**DECLARATION:** I understand that this is an **individual** assessment and that collaboration is not permitted. I have read and I understand the plagiarism provisions in the General Regulations of the University Calendar for the current year, found at <http://www.tcd.ie/calendar>. I understand that by returning this declaration with my work, I am agreeing with the above statement.

1. **Introduction**

I mainly used Python's Pandas and Altair libraries and Json's Vega-Lite library to complete to complete the marching route. For the date and temperature graphs I used Python's Pandas and Matplotlib.

1. **Programming ideas**

Route of march: Firstly, the Pandas library was used to read the data from the xlsx file. Secondly, I used the mark\_text function of the Altair library to draw the names of the cities in the appropriate places. Thirdly, use the mark\_trail function of the Altair library to plot the survival number as the width of the curve to plot the marching route. Finally, JSON code was generated to plot the city coordinate points in the Veta-Lite environment, merging the two maps of the marching route and the city location together.

Date temperature curves: Firstly, the data from the xlsx file is read through the Pandas library. Secondly, the data type is converted to list type, flipping the order of the data. Finally the curve was plotted using Matplotlib's plot function.

1. **Graph description**

The yellow part represents the advancing marching route, the light grey part represents the retreating route, the width of the curve represents the number of survivors, and there is a comparison table between the width and the number of survivors on the right side. The horizontal coordinates in the date and temperature curves are the month and date, and the vertical coordinates are the temperature in degrees Celsius.

The images are shown below.



