How to solve the situation according to COVID19 in UK

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1. Introduction

1.1 Background

On 31 December 2019, the World Health Organization (WHO) was informed of a cluster of cases of pneumonia of unknown cause detected in Wuhan, Hubei Province, China. A novel coronavirus (SARS coronavirus-2 (SARS-CoV-2)) was subsequently identified from patient samples. On 12 January 2020, it was announced that a novel coronavirus had been identified in samples obtained from cases and that initial analysis of virus genetic sequences suggested that this was the cause of the outbreak. This virus is referred to as SARS-CoV-2, and the associated disease as COVID-19. Coronaviruses are a large family of viruses with some causing less severe disease, such as the common cold, and others causing more severe disease, such as Middle East respiratory syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) coronaviruses.[1]

The first confirmed cases of coronavirus in the United Kingdom were on January 29, when two Chinese nationals fell ill at the Staycity Aparthotel in York. Then on February 6, a British businessman in Brighton was diagnosed with the virus after catching in Singapore. The so-called 'Super Spreader' was later linked to 11 other cases, five of which were in the United Kingdom. Later that month, on February 28, the first person to catch coronavirus in the United Kingdom was diagnosed, a man who lived in Surrey, but who had not been abroad. The same day, the first British citizen died from the virus, having caught it onboard the Diamond Princess cruise ship. The first death in United Kingdom came on week later, on March 5, when a woman in her seventies was confirmed to have died from the virus. By this point, 100 people in the country had tested positive for the virus. The sequence of events has unfolded quickly since then, with the United Kingdom going into lockdown on March 23, and the virus since claiming over 16,000 deaths in the country.[2]

1.2 Summary

This report is to analysis the death toll, number of cases, tests, and number of people receiving treatment in four countries(England, Scotland, Wales and Northern Ireland) of the United Kingdom. Moreover, using the outcomes of the data to decide how to solve the problems bring from COVID-19.

1.3 Problem

Because of the highly spread speed of the virus, government should implement some measurements to release the severe pressure of hospital. Moreover, take effective method is

necessary to solve the problem which caused from migration.

2. Data acquisition and cleaning

2.1 Data sources

The data was founded from UK.gov website and I copy the data to xls files. Then uploaded to the Kaggle under my account. The files are all include the data of the death toll, number of cases, tests, and number of people receiving treatment from March 1 to June 30. The link of the data is here:
https://www.kaggle.com/xiaohanhuang/covid19-in-uk-from-march1-to-june-30
and the data is about the death toll, number of cases, tests, and number of people receiving treatment in England, Scotland, Wales and Northern Ireland daily and totally. The data of the location of these four countries is here:
https://www.kaggle.com/xiaohanhuang/location-of-countries-uk

2.2 Data cleaning

Searching the data from uk.gov website and copy the data to xls files using the tool Excel. Because of the data which are all numerical. I used the tool Excel to simply cleaning the data. For example, after I finishing copy there were some data which showed 'NaN'. Hence, I use the 'Replace method' to turn all 'NaN' into '0'. Moreover, I deleted the data which is before March 1,2020, since there was no recorded before that date.

First, I imported five different data sets using pandas library. The data are "COVID19_UK_Case", "COVID19_UK_Death", "COVID19_UK_TEST", "COVID19_UK_PATIENTINHOSPITAL" and "Location of four countries in UK". Then I used numpy library to clean these data sets. I reversed the row order since the date is starting from March 1st to June 30th . In addition, the data for location has the sign "°" which should be deleted.

Secondly, I created a data frame for drawing map. Using the data on the date of 30/06/2020, since on that day, the total number means from March 1st to June 30th the total death, test, case number. Before March 1st there was no recorded number so that is not considered.

Thirdly, combine the data frame I created with the data frame which named "Location of four countries in UK" using ".concat()" method. Hence these four countries have their latitude and longitude respectively, which would be used to draw maps.

3. Exploratory Data Analysis

3.1 The trend of daily case

There are around 55.98 million people who making there lives in England. Most of them lives in London which is the capital and largest city of England and United Kingdom. The

population density in London is really high with 5,666/km^2, which also means this place makes virus more easy to spread through people by people.

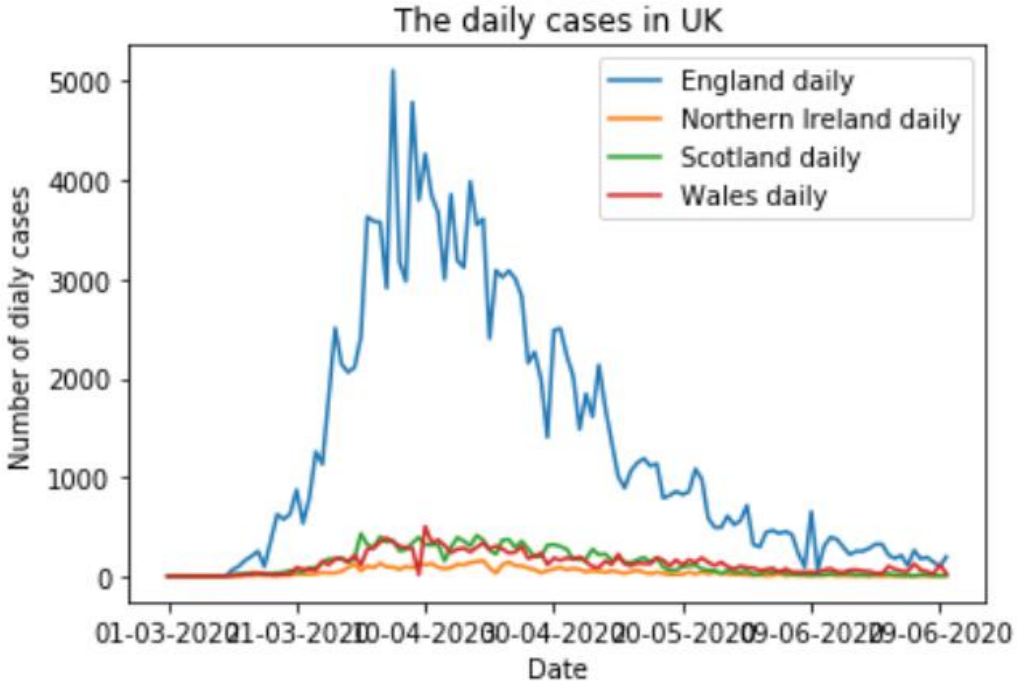

Figure 1 : The relationship between daily case in UK and date

From the figure 1, it shows that from the beginning, the number of infections in England was higher than in the other three countries, even higher than others from beginning to end. At the end of March it reached the peak. From mid-March to mid-April, various universities and colleges began to suspend classes and opened online classes one after another.

3.2 The trend of daily death

Like the daily cases in United Kingdom, the daily death number in England is higher than other three countries.From the figure 2, we can see that the number of death in England first increased sharply from the beginning, after reaching the peak around the beginning of April, then declined fluctuatingly.

As for the trend of daily death, we can see from the figure 2 below :

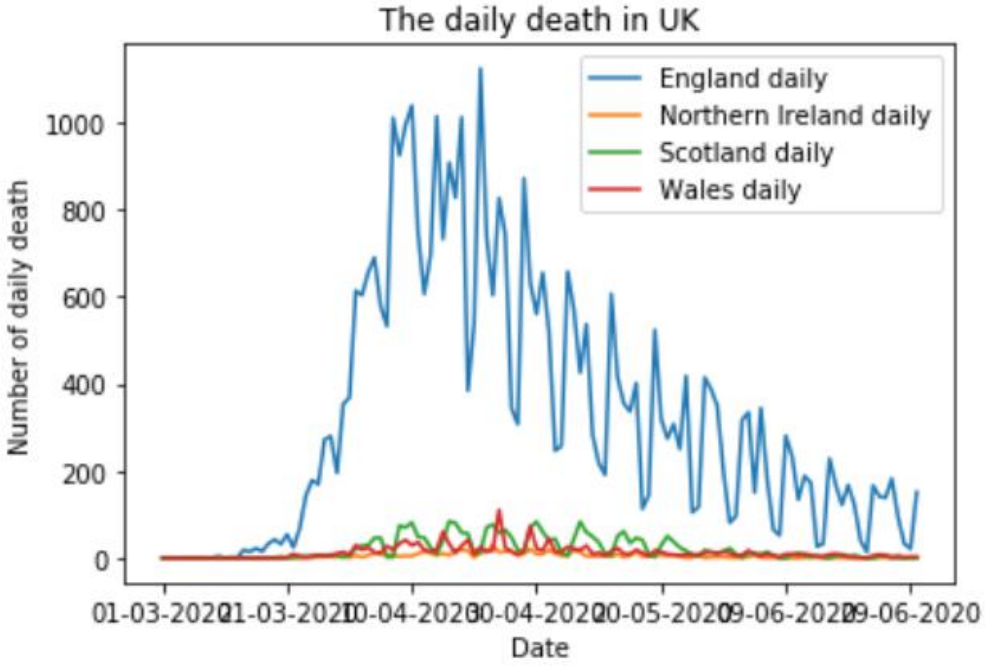

Figure 2 : The relationship between daily death in UK and date

3.3 The trend of daily test

From the figure 3, the general trend of daily test in England was volatility increasing. The rate of increase in Scotland and Wales were roughly similar. The trend of Northern Ireland was always flat and stable, at the end of June even appeared a little drop.Which also means that the continuous supply of test materials in UK.

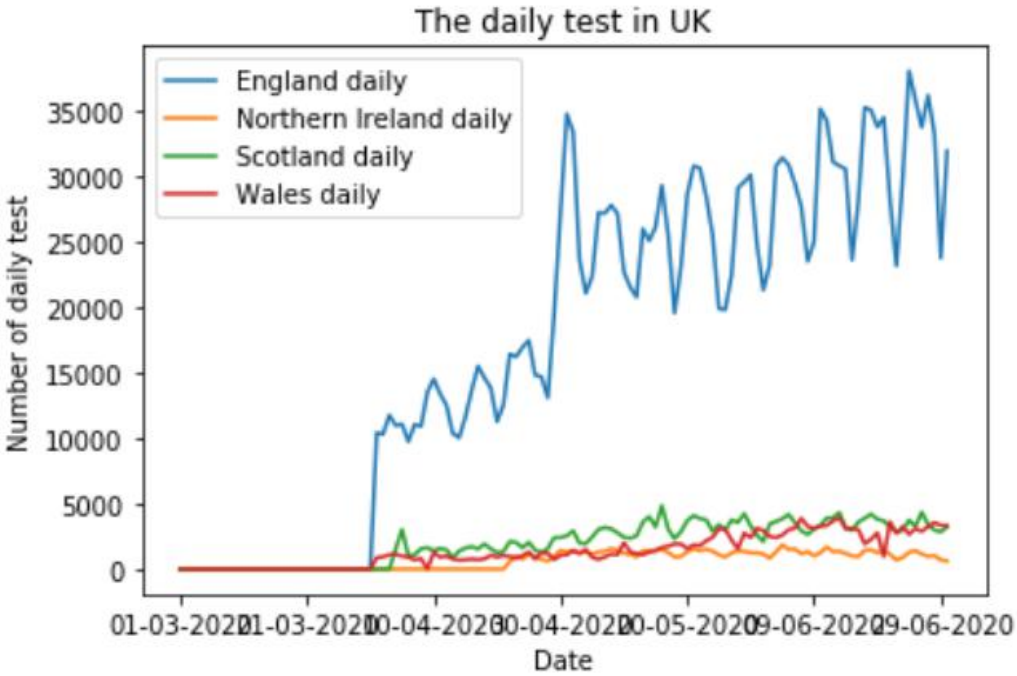

Figure 3 : The relationship between daily test in UK and date

3.4 The trend of daily number of patient in hospital

Hospitals are always full with patients. After advocating stay at home, there were less cases appeared, the pressure of hospital released. When in late June there even no patient appeared in England, Scotland, Wales and Northern Ireland. Which also meant that the situation was getting better.

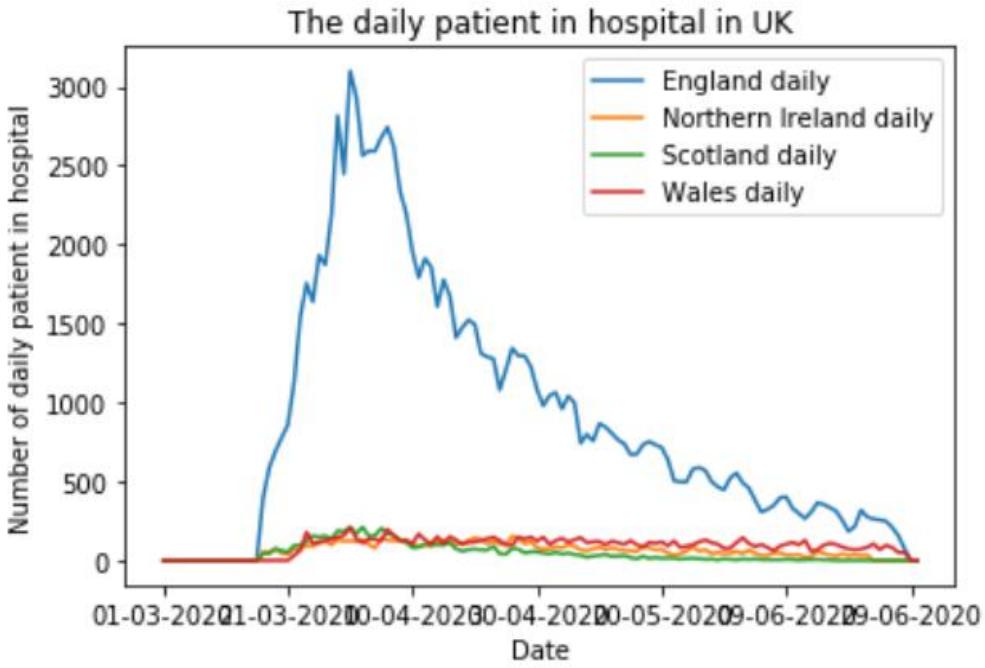

Figure 4 : The relationship between daily patient in hospital in UK and date

3.5 The trend of the total

Exploring the total data. Overall, the total cases, death and test in England are higher than that in Scotland, Wales and Northern Ireland. Scotland is the second highest country which covering the northern third of island of Great Britain, mainland Scotland has a 96 mile border with England to the southeast and is otherwise surrounded by the Atlantic Ocean to the north and west.[3]

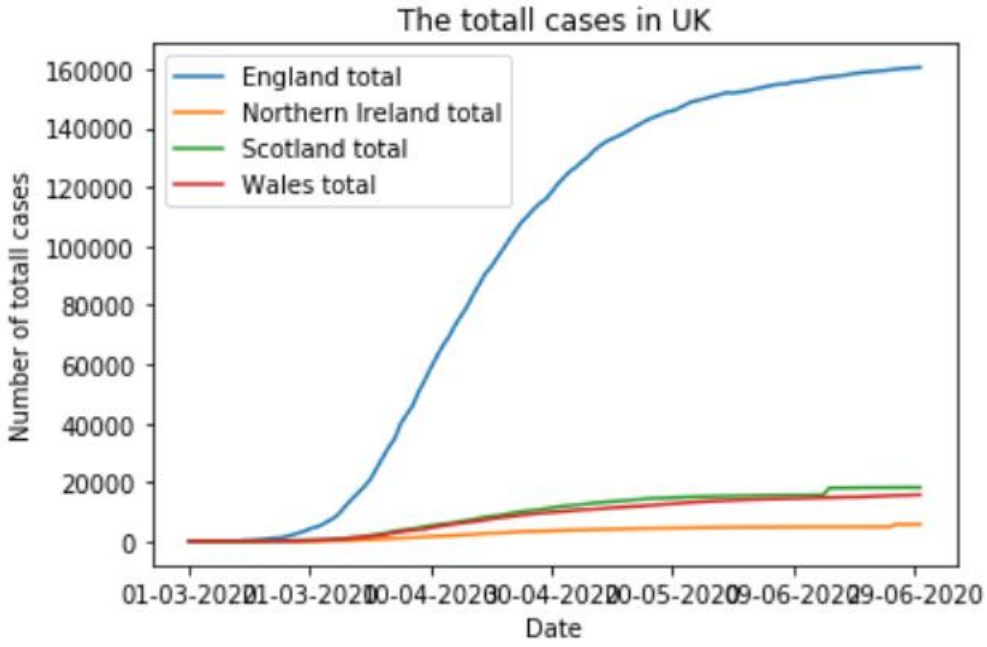

Figure 5 : The relationship between total cases in UK and date

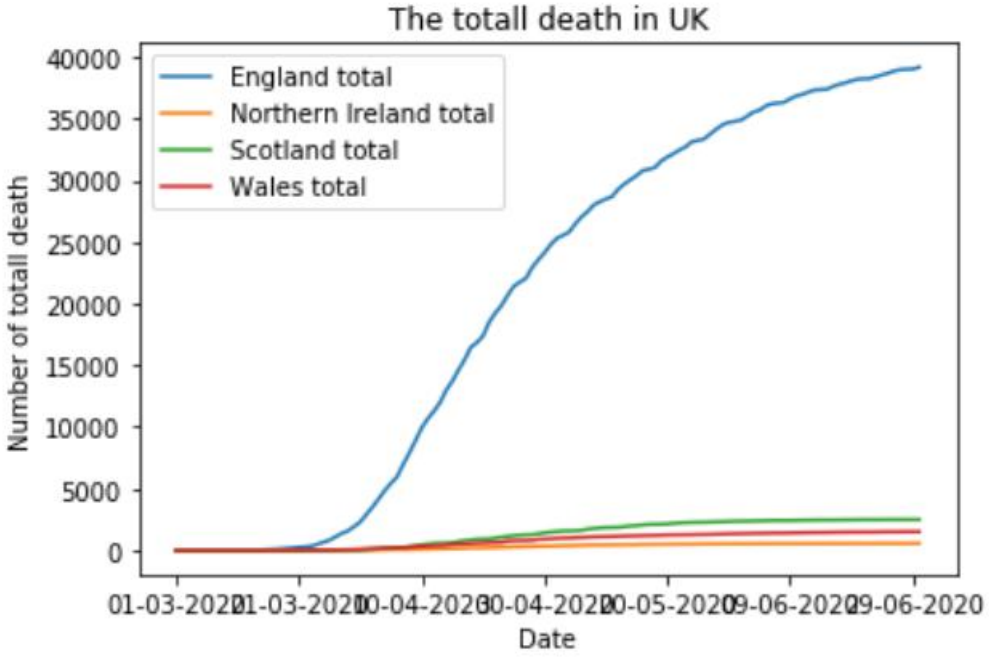

Figure 6 : The relationship between total death in UK and date

Scotland has land area with 77,933 km^2 and population density with 67.5/km^2 , which is much lower than England. About Wales, it is bordered by England to the east, the Irish Sea to the north and west, and the Bristol Channel to the south. It had a population density of 148/km^2 , and area with 20,779 km^2. As for Northern Ireland, it located in the northeast of the island of Ireland, Northern Ireland shares a border to the south and west with the Republic of Ireland. Northern Ireland has area of 14,130 km^2 and population density of 133/km^2.

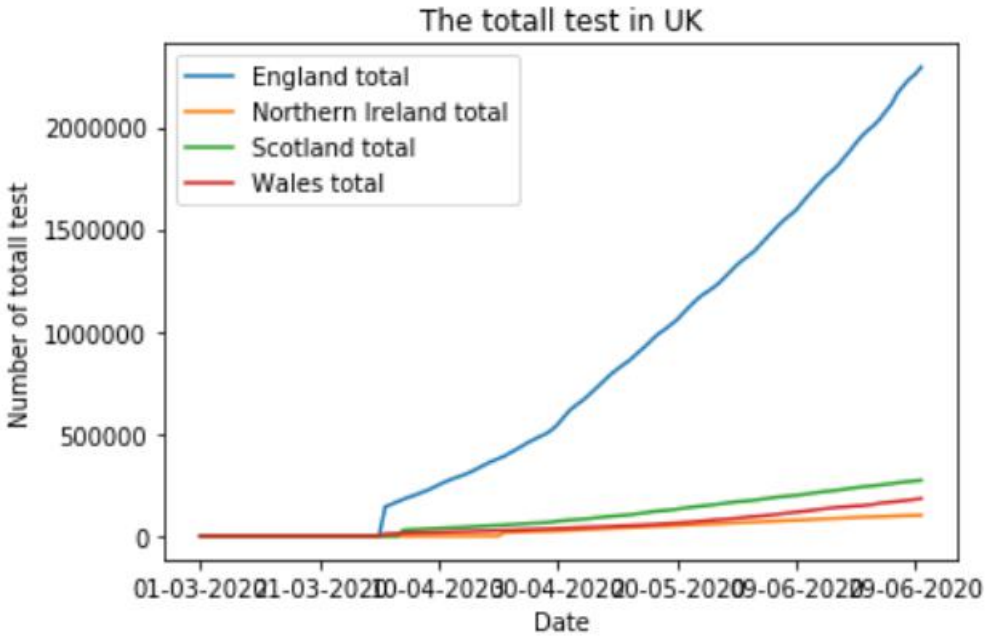

Figure 7 : The relationship between total test in UK and date

With effective solution made by United Kingdom's government, the total number of patient in hospital was decreasing. In addition, with doctors and nursers dedication, with the contribution of people who lived in United Kingdom, there was no patient in hospital in late June, which also means that this epidemic had been well controlled.

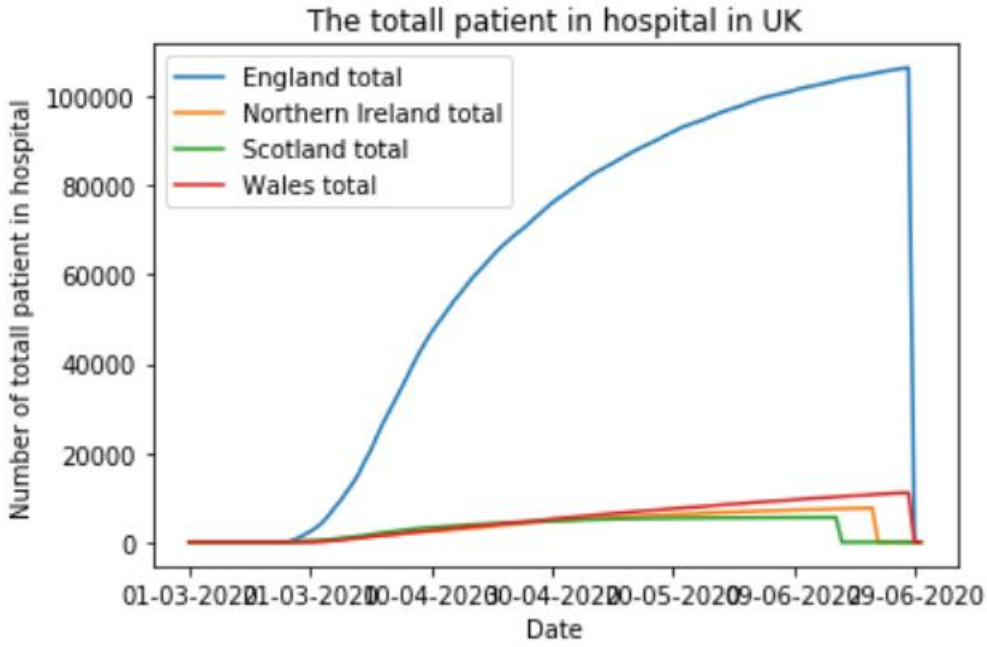

Figure 8 : The relationship between total patient in hospital in UK and date

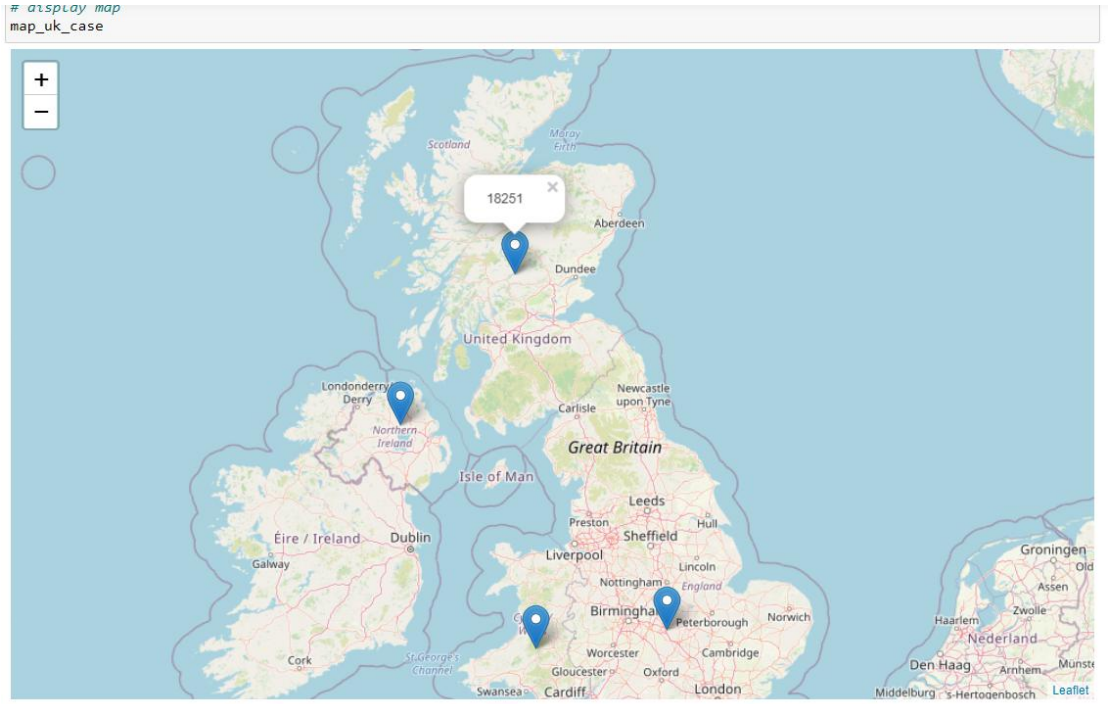

Figure 9 : The map of UK with the total cases in Scotland

4. Conclusion

In this study, I explore the trend of the number of cases, death, test and patient in hospital in United Kingdom daily and totally. With the effective solution made by United Kingdom government, the situation is getting better. In different countries, government took different measures according to various local conditions. Also, with doctors and nursers unremitting efforts and enthusiastic people's help, the cases were decreasing day by day.