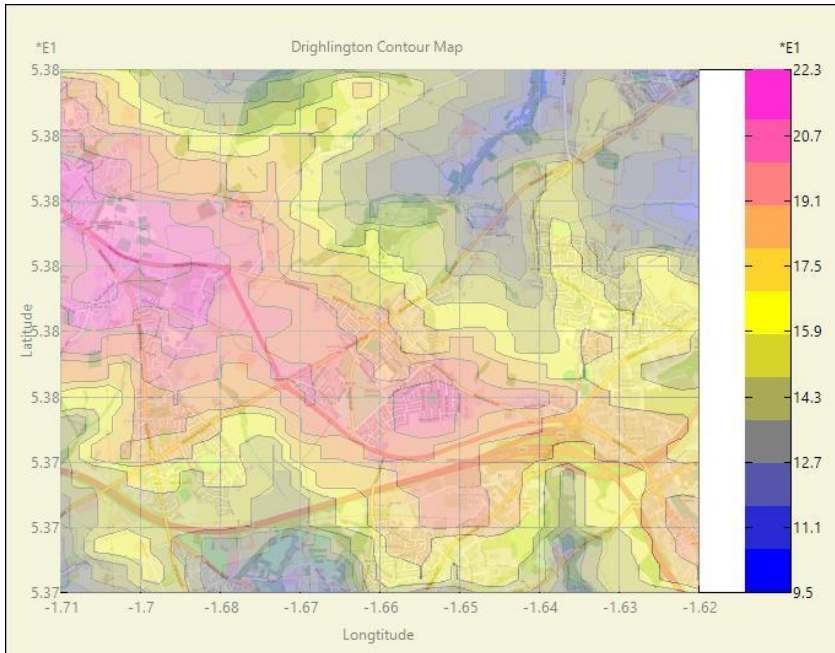


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## 1 Introduction

This is a manual for the installation and use of the application 'ImageFormer'. The program is a Windows application, for creating an image of elevation contours superimposed on a street map of an area. A typical output would be a .jpeg file such as in the following figure:



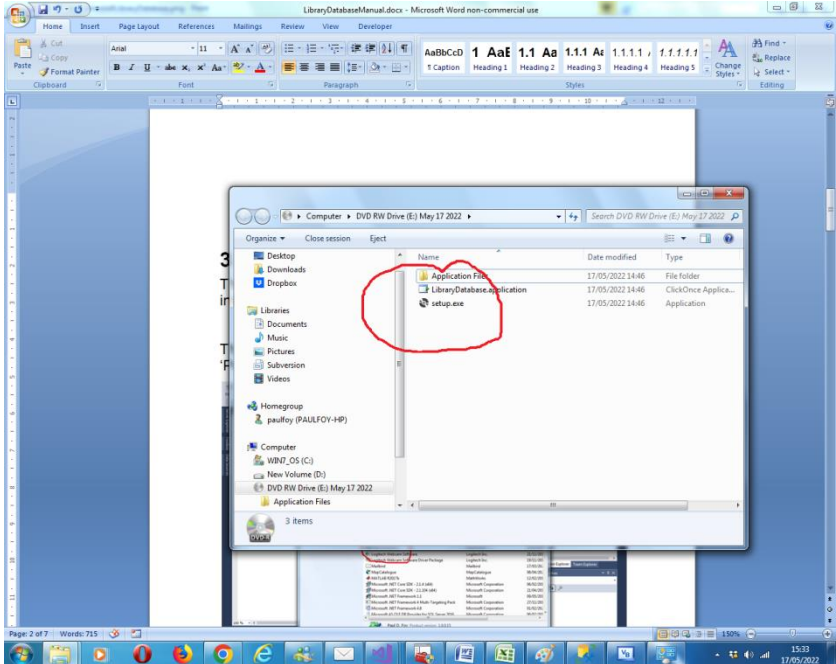
## 2 Pre-requisites.

1. A PC running Windows 7 or above.
2. A USB stick or optical drive containing the program setup files, together with this manual (available online).

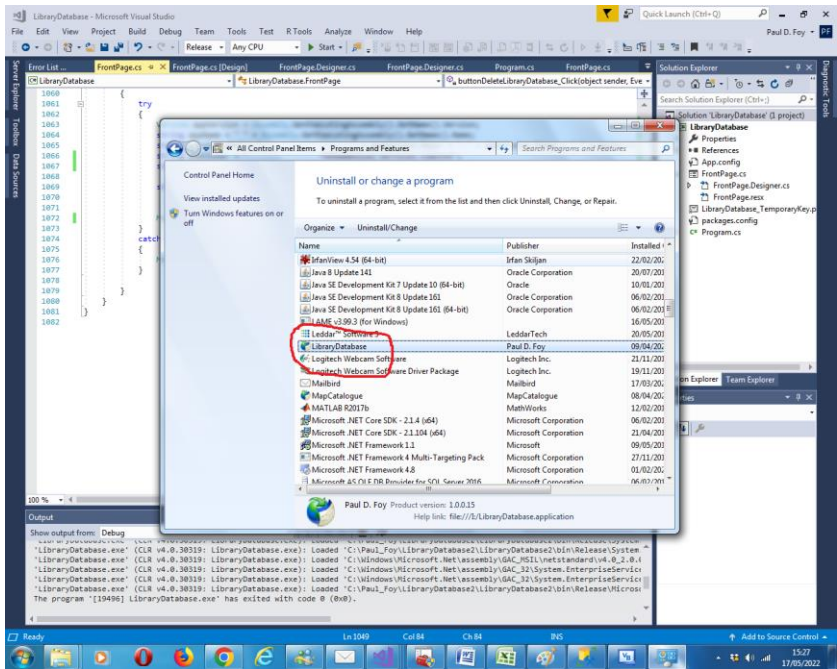
3. Access to and use of <https://www.openstreetmap.org/> for creating a street map of an area, to be used as a background image on which to superimpose contours.
4. Access to and use of the API at <https://open-elevation.com/> for obtaining elevation information for a (longitude, latitude) pair of GEO coordinates.

### 3 Installation/Removal

The program is installed by inserting the supplied stick or disc into the PC and running the 'setup.exe' program on it.



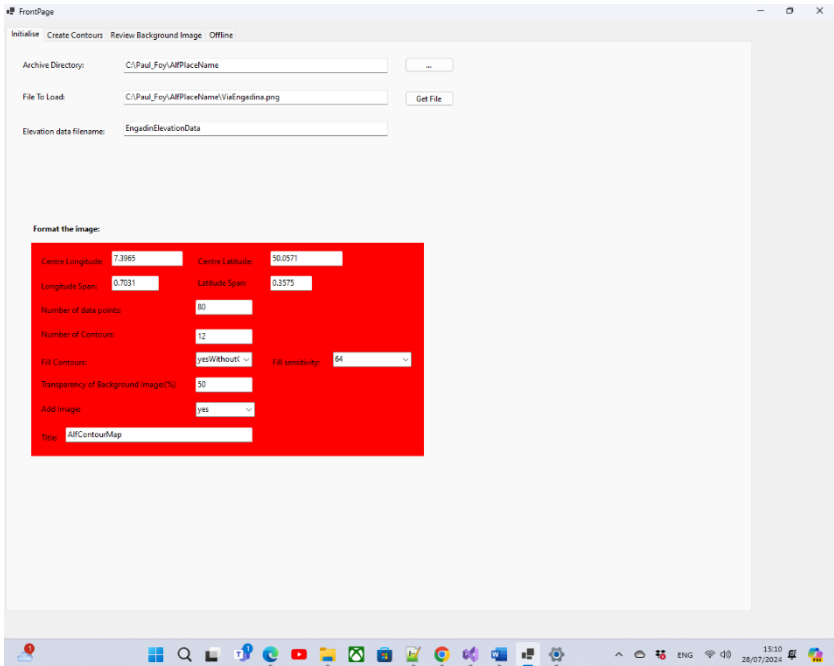
The program can be removed from the PC, by using the 'Program & Features' menu from within Control Panel.



# 4 Use

The application has 4 tabs:

## 4.1 Initialise



This tab initialises the names and directories and the settings for creating the image of contours.

**Archive Directory:** the directory where all files are loaded from or saved to.

**File To Load:** the file path of the background image on which to superimpose the contours and/or the contour shading.

**Elevation Data Filename:** the file name (without extension) for archiving the elevation data gathered. A filename with this

name plus the suffix 'Parameters' is used for storing the parameters used in gathering the matrix of elevation data points.

### **Format the image:**

This panel contains the parameters for controlling the contours provided. All have default values except the **Centre Longitude** and **Centre Latitude** of the image which must be provided.

**Longitude Span** and **Latitude Span** are the differences between the central values and the extremities of the image to the West (longitude) or North (latitude). Defaults of 0.044 and 0.02 respectively.

**Number of Contours** is the number of contours to be employed (default 12)

**Fill Contours** describes the contour map and has 3 options: *yesWithContours* colours in the contours, leaving the contours in black; *yesWithoutContours* colours in but does not draw the contours; and *no* just draws contour lines.

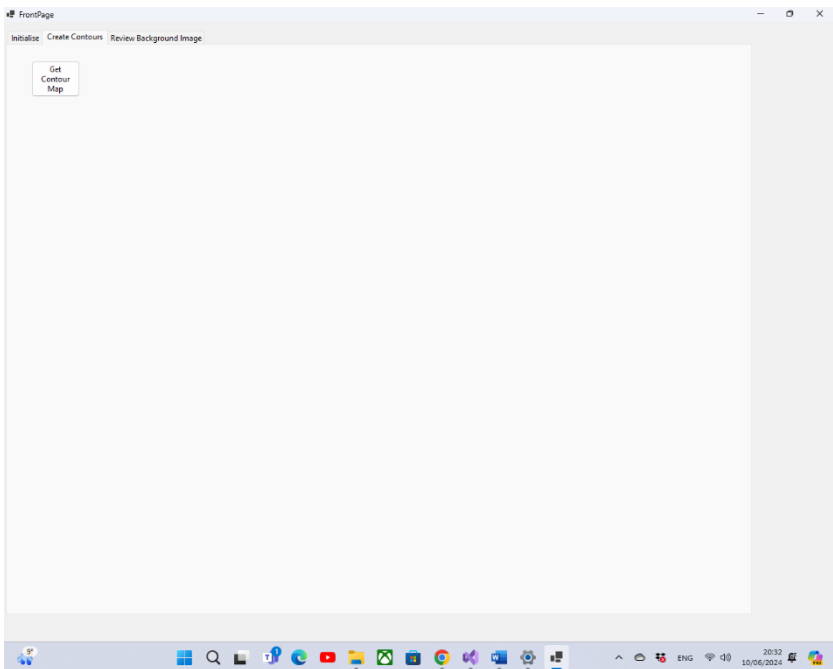
**Fill Sensitivity** is an integer which controls the granularity with which contours are filled in if either of the fill options *yesWithContours* or *yesWithoutContours* is selected. The values permissible are 8, 16, 32, 64 and 128. The default is 8. Higher values significantly effect the time of processing.

**Number of data points** controls how fine the underlying elevation data map is and is the number of points at which elevations are requested in both longitude and latitude. Internally only multiples of 40 will be used (i.e. the figure is rounded from the one provided here). It is recommended to keep the default value of 40. Higher multiples of 40 may well overload the Open Elevation server resulting in obscure error messages of which this application does not have much control. I have however successfully used 80 on a regular basis.

**Transparency of Background Image (%)** – this indicates how prominent is the background image from (0) not prominent at all to 100 (very prominent). The default of 50 is recommended as a good value.

**Title:** the title of the resulting image.

## 4.2 Create Contours



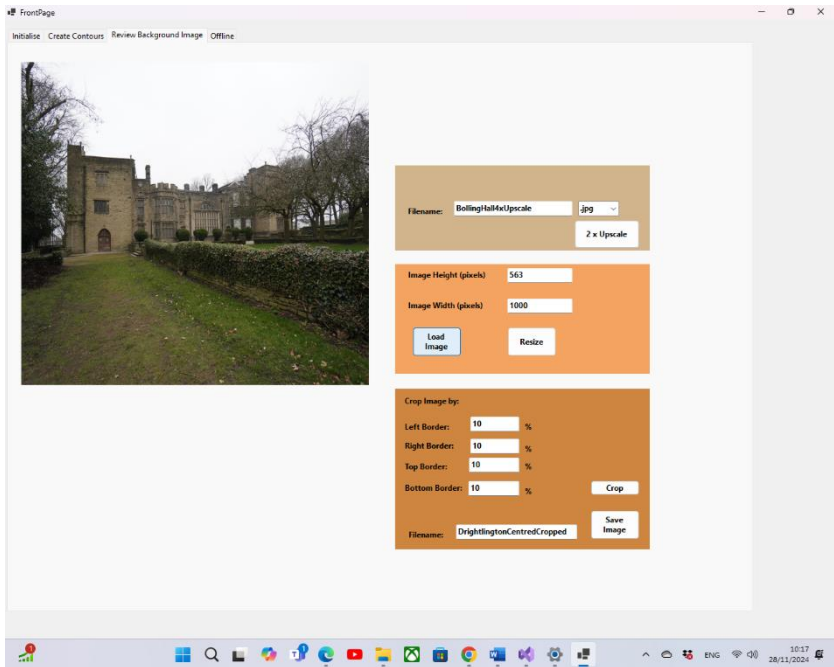
Use <https://www.openstreetmap.org/> to select the area for the background image. It is recommended to use the following procedure: Use the marker feature on the right-hand panel to position the map so that the desired coordinates (the ones supplied in this application) are in the centre. Note these values. Then note the feature which is directly to the North and



the one that is directly to the East respectively on the edge of the map. Then move the map so that these features are in the centre for each case. Note the coordinates again. Then the latitude and longitude spans are the difference in these two numbers respectively. Then you have the desired coordinate parameters for the map that is obtained by downloading using the tool in the right-hand panel. Use this downloaded image as the background image.

The button **Get Contour Map** calculates the contours and displays them, together with the background image, on a new form as shown in the introduction. Please wait whilst this operation occurs. With the number of data points set to 40 (the default and minimum) it will take a few seconds.

## 4.3 Review Background Image



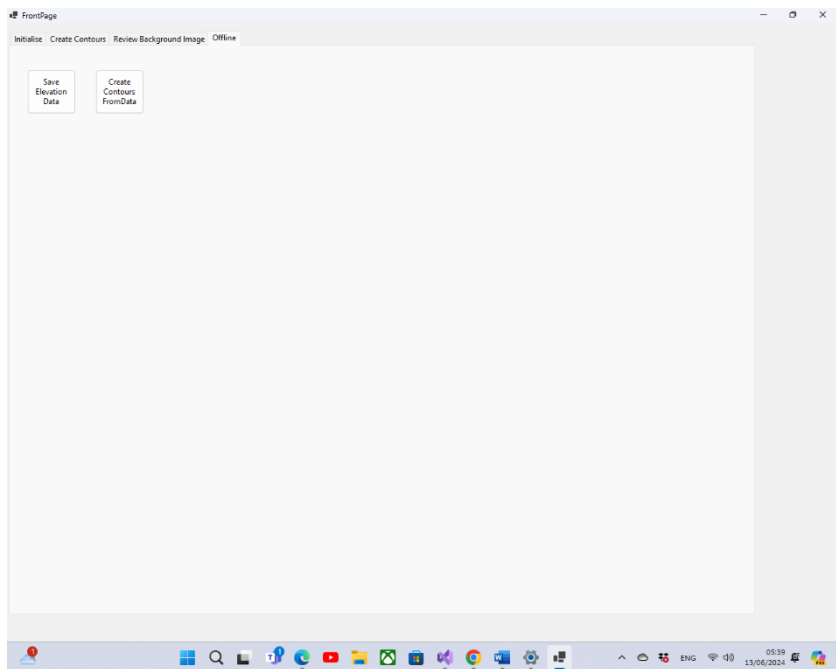
This tab allows you to do two things:

(1) (middle panel) to load the background image (button **Load Image**) and test how it looks when it is resized (button **Resize**) with a height and width (in pixels) provided in the upper right panel. The image loaded is the 'File To Load' textbox of the preceding section.

(bottom panel) You can also crop the image using the **Crop** button and save the cropped image to a filename of your supply (no file extension). The saved file goes in the archive directory. The crop is a border within the image the width of which is the % supplied with respect to all four edges. The cropped image is displayed with the pertaining size in the left pictureBox.

(2) (top panel) You can increase the resolution 2-fold in each direction by using the **2 x Upscale** button. The procedure works by working on the pixels of the raw image, from the initialise tab, by an interpolated insertion of more pixels. The image is saved with the name and filetype supplied. To increase the resolution another 2-fold simply repeat the procedure on the file produced (there is a limit to being able to do repeatedly caused by limitations on basic calls in the operating system).

## 4.4 Offline



This tab permits working with previous saved elevation data and parameters.

The button **Save Elevation Data** saves the matrix of elevation data to the file name (with .txt extension) given in the Initialise tab. The parameters are also saved with the suffix 'Parameters' and extension .txt.

The button **Create Contours From Data** performs a contour plot and map plot from saved data. The output is two files which can be saved in various file formats. One is a contour map of the saved data free of axes' latitude and longitude values. The other is a colour bar showing the relationship between colour and elevation.

I provide some advice on selected the file format: If you are using this software to obtain an image which is to be used in a Microsoft Word document then Word will accept many filetypes for the image. The integrity of the portrayal of the image in a subsequent printed document will depend upon the resolution of the image (that is the number of dots per inch on the hard copy). This is different from the number of pixels (width by height) of the image on a computer screen. It is recommended to save the image in this section as a raw bitmap file (.bmp) with the greatest pixel width and height that is practical. In this way no data is lost by converting the image to one of the compressed file formats (such as .jpg). This will tend to increase the resolution of the image in a subsequent printed document.

For high quality images use 80 data points and a fill sensitivity of 64 or greater.

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November 2024