Report on AC-1, AC-2, AC-3, and AC-4 implementation and findings

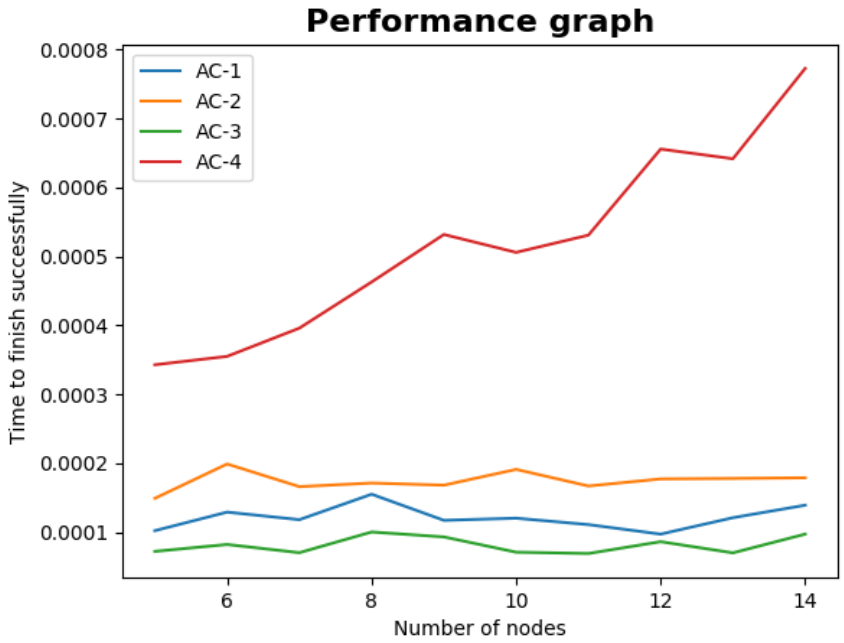
Md. Samiul Islam Siddiqui, Roll - 07

Overview

I implemented AC-1, AC-2, AC-3 and AC-4 algorithm and measured their performance.

Performance

The performance graph is as shown below. I plotted 9 points for each algorithm with number of nodes on the X-axis and required time to finish on the Y-axis.



Note that, as some of the generated graphs may be inconsistent, I considered the cases where the graph is consistent and has a successful domain reduction.

Findings

Among the four algorithm, AC-3 performed better than the other three. AC-1 and AC-2 performed almost similar. AC-4 didn't perform well for the domains and constraints I provided, maybe will perform better on other graph. One reason for this is probably the use of Python specific syntax that actually increased the complexity of the algorithm itself.

I used the constraints and domains mentioned in the previous report. To maximize the generalization of performance, I assigned defined constraints randomly. I had to limit number of constraints as most of the time, there were so many constraints among the nodes that the domains are almost always becoming empty.

I used global constraints, variable constraints and bigger domains, tested my code and almost every time the performance corresponds to the performance graph depicted above.

Anova Test Result

Anova test with Tukey HSD (for 200 data points) result is depicted below. Here A, B, C and D means AC-1, AC-2, AC-3 and AC-4 respectively.

treatments pair	Tukey HSD Q statistic	Tukey HSD p-value	Tukey HSD inferfence
A vs B	0.2941	0.8999947	insignificant
A vs C	0.2694	0.8999947	insignificant
A vs D	35.0533	0.0010053	** p<0.01
B vs C	0.5635	0.8999947	insignificant
B vs D	34.7592	0.0010053	** p<0.01
C vs D	35.3227	0.0010053	** p<0.01

Difficulties

Other than some coding mistake, there was no problem for me to implement the algorithms. I just followed the pseudo-codes I found through google search. Although, the design took some time. I used very few points to plot the performance graph because if more points are added, the scaling becomes higher for AC-4's contribution and the other three's performance could not be visually distinguished.