**Changelog**

**Version 1.0.2 and 1.03 will be deployed together, which constitutes a large enough upgrade to the program to warrant the following version number: 1.1.0 (Quite an upgrade if I do say so myself).**

**V1.0.2, 20-08-2024**

Improved the loading efficiency of the program. A 109 row dataset went from 6-7 minutes to 27 seconds (on my system which is pretty amazing, so might be a smaller difference on other systems).

Improved the ID selection menu

* Improved layout
* Added select / deselect all option
* Added search feature

Resolved an issue where the gradient arrow on the 2D plot appeared outside of view when filtering data.

* This was due to the code responsible for placing the arrow did not use the filtered data to center the arrow based on the points in the filtered data. It still used all the data points to place the arrow which sometimes meant it was placed out of view on the plot.

Implemented caching of results.

* This provides another significant efficiency improvement when messing around with filters. For example, if a certain triangle has already been calculated, the code does not calculate that triangle again. Using the 109 row dataset as an example, if 50% of the points are filtered away and then added again, it only takes around 4 seconds (instead of 27 seconds) to fully update the plots and statistics etc.

**V1.0.3, 11–10-2024**

**Resolved issues**

1. Resolved an issue with the angle not being exactly the same between 2d plot and Gradient rose plot

* The difference in the angle between the 2D plot and the Gradient Rose plot was due to different calculation methods being used for the average angle:
  + The 2D plot was using a simple arithmetic mean of the angles, which doesn't account for the circular nature of angle data.
  + The Gradient Rose plot was using a circular mean calculation, which is more appropriate for directional data.
* The circular mean takes into account that angles wrap around (e.g., 359° is close to 1°), while a simple arithmetic mean doesn't.

1. Removed the degree from Mean Gradient legend entry in the ***Hydraulic gradient distribution*** plot
2. Resolved an issue with some UI elements like buttons moving out of frame so that they were no longer clickable, when the user resized the window
   1. This was resolved by making the UI elements in the left side of the program into a scrollable area with static sizes for the buttons etc.
      1. Potential issues might still occur on some screens, but I have tested on my 2 laptops and 2 screens of varying sizes, and it works on them.

**New features**

1. Added an additional customization option for *the* ***2Dplot and gradient vectors*** plots. This new option is a compass that shows the cardinal directions related to the degrees
2. Added cardinal directions to the roset plot
3. Added the option to export contour lines to use in QGIS
4. Added an option to create a pdf document for use in reports as an appendix.

* To access this new option, a button ‘’Export complete report’’ has been added to the export section of the program. Pressing this button opens a window where you can configure some aspects of the pdf created.
  + The window allows for the following to be included/excluded in the exported pdf:
    - Statistics (as seen in the program in the summary statistics tab):
      * General statistics
      * Gradient statistics
    - Plots
      * Each of the plot types available in the program with any customizations added by the user
    - Tables
      * Valid results table: A table of the triangles that are valid based on the criteria used by J.F. Devlin
      * Rejected results table (as seen in program in the Rejected triangles tab)
      * Rejected points frequency analysis (as seen in the program in the rejected triangles tab)
    - Since some of these tables have large amounts of data, an option to choose how many rows to export is provided (default is 50)
    - Plot settings are also available
      * An option to toggle on/off landscape mode for the pages with plots
      * DPI setting for increasing/decreasing quality of images
      * Plot size (how large the plot will appear in the pdf)
    - Lastly, an option to include the map is provided

1. Added an additional option for the **Gradient vectors** plot. This option allows the user to downsample the data, if their data has a lot of arrows, which clutters the plot if they are all plotted.
   1. Previously, we downsampled data down to 500 arrows with a semi-intelligent method that tried to ensure the overall pattern of the data was still captured, and the most important arrows (highest gradients) were kept.
   2. New version uses the following method to downsample and preserve the most important gradient patterns in the data through a two-step approach:
      1. The top 20% vectors with highest gradient value are automatically preserved
      2. The remaining vectors are downsampled using the Largest-Triangle-Three-Buckets (LTTB) algorithm.
         1. This algorithm maintains the overall pattern of the gradient distribution while reducing the number of vectors
         2. It works by dividing the data into buckets and selecting points that maximize triangle areas, ensuring important trends are preserved
         3. More can be read about it here: https://github.com/devoxi/lttb-py.
   3. The downsampling is introduced through a new UI element. First time creating the gradient vectors plot, a window pops up if there are more than 300 arrows and asks if the user wants to downsample or not. After this initial interaction, the user can find the downsampling option in the customization menu when the gradient vector plot is selected.
      1. A slider to select the number of vectors (from 50 to the maximum available)
      2. Clear display of current and maximum available vector counts
      3. The ability to adjust vector counts up or down within the available data range
   4. When filtering data:
      1. The downsampling limits automatically update to reflect the current number of available vectors.
      2. The ability to return to the original number of vectors is maintained
      3. The system remembers the original data state for accurate resampling