User Manual for Napier Map Elites

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Contents

1 File Formats

1.1 Results CSV

The results CSV file is the first file uploaded on to the website. This file requires a specific format for the application to be able to read it. A sample is shown below.

Dimensions	2				
Normalised	20				
evals	100				
key	dist	emissions	fixedCost	actualEmissions	actualFixedCost
14:8	142.5	14	8	152.95	1700
2:5	134.9	2	5	122.78	1550
20:18	178.5	20	18	171.14	2100
⋮	⋮	⋮	⋮	⋮	⋮

Figure 1: A sample CSV with two dimensions

Dimensions This is the number of variables in your results, excluding 'dist' which is mandatory. In the above example there are two dimensions - emissions and fixedCost.

Normalised This value is kept for historical reasons. It is no longer used and can be set to any integer number.

evals This is the number of evaluations contained in your results. This must be set equal to the number of lines in your csv, excluding the top four lines.

Headers The fourth line in the CSV is the headers for the data. 'key' and 'dist' are required headers. These two columns must be followed by a set of normalised columns equal to the value of dimensions - in the example above these are 'emissions' and 'fixedCost'. These columns must be followed by the actual values of these normalised headers - in the above example 'actualEmissions' and 'actualFixedCost'.

The names of the 'key' and 'dist' columns are fixed. The names of the other columns are not fixed.

Values The first value is the result key. This is the normalised values joined with a semi-colon between each. In the example above the normalised values in the columns are 14 and 8, so the key is 14:8. If these was a third dimension the key may look like 14:8:20.

The second value is the solution distance.

The following values are the normalised data points followed by the actual data points.

1.2 Solutions zip file

The solutions zip file should contain a single folder for each of the results in the associated zip file. These folder should be named the same as the key column, however the colons should be replaced with underscores.

Three folders from the sample above (Figure 1) can be seen below.

Each of these folders contains details about the solution.

Each folder must contain a single Markdown[1] file. The name of this file is not fixed but must end with '.md' This file should contain a Markdown formatted description of the solution.

Each folder may contain any number of Keyhole Markup Language[2] (kml) files. The names of these files are not fixed but must end with '.kml'.

[1] http://commonmark.org/help/
[2] https://developers.google.com/kml/

2 Usage

2.1 Browser requirements

The application has been designed for use with Firefox. For the best user experience a modern version of Firefox should be used.

The application has also been tested with Google Chrome. When using Chrome all the functionality is available however the application runs considerably slower than Firefox. If speed becomes an issue please consider using Firefox.

The application has not been tested with other browsers such as Edge, Internet Explorer or Safari. While the application may function on these no guarantees are made.

2.2 CSV

The main application page can be found at the '/upload' endpoint. This will be 'commute.napier.ac.uk/upload' if using the Napier University server or at '127.0.0.1/upload' if you are hosting the application locally.

On loading the application you will be presented by the view below (Figure 2).

This box may be clicked, or a CSV file dragged onto it, to initialise the application. If the CSV file is incorrectly formatted the page may not present an error but may not function correctly. Displaying or error messages will hopefully be added in a future update.

The application may appear to stall at this point. It may stall for up to 1 minute depending on the size of the CSV file and the software and hardware used to access the site.

Once the CSV file is loaded you will be presented with a page similar to the following image (Figure 3). This page has been divided into four sub-section which are detailed below.

2.2.1 Section 1 - Solution upload

The first section allows the user to upload the zipped solutions folder mentioned in 1.2. This does not display when a solutions file has already been uploaded to the server. In this event the section can be shown by clicking the cloud icon at the top right of section 2. If a second file is uploaded this will overwrite the first file.

File locks Only one user may upload a solutions file for a specific CSV file at one time. If another user attempts to upload a a file an error message will be displayed. If an upload fails or is cancelled there is a chance this message will be displayed incorrectly. This issues will automatically fix itself after 15 minutes.

Details of how to manually clear the locks can be found in the installation and maintenance documentation.

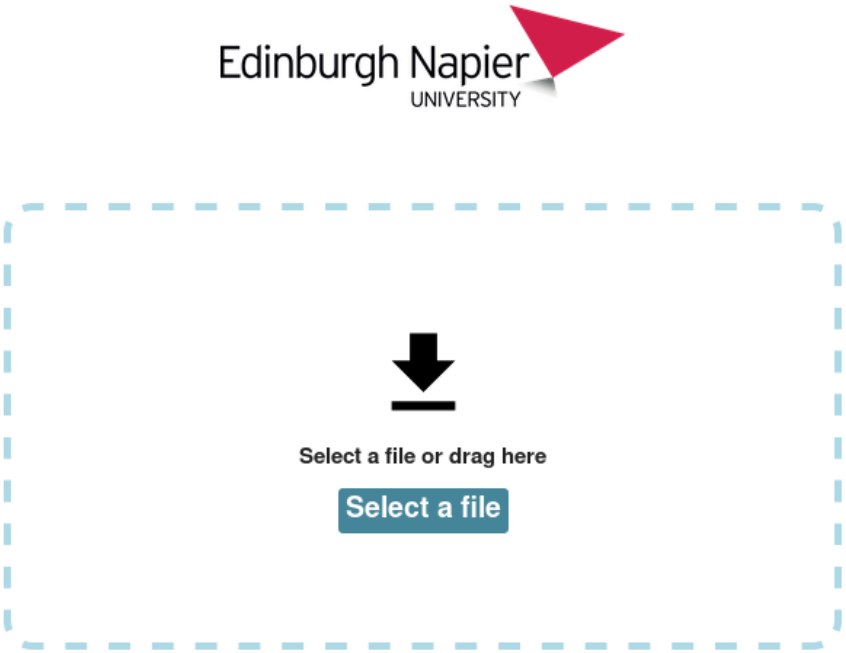

Figure 2: The first view presented by the application

2.2.2 Section 2 - Parallel coordinates

The second section contains a parallel coordinates graph.

This graph is interactive and can be filtered by clicking or dragging on each of the columns. Right clicking on a filtered column will reset it. Clicking the refresh button in the top right will reset all the columns.

The graph is colour where red lines have a high distance and green lines have a low distance.

2.2.3 Section 3 - Results

The third section contains details about any selected results. This section only displays information when a single solution is selected through the filtering in the parallel coordinates. If this section contains the text 'Too many results found' then more than one result is available through the parallel coordinates filtering.

When a single result is found, the details of that result are displayed in this section. If a solutions file has been uploaded the 'View details' link can be clicked to view further details loaded from the solutions zip file. If this link leads to a 'Not found' page then the solutions file and the CSV file do not match

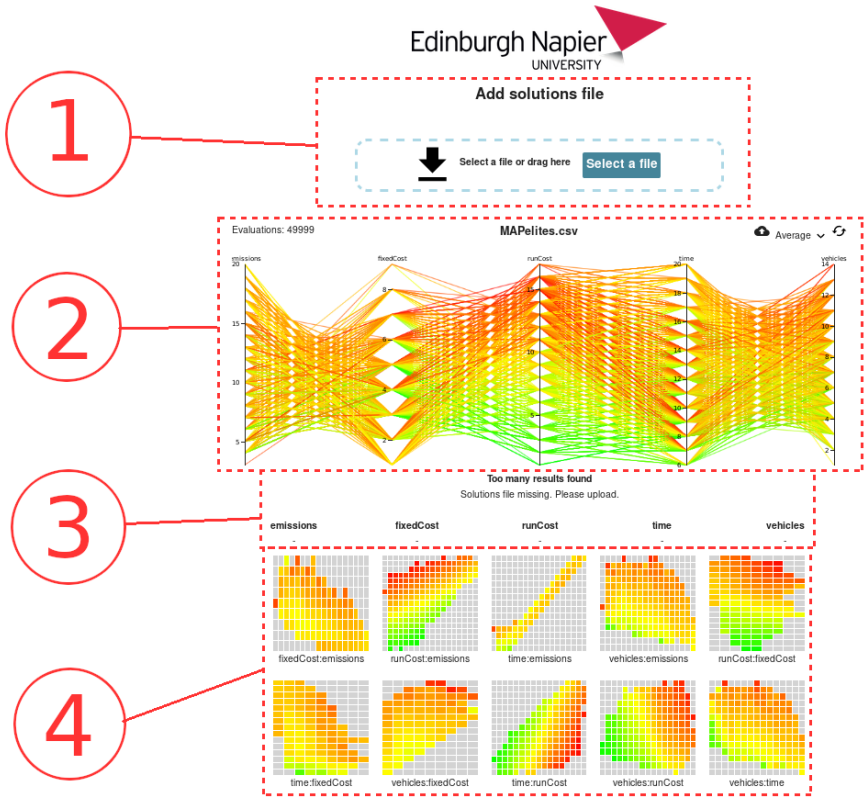

Figure 3: The page layout when a valid CSV file has been uploaded

and correct or updated solutions file should be uploaded as mentioned in 2.2.1.

2.2.4 Section 4 - Heatmaps

Section 4 contains heatmaps to display the data. These are filtered to display the same data at the parallel coordinates graph is section 2.

By default these heatmaps are coloured based on the average distance of all the elements on a tile. This can be changed to use the best distance of the elements on a tile using the drop-down in the top right of section 2.

2.3 Solution

Clicking the 'View details' link on the main application page will open up the solutions page. This page is dynamically populated based on the solutions file uploaded and so a sample is not shown here.

This page is hosted on the server. If you are using the commute.napier.ac.uk, or another publicly available server, the url can be sent to others to view the

content.

Each page is made up of three core sections detailed below.

2.3.1 Routes

The first section of the page contains a list of routes named after the files found in the solutions folder. These are colour coded to match the map below. Clicking on these buttons toggles their visibility on the map. The colours used here and in the map can be defined in the KML files with blue being used if this information is missing.

2.3.2 Map

This map displays the data contained in the KML files from the solutions file. If the tiles are slow to load zooming in and out can often help.

2.3.3 Details

This details section is the rendered Markdown file from the solutions folder.