

Project Report

Zaid Ur Rehman 3955500

Introduction:

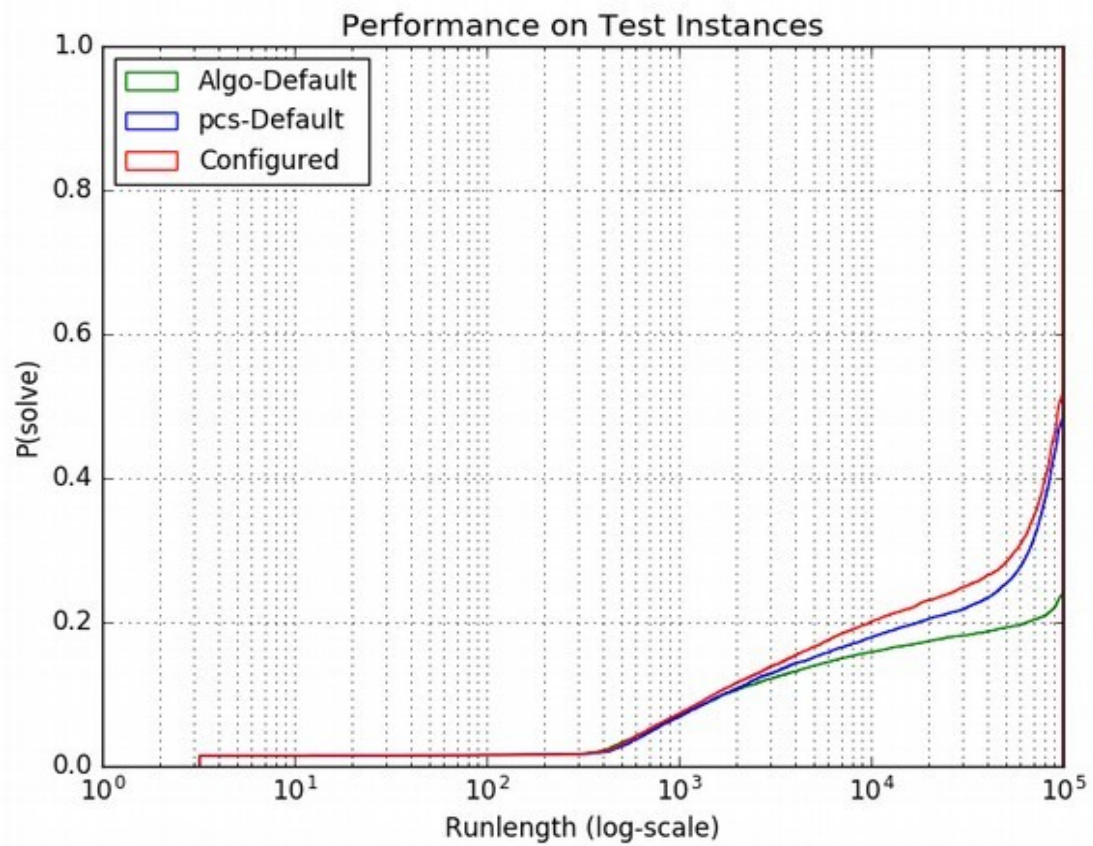
- At the start of the project, I measured the default performance with the algorithm's default parameters. However, the configured results included here are from the SMAC run which used given pcs-file.
- The Default Runlength in this report refers to the defaults search steps measured with pcs-file defaults, unless otherwise specified.
- I measured the Runlength (search steps) as average of 10 algorithm runs on all instances.
- I omitted all QCP instances with 'c p 0 0' from both train.txt and test.txt
- I omitted all SWGCP instances which were not cnf's from both train.txt and test.txt
- At the end, I had 39173 training instances and 11453 testing instances.

Performance of SAPS:

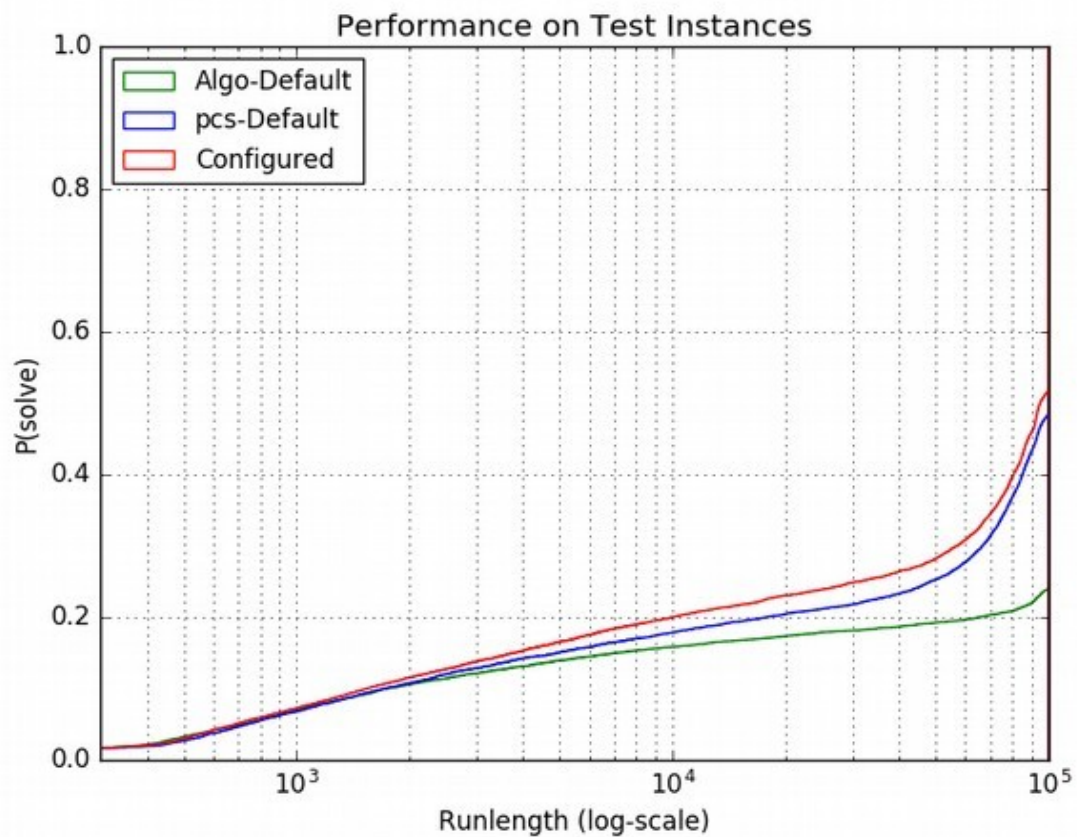
Parameter Setting	No. of Timeouts	PAR1	PAR10
Default (algorithm)	8696	81090	764439
Default (pcs-file)	5905	72293	536320
Configured	5527	69542	503864

- The performance with pcs-file defaults is much better as compared to algorithm defaults' Runlength performance.
- SMAC optimized mean quality, thus only working on PAR1. It marginally improved the performance.
- Validation Configuration: alpha = 1.2650605061027664, ps = 0.182795637980799, rho = 4.325126936079171E-5, wp = 0.0064841847663635105

CDF of Default and Configured RTD:

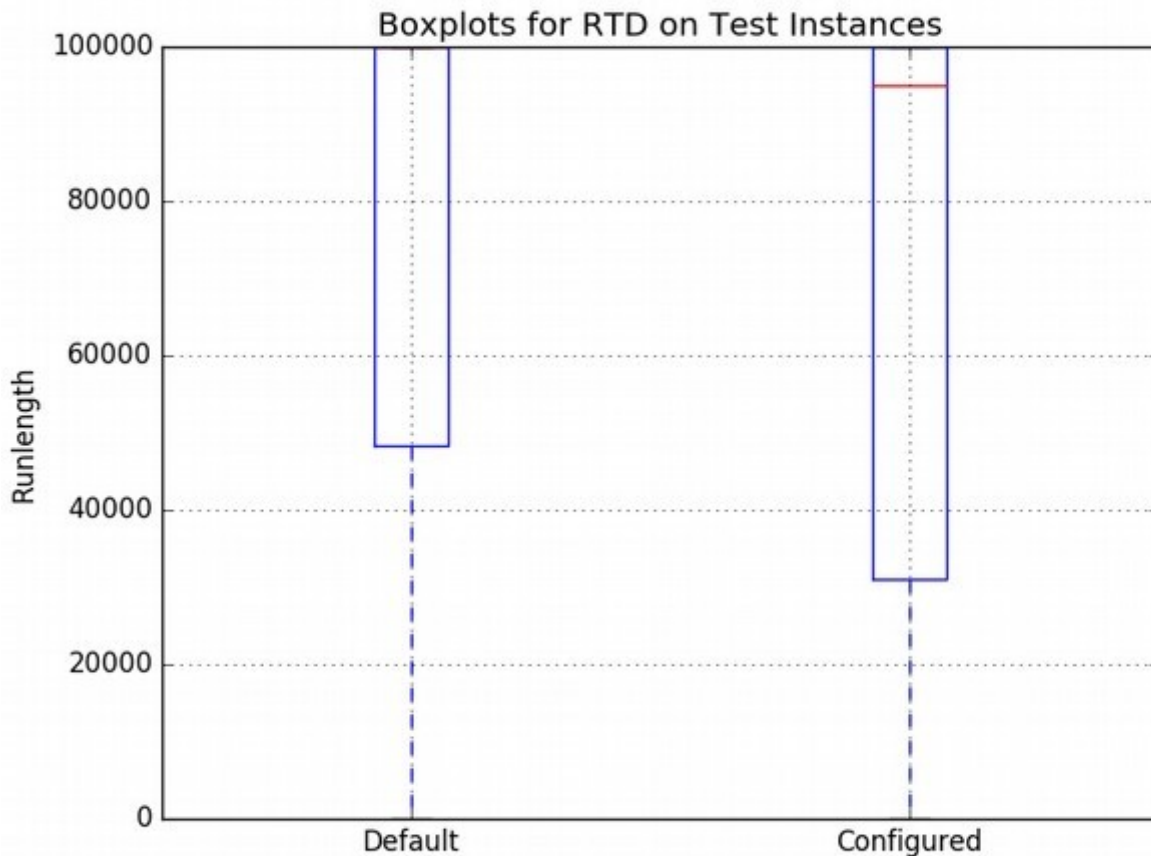


- Same graph with truncated x-axis (below)



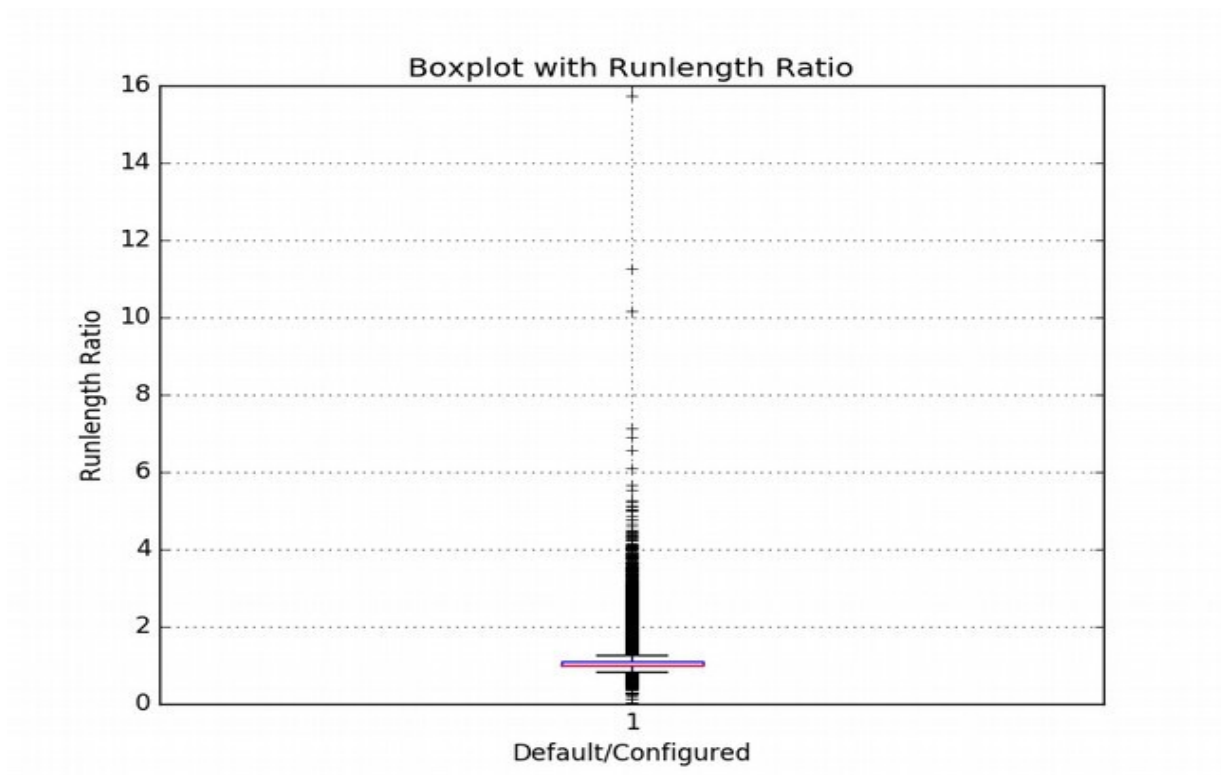
- The graphs above show a small improvement with the configuration found by SMAC.
- Generally, the success probability is greater with the well-performing configuration.
- Number of Timeouts in these graphs can be estimated with the point at which the curves touch the right boundary of the figure. The higher the point, lesser the no. of Timeouts.
- Success probability with both configured parameters and pcs-file default parameters is almost double as that of algorithm's default parameters.

Boxplot of Default and Configured RTDs:

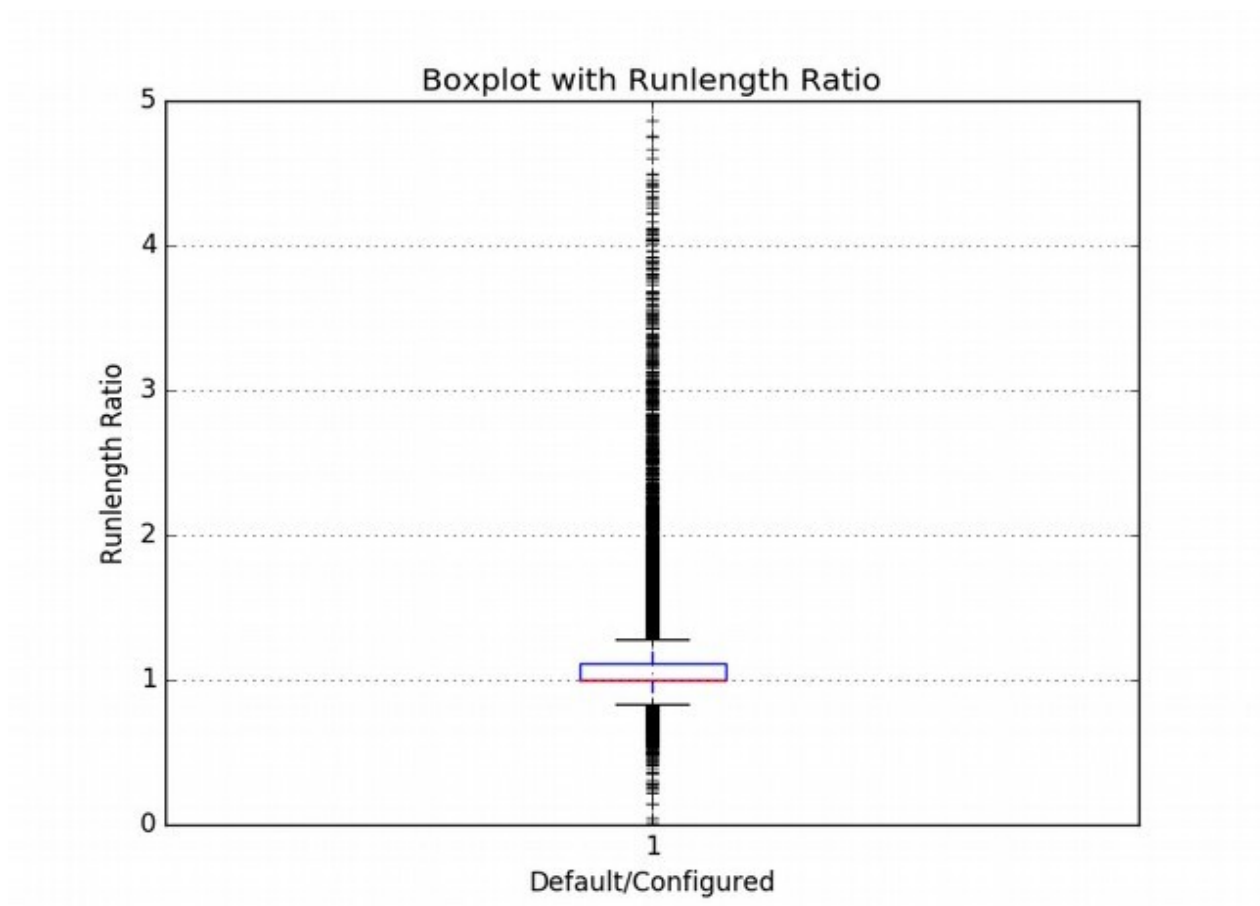


- The median Runlength with default parameters is 100000 i.e. cut-off length.
- The median Runlength improved with the found configuration. This means that half of the instances are expected to be solved with at-most ~95000 search steps.
- More instances lie in the 25% quantile - 50% box.
- With the default configuration, no instances lie in the 50% quantile – 75% quantile. They are all counted as timeouts. However, some instances fall into the the upper box with configured parameters.

Boxplot of Default/Configuration for Runlength Ratio:

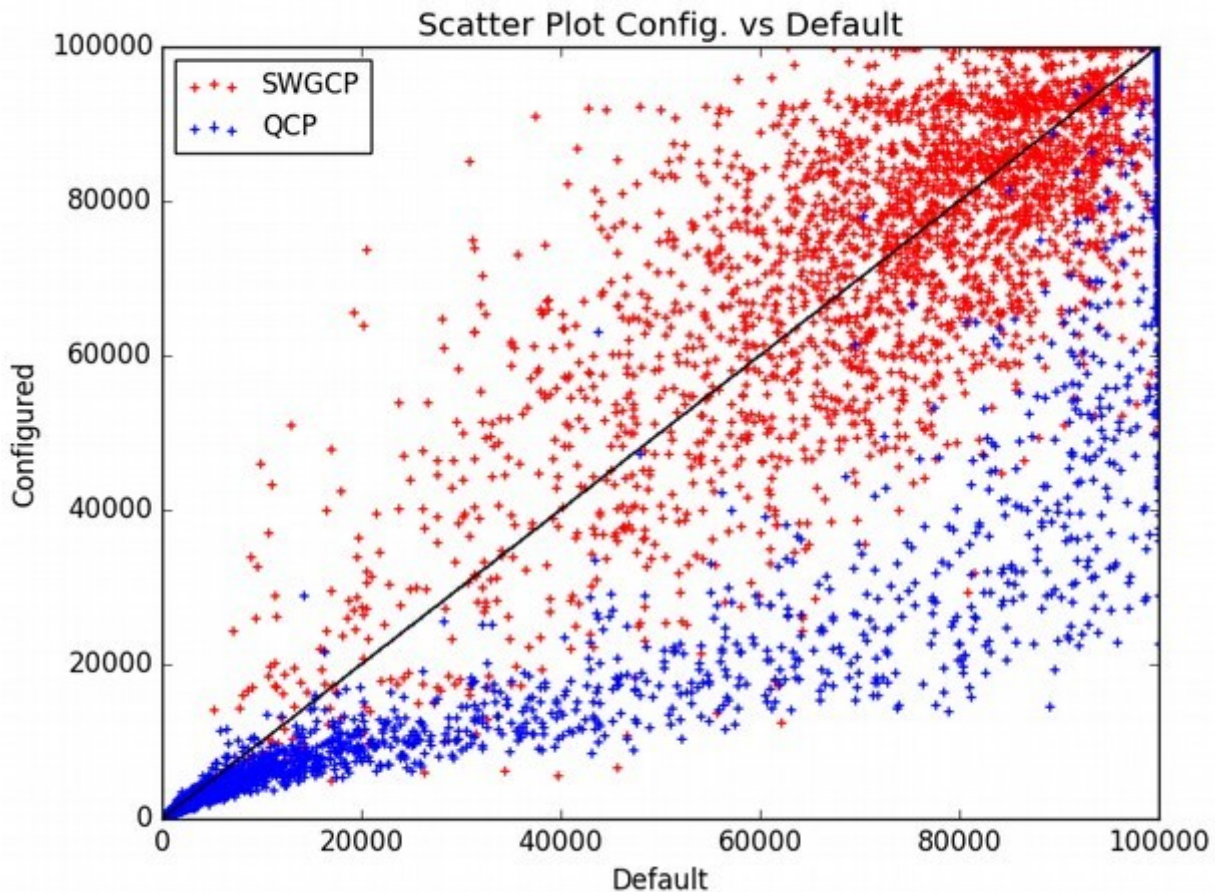


- Same plot with truncated y-axis below:



- As the box in these boxplots are skewed towards Runlength ratio > 1 , it's visible that configured parameters performed better on many instances.

Scatter Plot for Configured vs Default Runlength:



- The blue dots represent the QCP instances and the red dots the SWGCP instances. From the graphical representation of these blue and red clusters, it can be said that the instance set is heterogeneous.
- As almost all of the QCP instances lie below the diagonal in this scatter plot, the configuration found performs better on the QCP instances.
- The blue QCP points are clustered at the lower left corner of the scatter plot, which means these instances generally have smaller Runlengths.
- The red SWGCP points are clustered at the top right corner hence these instances have generally higher Runlengths.
- There are a lot of dots on the right boundary of the plot, which means all of these QCP instances timed-out with default parameters but were solved with the found parameters configuration.
- The SWGCP points are equally distributed above and below the diagonal, hence the configuration found does not improve the performance much for these instances.

General Comments:

- I couldn't use Fanova for parameter importance. I kept getting this error: `'RuntimeError: Failed starting fanova. Did you start it from a SMAC state-run directory?'`, even though I was using the correct state-run

folder. I even tried to on a different computer but still got the same error. I finally gave up.