

# Assignment Report

*by* Yap MingYee

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Lecturer Name: Dr Law Foong Li			
Assessment Due Date: (dd/mm/yy)	29/11/2022	Assessment Title:	Introduction To Data Science Assignment

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## Introduction

The research we have conducted is about the Inflation Rate of countries from the year 1960 to the year 2021. This is a study analysis to understand the inflation rate of the countries and to find out any correlation between the countries that suffer from high Inflation. This analysis focuses on colonized and non-colonized countries because Inflation rate depends on a lot of different values that vary from country to country. Volatile global energy costs, varying currency values by nation, unpredictable growth of aggregate demand, erratic food prices, shifting government tax policies, and others are a few of the associated factors.

According to Carlson.B (2021), Inflation typically occurs when governments are in a financial bind, particularly during times of conflict or after a war has severely weakened the government's financial capabilities. The biggest price fluctuations in history have always been caused by war, which has historically been the largest expander of paper money and credit. First, there would be a period of ambiguity during the conflict regarding the result and which nations would be most adversely affected. After the war, there would be a recovery from all of the government spending. All of that spending would cause the economy to overheat, inflation, and the inevitable slump that would come after the boom. Additionally, following a post-war depression, the economy would recover until the next war arrived.

There is a problem in evaluating the Inflation Rate using technical analysis. Although the insight provided by technical analysis reduces risks, it is not always accurate. This problem has negatively affected global markets. A possible cause of this problem is that the economy of countries is characterized as highly volatile & non-linear in nature (Vijh et al., 2020). High volatile & non-linear in nature behaviour arose when people had biased opinions and emotions affected by sentiment analysis. According to Pettinger.T.,(2020) A combination of cost-push and demand-pull variables contribute to inflation. As a result, the MPC will examine a wide range of statistics to determine whether the economy is experiencing full employment and inflationary pressures. This will comprise the rate of economic expansion, the unemployment rate, and the size of the economy's spare capacity (output gap). Supply-side factors like rising wages and oil prices could also cause inflation.

Our Research Question is: Does the history of colonization influence the inflation rate of colonized countries?

The Hypothesis will be: Countries colonized have a higher inflation rate than countries without historical colonization.

The alternate Hypothesis: Colonization of countries does not have an impact on the inflation rate of the country.

The result of the study is to visualized relevant graphs to identify the effect of colonized countries and non-colonized countries and the comparing of Inflation Rates. The study will also be using Random Forest Classifier to try and determine if the Inflation Rate of a country next year will be higher or lower. The result that we obtain from the classification is 70% accuracy using Random Forest Classifier.

## Methodology

### Method of collecting data

The dataset being used in this study is the Inflation Rate of Countries from year 1960 to 2021, the dataset was collected from countries by the World Bank. Since the data is collected by the world bank, it consists of data to some degree with a political view point, which in this case translates to missing and null values from some countries. The world bank did not provide some details from some countries or the countries did not provide this information to the world bank due the various reasons.

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### Data visualization method

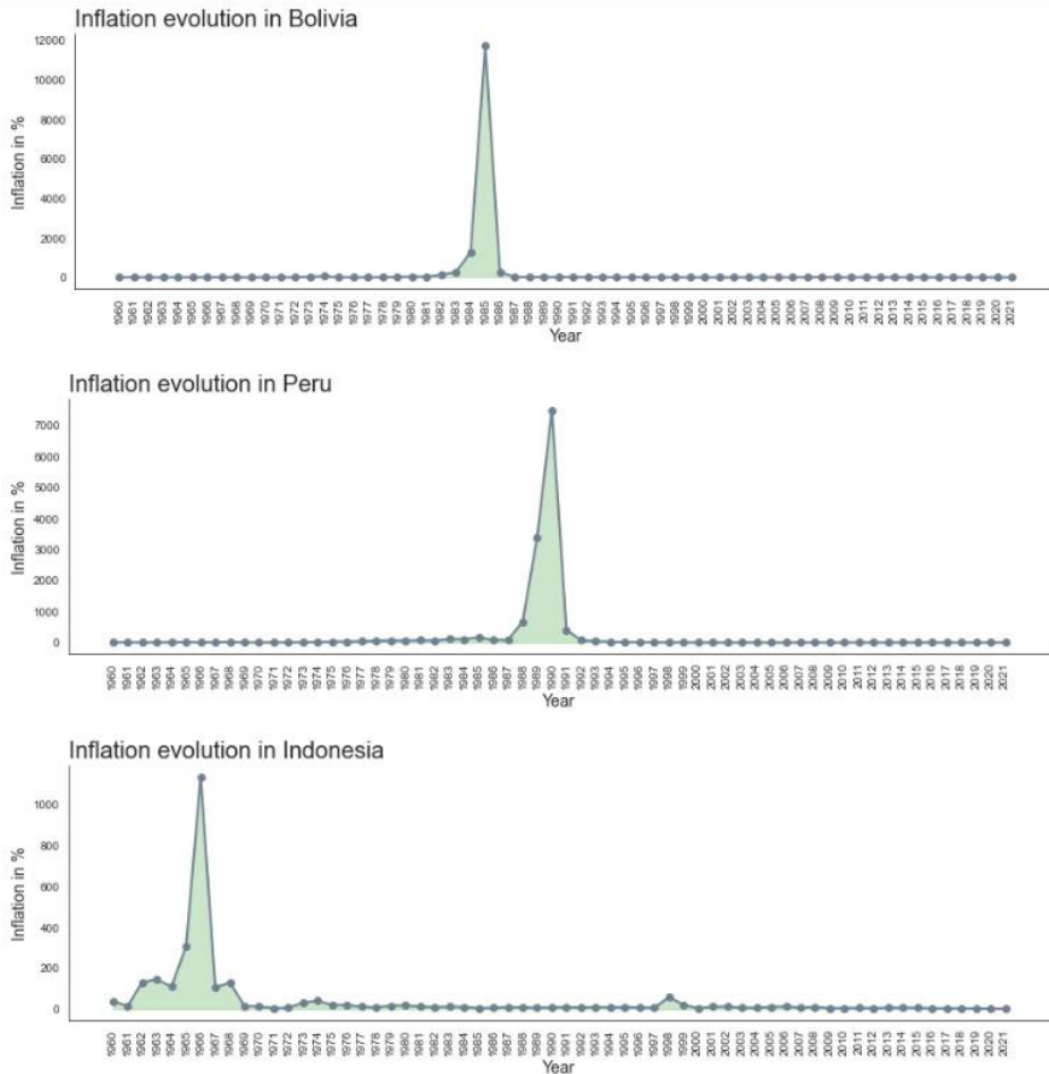
The graphic display of information and data is known as data visualization. Data visualization tools offer an easy approach to observe and analyze trends, outliers, and patterns in data by utilizing visual elements like charts, graphs, and maps. Using graphs to present the data over the progress of Inflation Rate to compare them with colonized and non-colonized countries to find out the correlation and the determine if there are some factors that determine the progress of Inflation Rate. By using line graphs, it provides an accurate representation of the trend of Inflation in the country then comparing the countries together to find out if the colonized countries have on average a higher Inflation, then non-colonized countries. We will also find out if the influence of the non-colonized country is still in effect in modern days, as well as comparing some countries that have a lower Inflation Rate then the countries that colonized them in the past.

### Random Forest Algorithm

We will also be using Random Forest classifier to find out if the Inflation Rate of a country next year will increase or decrease. Random forest and other supervised machine learning algorithms are frequently used in classification and regression problems. It builds decision trees from different samples, using their average for categorization and majority vote. Random Forest classifier decorrelates the trees with the addition of splitting on a random subset of characteristics, random forest outperforms bagging. This indicates that the model only takes to account a small subset of features rather than all of the model's features at each split in the tree. While the trees are developing, the random forest adds more randomness to the model. When dividing a node, it looks for the best feature from a random subset of features rather than the most crucial one. Because of the wide diversity created by this, the model is generally better. So, in this model we will be inputting the values of 0 and 1 in an array with 64 values since we are going to be using 64 countries, the 0 values represent No which the 1 value represents yes.

## Results

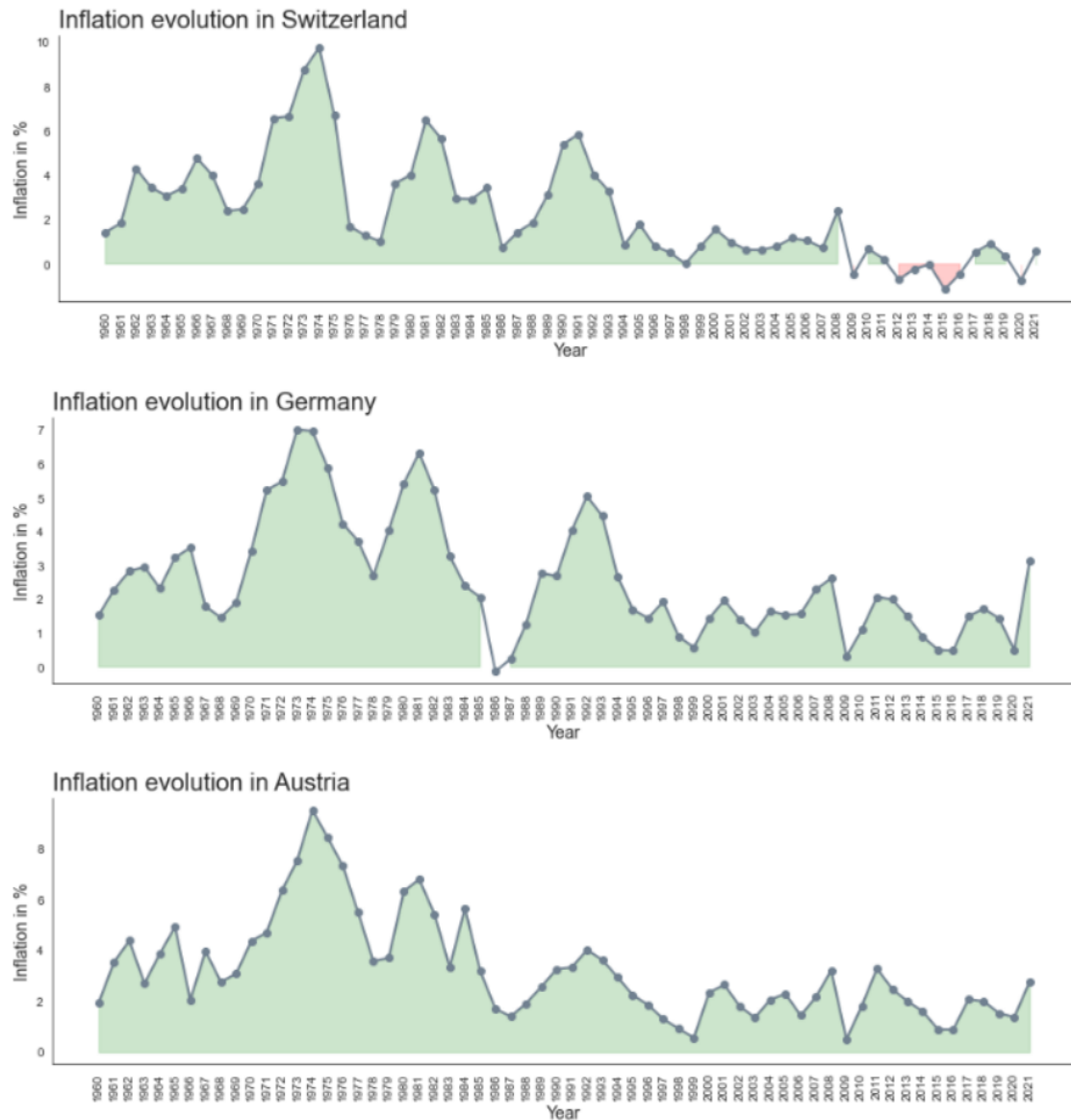
### Subplot for Countries with the Highest Inflation Rates



The Inflation Rates of the 3 highest average Inflation rate countries, these 3 countries Bolivia, Peru and Indonesia have a common point, they all have signs of Inflation spike in a particular year and it proceeds to rise due to hyperinflation, then it drops dramatically over the next years. The 3 countries were all suffering from political instability.

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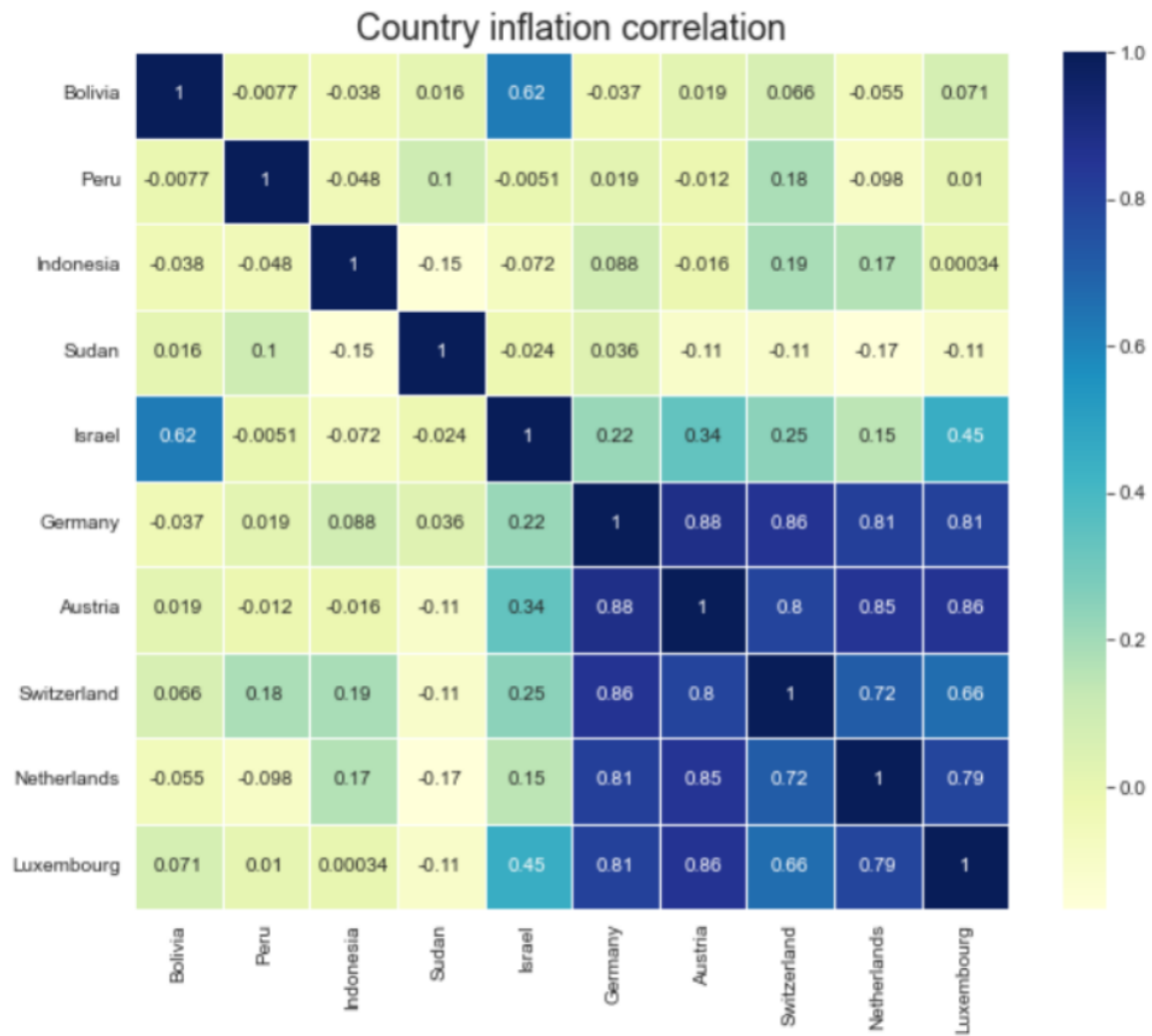
### Subplot for the countries with the lowest Inflation Rates



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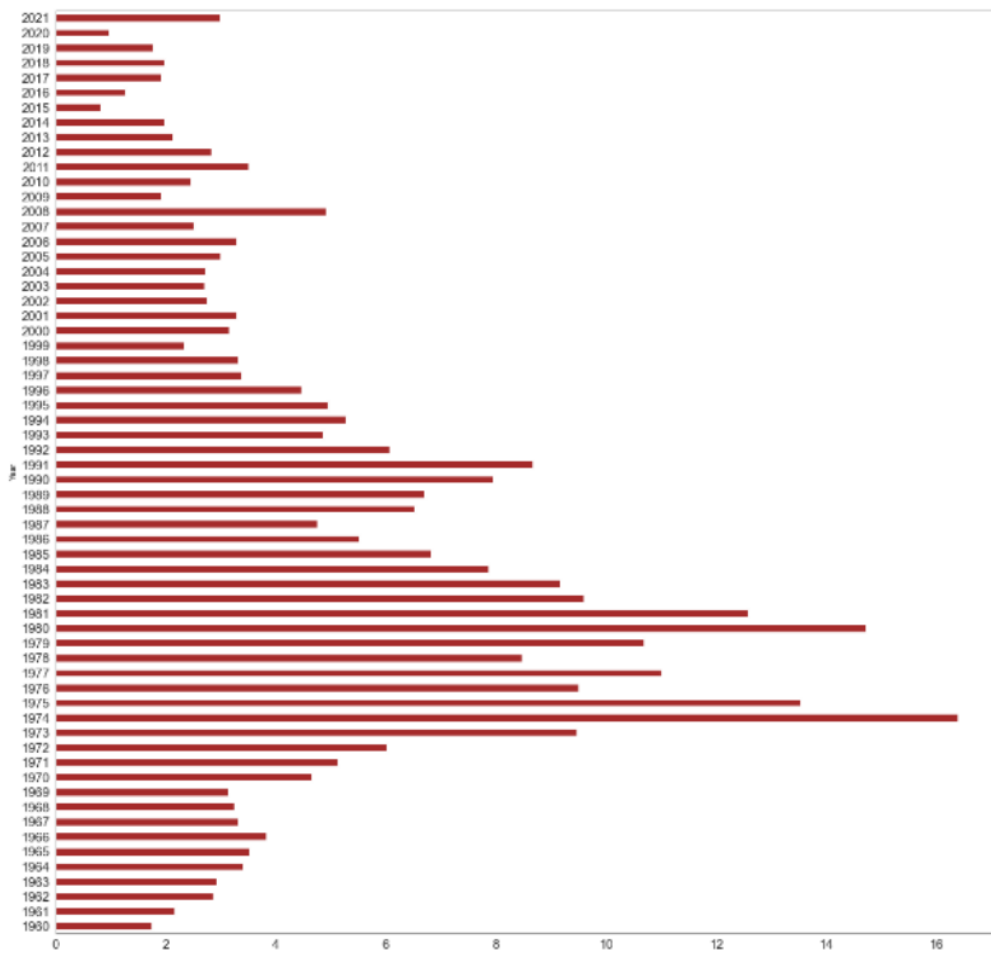
These 3 countries are the countries with the lowest Inflation rates, which are Switzerland, Germany and Austria. Unlike the countries that have hyperinflation over short periods of time, the Inflation Rate of Switzerland, Germany and Germany rose over a period of time and Lowers over the years. These countries never had an Inflation Rate higher than 10% since 1970.

Heatmap to find the correlation of highest and lowest Inflation Rates between countries





### The overall number of Inflation Rates of countries since 1960



This bar chart is a representation of number of countries to see in which year did most countries have a increase in Inflation Rate. We can see from this graph that most countries have a high Inflation Rate from 1974, a total of 16 countries has seen a high Inflation rate that year, compared to recent years where countries have a fairly low Inflation rate.

## Calculating percentiles of countries that were colonized and non-colonized

For non colonized country we are going to use Germany, while for colonized Country we are going to use India.

```
1 for i in range(90, 100): print("The {:.1f}th percentile value is {:.2f}".format(i, np.percentile(transp['Germany'],i)))
```

```
The 90.0th percentile value is 5.24
The 91.0th percentile value is 5.34
The 92.0th percentile value is 5.45
The 93.0th percentile value is 5.47
The 94.0th percentile value is 5.63
The 95.0th percentile value is 5.89
The 96.0th percentile value is 6.15
The 97.0th percentile value is 6.45
The 98.0th percentile value is 6.85
The 99.0th percentile value is 7.00
```

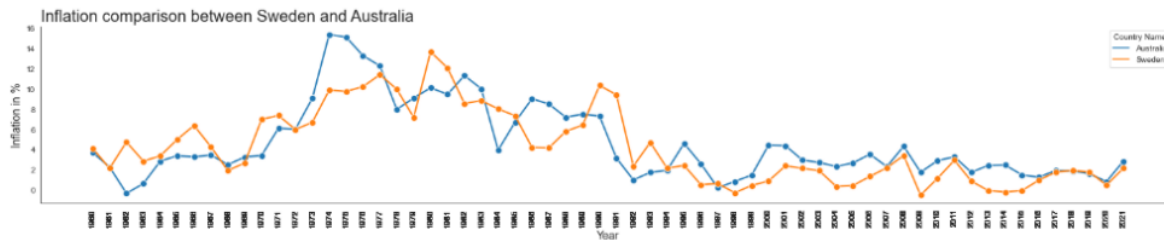
```
1 for i in range(90, 100): print("The {:.1f}th percentile value is {:.2f}".format(i, np.percentile(transp['India'],i)))
```

```
The 90.0th percentile value is 12.95
The 91.0th percentile value is 13.09
The 92.0th percentile value is 13.13
The 93.0th percentile value is 13.20
The 94.0th percentile value is 13.27
The 95.0th percentile value is 13.35
The 96.0th percentile value is 13.64
The 97.0th percentile value is 14.39
The 98.0th percentile value is 16.27
The 99.0th percentile value is 21.49
```

For non-colonized countries like Germany, the 99<sup>th</sup> percentile suggests that the value will be around 7% Inflation Rate while 90<sup>th</sup> percentile suggests 5.24% inflation. This means that only 1% out of the entire history of Germany is at 7% Inflation.

For colonized countries like India, the 99<sup>th</sup> percentile suggests that the value will be around 21.49% Inflation Rate while 90<sup>th</sup> percentile suggests 12.95% inflation. This means the 1% of the history of India remains at 21.49% Inflation, while 90% of the time the inflation rate is at 12.95%.

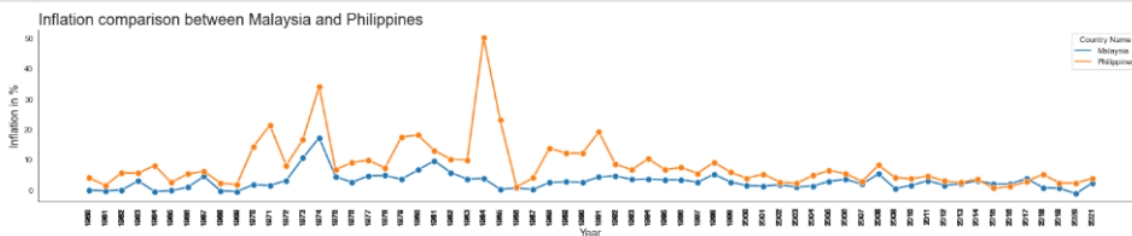
## Comparing colonized and non-colonized countries



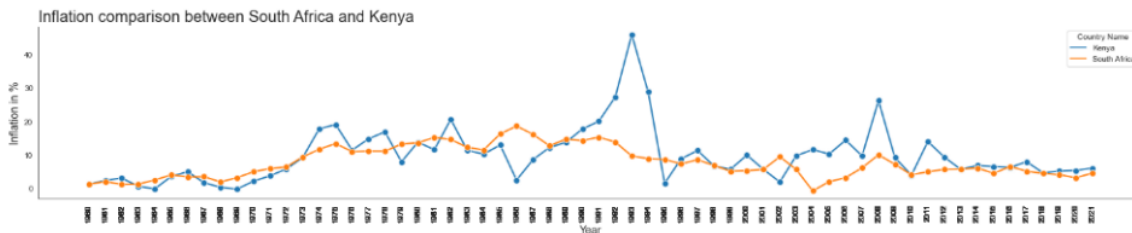
This line plot consists of Australia a colonized country and Sweden a non-colonized country. Sweden was a country that was never colonized while Australia was colonized by British and later gain Independence. This graph shows that both countries had a similar Inflation Rate throughout the years. Australia even after being colonized was able to lower their Inflation Rate to non-colonized countries.

## Colonized countries that had different Inflation Rates

```
1 compare_countries(da, ['Malaysia', 'Philippines'])
```

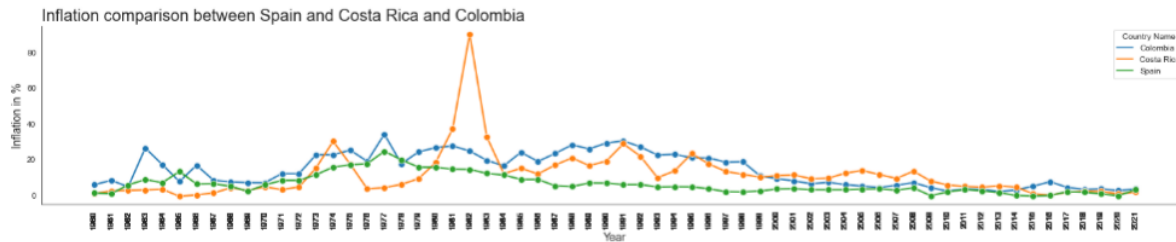


```
1 compare_countries(da, ['South Africa', 'Kenya'])
```

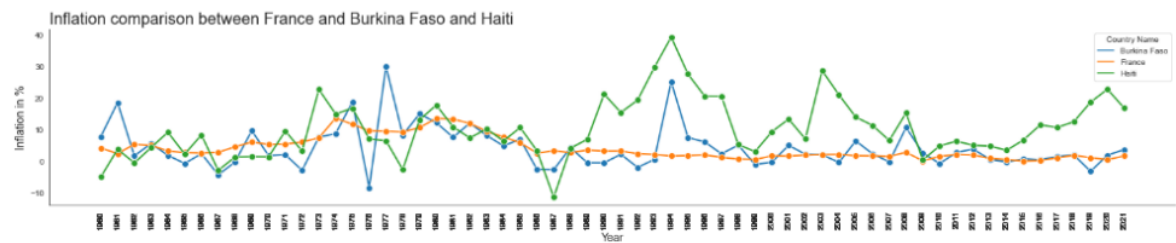


This line plot consists of Kenya and South Africa. Countries that were colonized have different Inflation rate progressions, even though they were colonized, some countries deal with their Inflation rate better than others. Malaysia and Philippines are both countries in Asia and were colonized, Malaysia has a lower inflation Rate compared to the Philippines even though they gain their independence earlier then Malaysia. South Africa and Kenya were colonized by the same United Kingdom but South Africa had a more stable Inflation then Kenya.

## The influence of colonized countries on countries they colonize

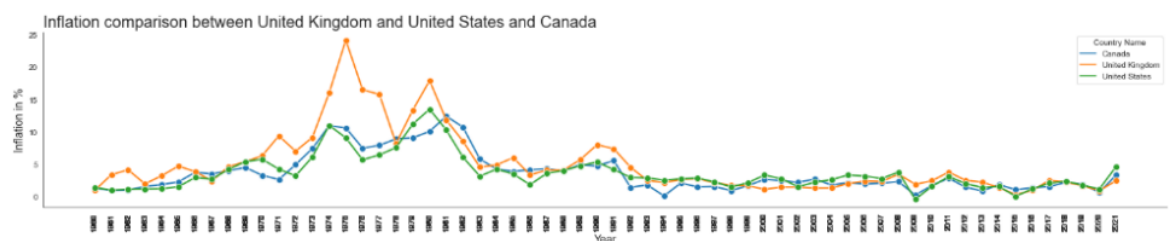


The graph shows the relation between the colonizing countries which are Costa Rica and Colombia, and the country that colonized them which was Spain. Spain has a lower Inflation rate compared to the countries that it has colonized.



Another example is France which is the colonizing country, and the ones that were colonized are Burkina Faso and Haiti. France has a stable economy Inflation over the years without any massive changes. While Haiti and Burkina Faso have seen some dramatical changes over the years. These are some examples of the impact of colonization from the countries that were colonized. Colonizing a country leaves some inflation impact even after years of Independence.

## Colonized countries that have better Inflation Rate then non colonized countries



The United States and Canada gained their independence before 1960, this graph shows that the United Kingdom which were the ones who colonized the United States and Canada, have a low Inflation Rate throughout the years. The graph shows an Increasing Inflation Rate in the 1974 due to the world being unprepared for higher oil prices, cars were not fuel efficient and there were fewer alternatives to oil. Canada and United States handled their Inflation better than the country which colonized them. This proves that not all colonized countries are the same with dealing with Inflation, being colonized does not mean the country will have a high Inflation Rate.

## Random Forest Classification to check if the Inflation Rate next year will be higher or lower

ACCURACY OF THE MODEL: 0.7142857142857143

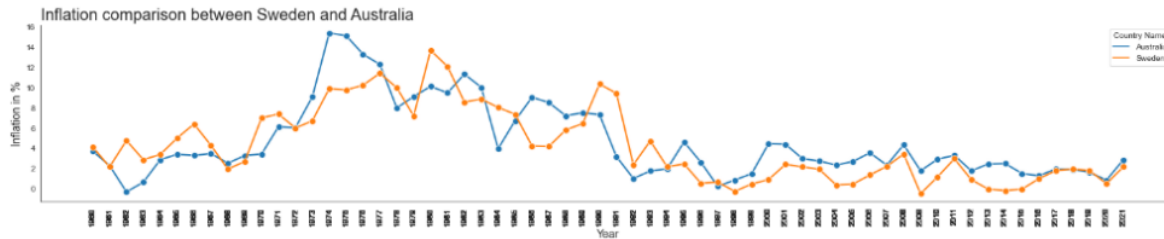
	Country Name	Austria
'0',	0	1.945749
'0',	1	3.54224
'0',	2	4.381799
'0',	3	2.708767
'0',	4	3.868564
'0',	5	4.930916
'0',	6	2.054821
'0',	7	3.974673
'0',	8	2.764864
'0',	9	3.080404
'0',	10	4.372824
'0',	11	4.704258
'0',	12	6.355146
'0',	13	7.531078
'1',	14	9.521788
'1',	15	8.445259
'1',	16	7.318685
'1',	17	5.494616
'1',	18	3.574319
'1',	19	3.707401
'1',	20	6.328325

By using X as the country, we want to classify and Y as the Yes and No factor. We are able to use Random Forest Classifier to predict the result. Although the accuracy of the model is at 71%. It provides a look into the result. The training set of the model will consist of 90% of the data within the dataset while the testing model will consist of 10% from the training set.

```
array(['1'], dtype='<U1')
```

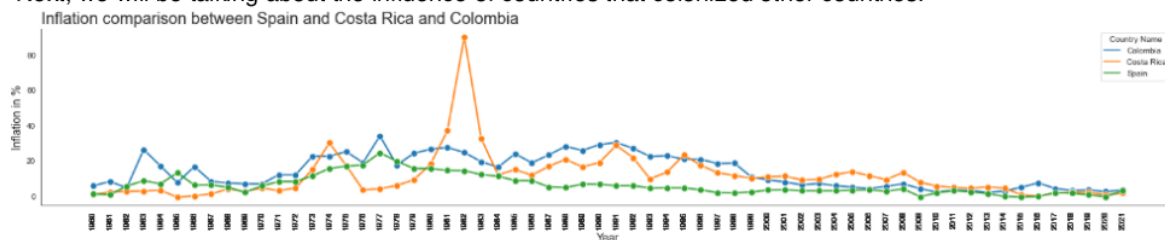
The results showcase the value of 1 which is no, the model suggests that Austria will not have a higher Inflation Rate in the year 2022 since its Inflation Rate was already at 3% in 2021, the model has a 71% confidence that 2022 Austria will not have a higher Inflation Rate.

## Discussion

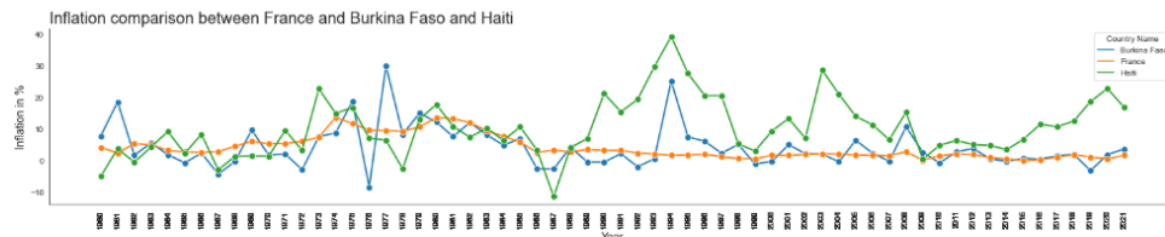


This graph is a representation of colonized and non-colonized country. Australia is a country which was colonized by the United Kingdom while Sweden is a country that has never been colonized. We can see the Inflation rate for both countries are relatively similar over the years. When Inflation rate raises, it happens to both countries. This is one of the examples of not all colonized countries will have higher Inflation then non-colonized countries.

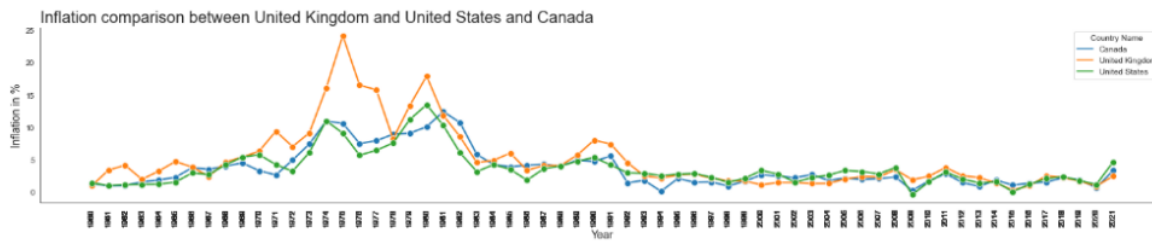
Next, we will be talking about the influence of countries that colonized other countries.



We can see the inflation rate of Spain, the country that colonized both Colombia and Costa Rica, has never achieve a 20% Inflation rate over the period of 61 years. Although Colombia doesn't have hyperinflation, their inflation rate is still higher than Spain, on the other hand, Costa Rica has had hyperinflation at some point of the countries' independence. This does not provide enough evidence that Spain the country which colonized Costa Rica is the main caused of its Inflation rate. We will use another example.



France is the country that colonized both Haiti and Burkina Faso. Both colonized countries have had unstable economy over the years since their independence from France. Haiti and Burkina Faso both have periods of hyperinflation and has never had a period of economy stability like France. France's economy has never differ away more then 5% over the period of 61 years.



On the other hand, United States and Canada both have a stable economy and lower Inflation rate then the United Kingdom which had colonized both countries. This is an example of not all colonized countries are influence by colonizing countries.

## **Conclusion**

The purpose of this study was to find out if the history of colonization influences the inflation rate of colonized countries. The hypothesis propose was the countries colonized have a higher inflation rate than countries without historical colonization. Colonized Countries have on average higher Inflation Rates compared to their non-colonized counterparts. The Inflation rate of colonized countries tend to have a period of dramatic hyperinflation then the inflation rate will decrease over a few years. Compared to colonized countries where their inflation normally will increase within 2 or 3% over some years then return to normal. Colonizing countries does have some impact on their Inflation Rate for the majority but it does not remain the same for countries like Australia and United States. Some colonized countries can have a lower Inflation Rate than the non-colonized countries. Various factors contribute to Inflation, although colonizing has some Impact to countries that have a weak economy but it is not the deciding factor of Inflation for colonized countries. Countries that have a high Inflation rate are often affected by war, high price fluctuation of local products, sudden price increase of imported goods.



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