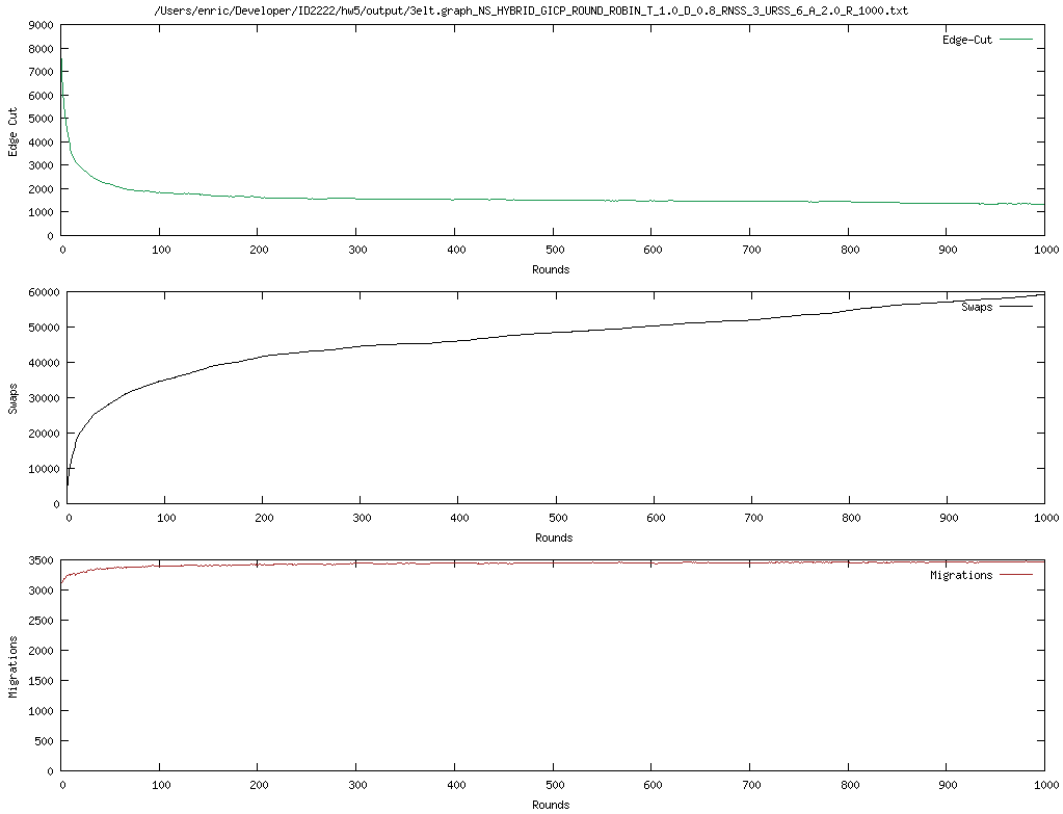
Task 2

For the task 2 we have used exponential decaying annealing. In this case we have used an HYBRID policy with a temperature 1 and alpha of 2.

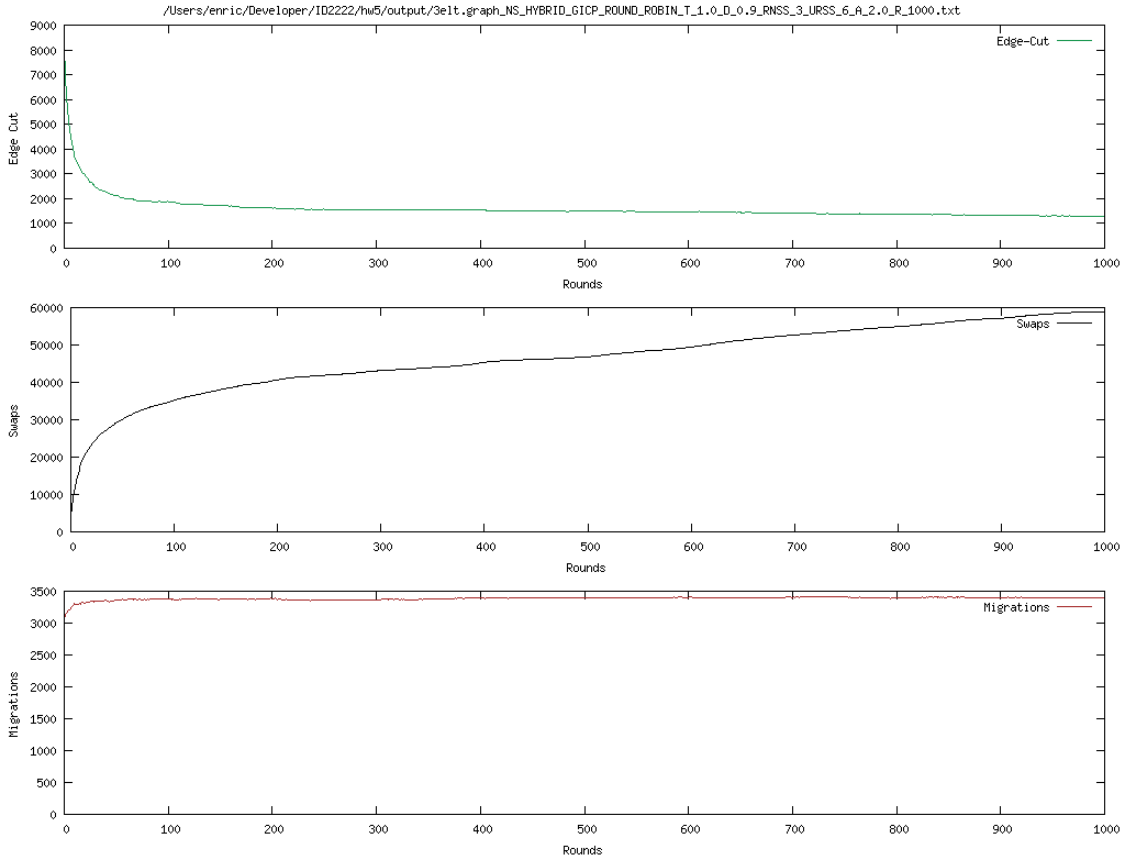
Graph	Delta	Edge-cut	Swaps	Migrations
3elt	0,8	1261	54173	3399
3elt	0,9	1256	58496	3426
add20	0,8	2972	1651264	1793
add20	0,9	2492	1424414	1774
Facebook	0,8	Too long	Too long	Too long
Facebook	0,9	Too long	Too long	Too long

In other to avoid the local minima stuck we have used as well a restart Temperature function. After 100 rounds of the edge count being constant we reset the temperature.

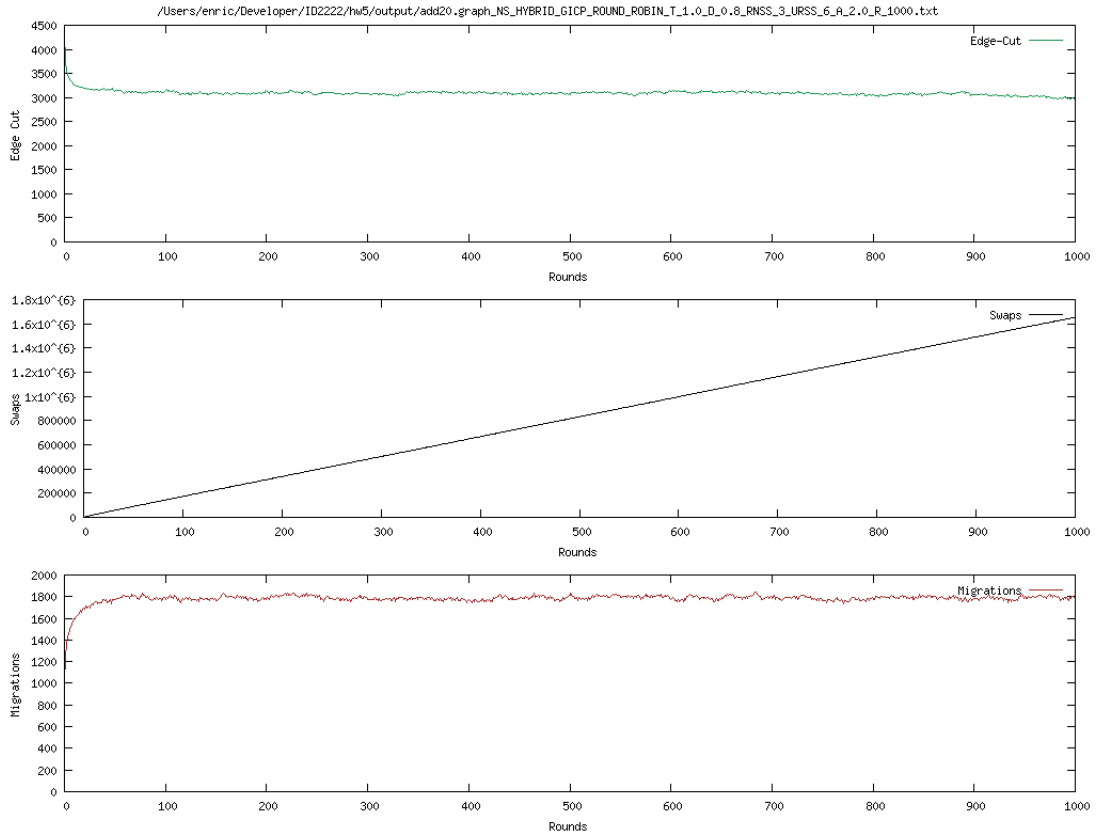
Graph	Annealing	Delta	Edge-cut	Swaps	Migrations
3elt	Lineal	0,005			
3elt	Exponential	0,9	1342	55110	3410
add20	Lineal	0,005			
add20	Exponential	0,9	2660	1480677	1780
Facebook	Lineal	0,005	Takes too long	Too long	Too long
Facebook	Exponential	0,9	Too Long	Too long	Too long



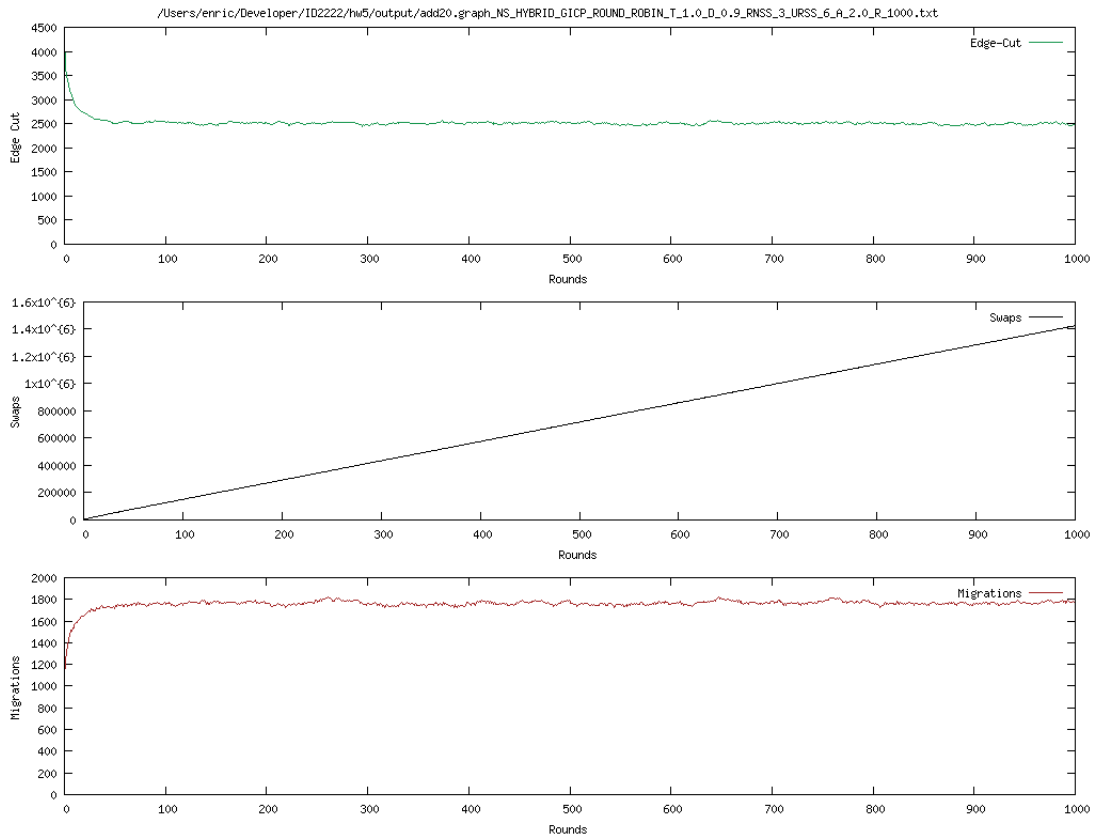
3elt with Delta = 0.8



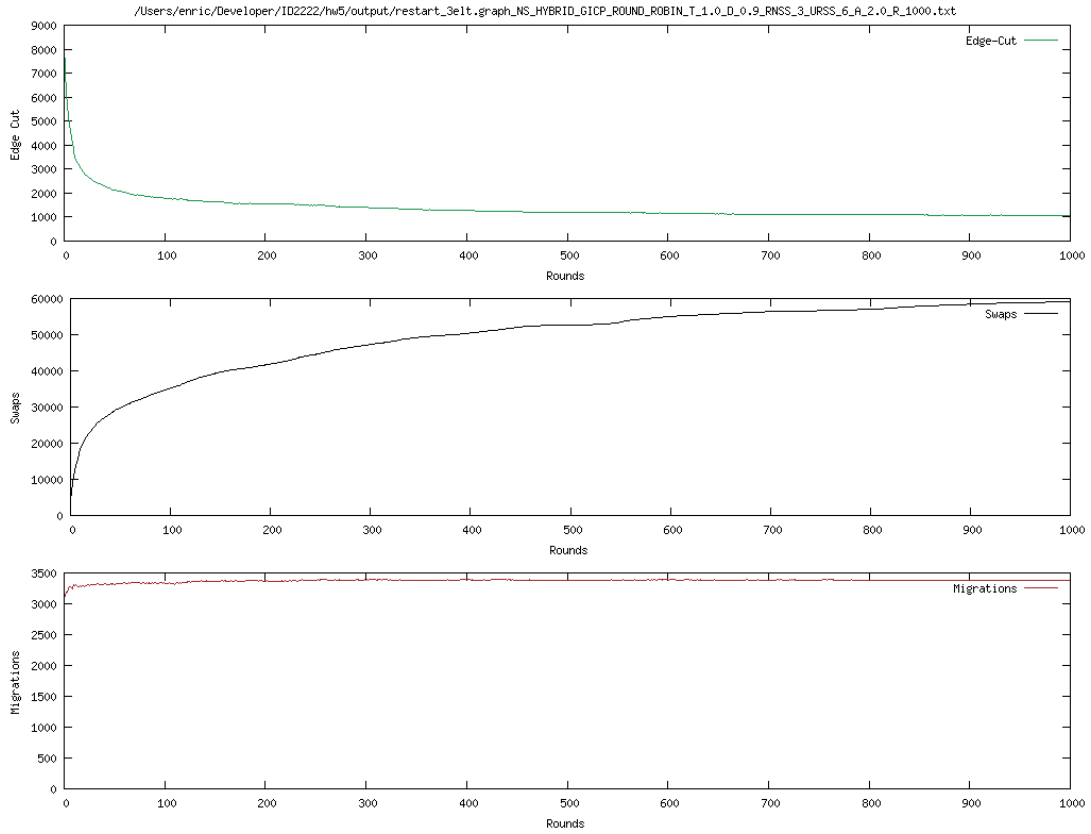
3elt with delta = 0.9



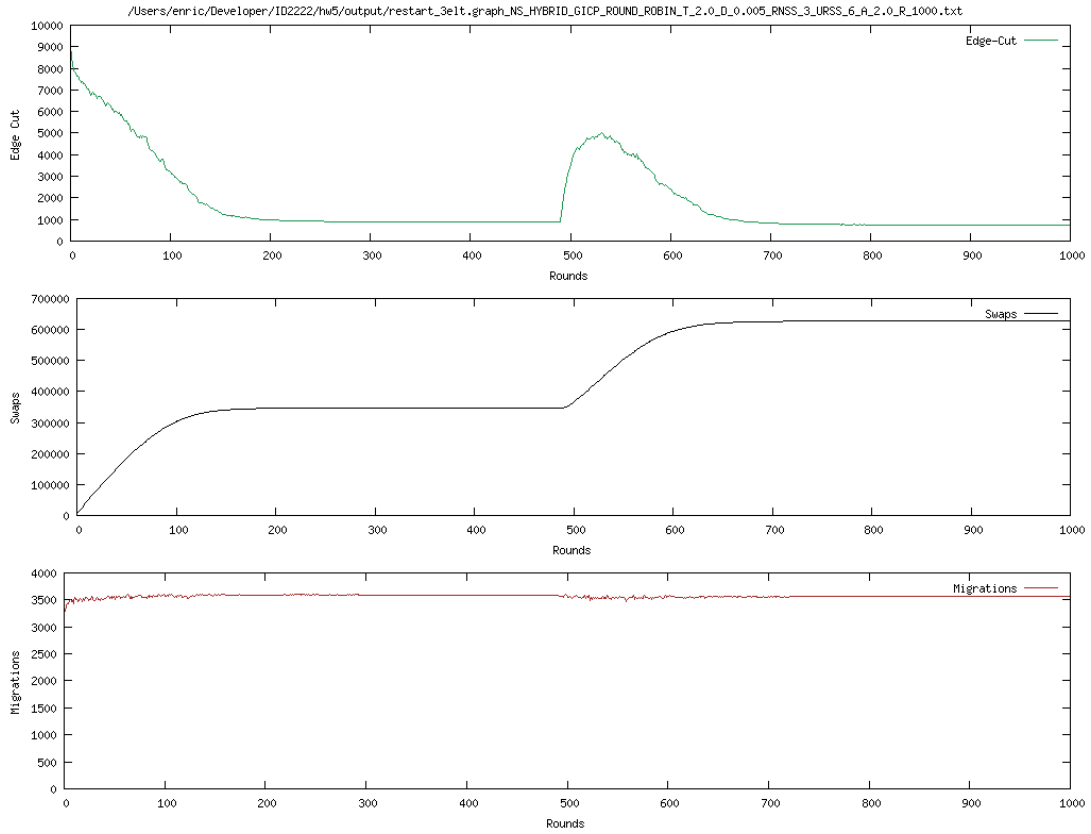
Add20 with alpha = 0.8



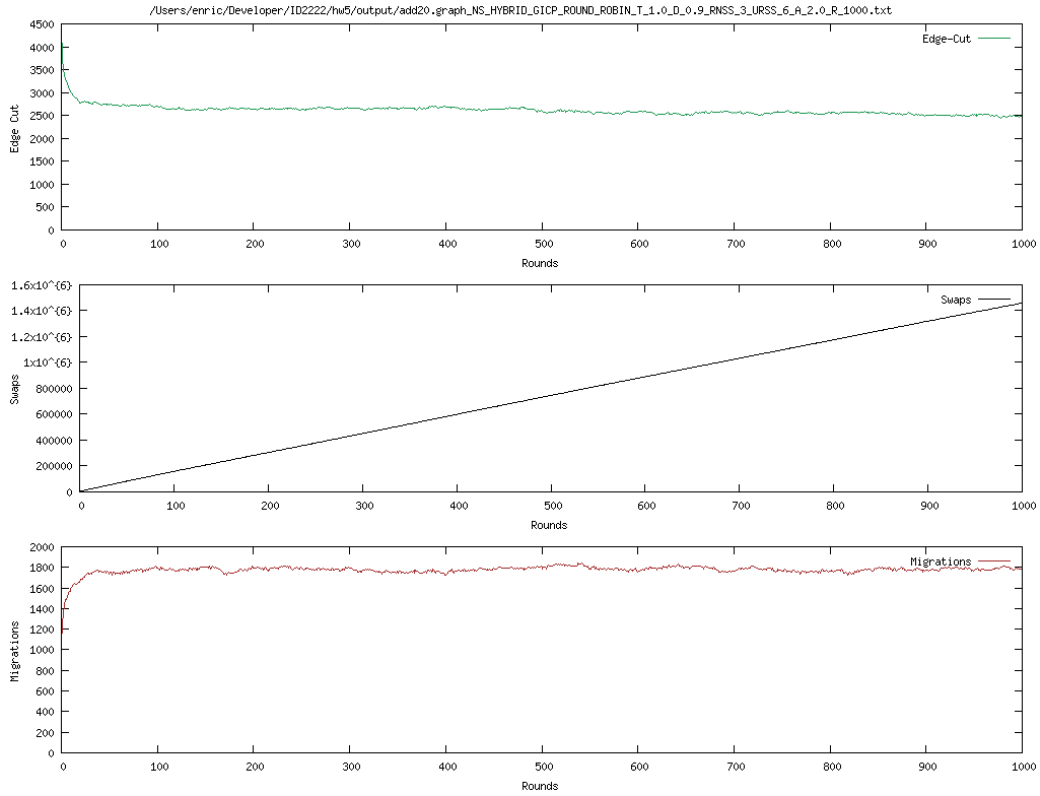
Add20 with alpha = 0.9



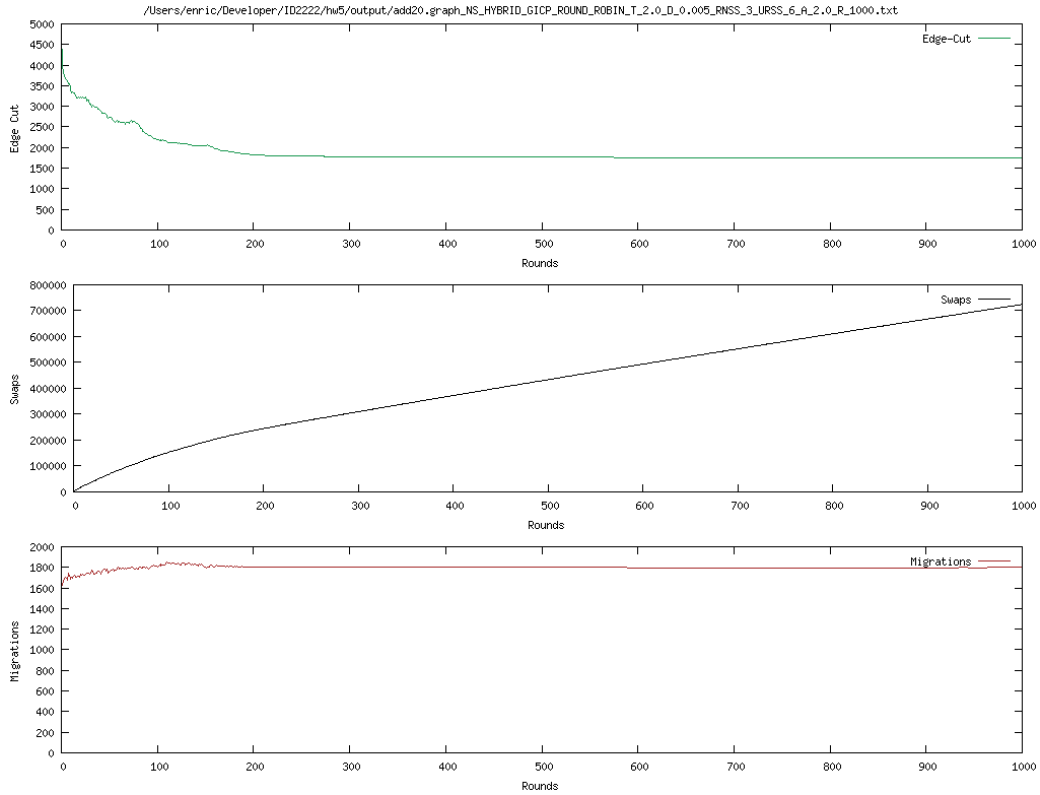
3elt exponential with restart on 100 rounds



3elt lineal with restart on 100 rounds



Add20 exponential with restart on 100 rounds



Add20 lineal with restart on 100 rounds

Task 3

In order to further improve the algorithm the idea I have in mind is to aproximate the annealing to the infinite so it converges to 0. Basically instead of using $e^{c_{new}-c_{old}/T} -> e^{1/T}$, we use $e^{(1/c_{old}-1/c_{new})/T} -> e\infty/T = 0$.