# DPTP - DMOP Parameter Testing Platform User Guide

The DPTP was constructed in MATLAB 2018b. All necessary files for it to work are included in .zip file. Please contact dgh756@student.bham.ac.uk if you encounter any problems. Any recommendations, suggestions or feedback is also welcome.

The GUI

The screenshot below shows what the DPTP window looks like. To open this, simple navigate to the directory containing the DPTP files and type " DPTP " (without the quotes) into the command window and hit enter.
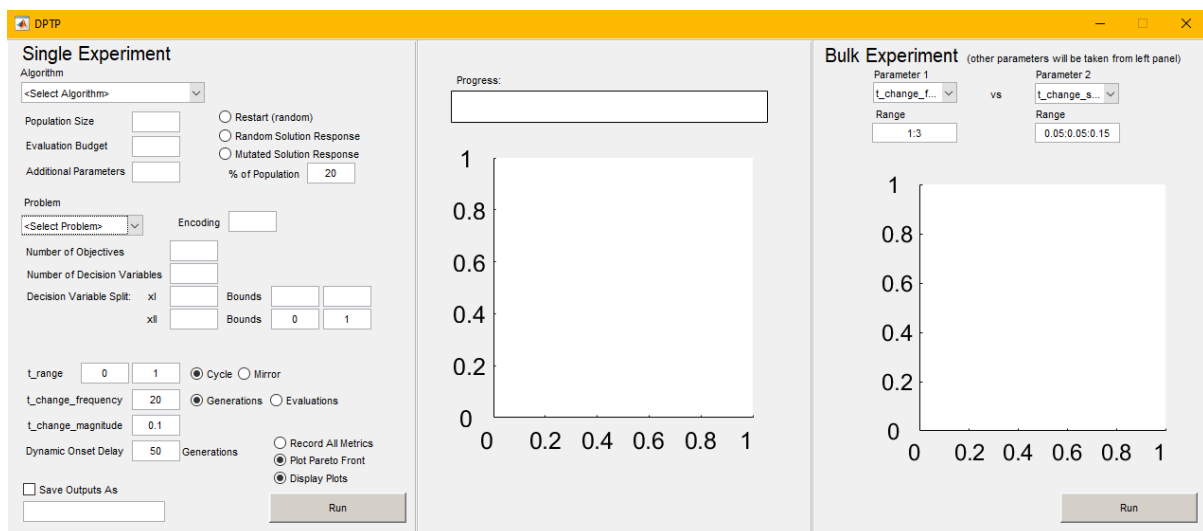
Selecting an algorithm

Choose from one of the implemented MOEAs for the algorithm drop down menu. This will auto-fill the Population Size, Evaluation Budget and Additional Parameters boxes, however these can be altered manually. The default values are sourced from the AlgorithmList.txt file and can be altered if desired.

The Evaluation Budget is automatically calculated based on the frequency of changes to ensure 30 change events occur – an upcoming version will allow this to be changed. Again, manual setting of the evaluation budget can override this.

Selecting a problem

As above, choosing a problem from the Problem drop-down menu autofills default values from the ProblemList.txt file. Again this can be altered if desired or the values in the boxes can be changed manually.

Saving Outputs

Ticking the "Save Outputs As" checkbox saves the important variables to a '.mat' file after completion. If no file name is given in the box below, a default file name is used.

Single Experiment Runs

After selecting an algorithm, a problem and the desired dynamics parameters, hitting the " Run " button in the first panel will begin the computation. A brief message will be printed in the Command Window that summarises the combination of problem and algorithm being tested.

If the "Display plots" button is toggled, the axes in the middle panel will show the objective values of the current population (as it evolves in the optimisation). The "Plot Pareto Front" button will include the Pareto Front at the current time t on this figure.

To escape a run/cancel the current experiment, ensure the DPTP window or the Command window is selected and used the shortcut Ctrl+C (Function+C) to interrupt the optimisation. Hitting the Run button again will work as normal.

An example of a completed single experiment run is shown in the screen shot below.
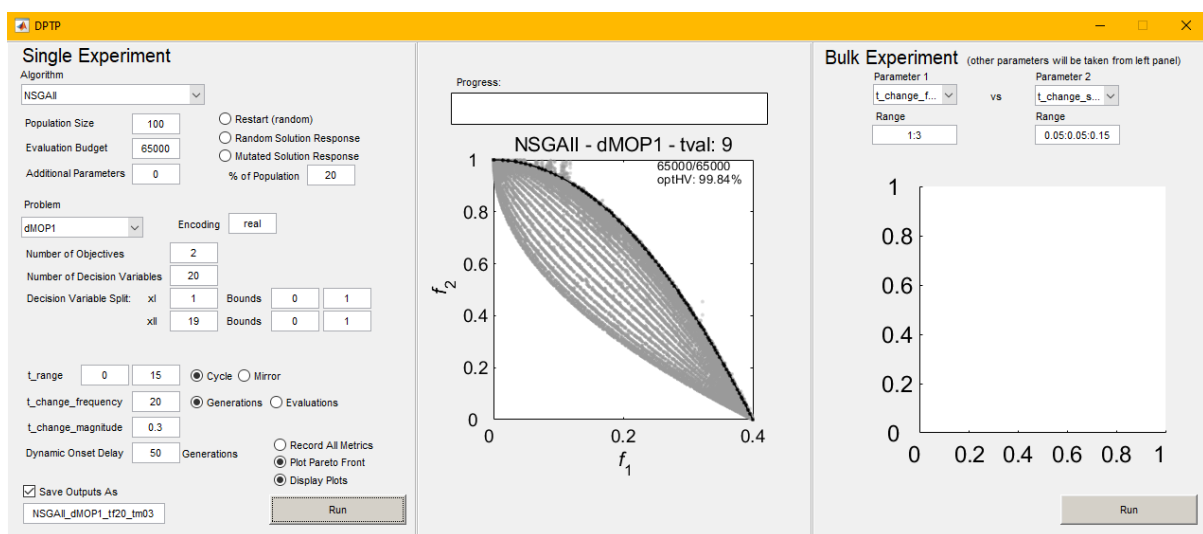
## Bulk Experiments (to examine parameter ranges)

The third panel allows for the examination of a range of parameters. Crucial to the reproduction of the figures in the associated paper that introduces this platform, we provide a working example using the change frequency and change severity parameters. Selection of the parameters can be done from the drop down menus and the ranges to examine can be specific in the boxes immediately below. Note that some parameters must have integer values and errors may be thrown if they are not used.

All other parameters must be specified in the first panel – an algorithm and a problem must still be selected. The parameters selected on the bulk experiments panel can be ignored in the first panel (auto-filled values will also be ignored). The Display Plots and Plot Pareto Front toggles will also be observed. NOTE: computation is faster if these are switched off. The Save Output As works similarly as for the Single Experiment Run functionality.

The Run button on the third panel begins the examination of the parameter ranges. The progress bar at the top of the middle panel will show the progress of the heatmap construction/parameter combination experiments.

Upon completion of all combinations of parameters in the ranges, the axes in the third panel will shown a heatmap of the Mean Hypervolume Difference (difference between the hypervolume attained by an algorithm and the optimal hypervolume achievable with an equal number of solutions). The recorded algorithm-achieved hypervolumes are from the generation immediately before each change event.

An example of a completed bulk experiment run is given below:
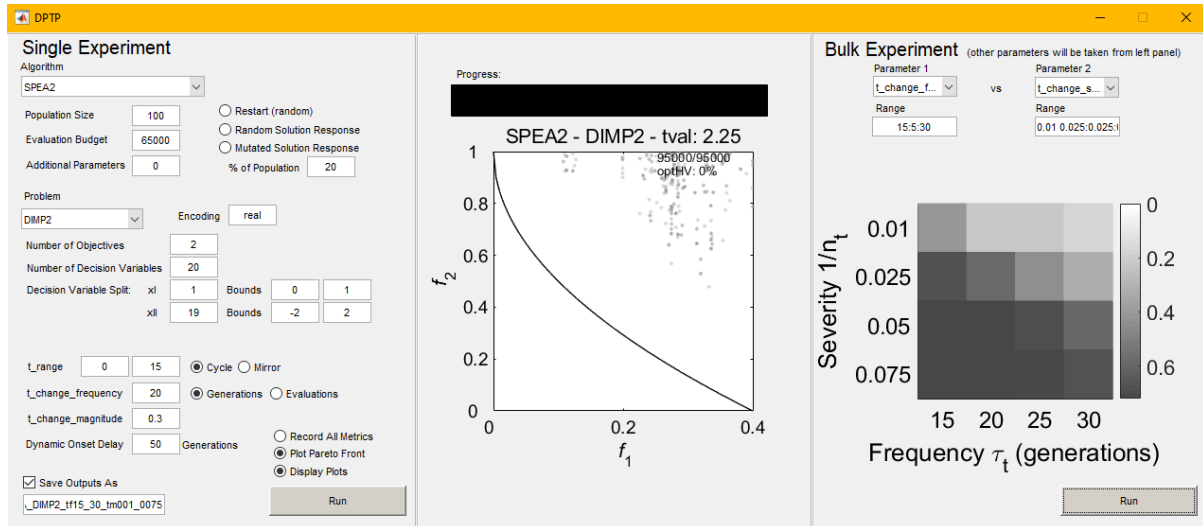
Future functionality

The following is a list of features that will be added in the near future

- Addition DMOP benchmarks including those from the SDP (Jiang2019), RDP (Ruan2021), JY (Jiang2018) suites.
- Ability to change the measurement that the heatmaps are created from.
- Button for cloning of figures to a new window for streamlined saving.
- DMOEAs as options for the algorithm.
- Additional parameter choices for the bulk experiments.