T.C.
YILDIZ TEKNİK ÜNİVERSİTESİ
FEN EDEBİYAT FAKÜLTESİ

İSTATİSTİK BÖLÜMÜ

DATA ANALYSIS TERM PAPER

Time Series Data: U.S. Carbon (co2) Emissions 1990-2023
Cross Section Data:

a. **In general, developed country inflation rates for year 2021 is higher than developing country inflation rates**
c. **Budget deficit of the European countries has been increasing over 5 year**
d. **Crimes (or crime rate) in Germany, England, Italy and Spain are increasing more slowly than the US crime.**

Prepared by

1- Ayşe Nur Erman / 21023606
2- Büşra Çetinkaya / 21023609
3- Ayşenur Alahabalı / 21023607
4 - Hanife Köse / 22023631
5 - Eren Demir / 20023062

Lecturer

Prof. Dr. Ali Hakan BÜYÜKLÜ

1)

#kütüphane tanımlama

```
install.packages("ggplot2")
```

 # Veri setini oluşturma

```
date <- c("1990-12-31", "1991-12-31", "1992-12-31", "1993-12-31", "1994-12-31", "1995-12-31",
        "1996-12-31", "1997-12-31", "1998-12-31", "1999-12-31", "2000-12-31", "2001-12-31",
        "2002-12-31", "2003-12-31", "2004-12-31", "2005-12-31", "2006-12-31", "2007-12-31",
        "2008-12-31", "2009-12-31", "2010-12-31", "2011-12-31", "2012-12-31", "2013-12-31",
        "2014-12-31", "2015-12-31", "2016-12-31", "2017-12-31", "2018-12-31", "2019-12-31")

kilotons_of_co2 <- c(4844520, 4807500, 4879630, 4995210, 5066810, 5117040, 5273490, 5543350,
                     5590540, 5609020, 5775810, 5748260, 5593029.7852, 5658990.2344,
                     5738290.0391, 5753490.2344, 5653080.0781, 5736319.8242, 5558379.8828,
                     5156430.1758, 5392109.8633, 5173600.0977, 4956060.0586, 5092100.0977,
                     5107209.9609, 4990709.9609, 4894500, 4819370.1172, 4975310.0586,
                     4817720.2148)

metric_tons_per_capita <- c(19.4073, 19.0034, 19.0229, 19.2183, 19.2562, 19.2169, 19.5754,
                            20.3309, 20.2663, 20.1011, 20.4698, 20.1715, 19.4455, 19.5065,
                            19.5976, 19.4693, 18.9459, 19.0429, 18.2785, 16.8087, 17.4317,
                            16.6042, 15.7898, 16.1112, 16.0409, 15.56, 15.1499, 14.8233,
                            15.2225, 14.6734)

df <- data.frame(date, kilotons_of_co2, metric_tons_per_capita)
```

 # Mean (Ortalama)

```
mean_co2 <- mean(df$kilotons_of_co2)
mean_per_capita <- mean(df$metric_tons_per_capita)
```

 # Mode (Mod)

```
mode_co2 <- names(table(df$kilotons_of_co2))[table(df$kilotons_of_co2) == max(table(df$kilotons_of_co2))]
```

mode_per_capita <-
names(table(df$metric_tons_per_capita))[table(df$metric_tons_per_capita) ==
max(table(df$metric_tons_per_capita))]

 # Median
median_co2 <- median(df$kilotons_of_co2)
median_per_capita <- median(df$metric_tons_per_capita)

 # Standard Deviation (Standart Sapma)
sd_co2 <- sd(df$kilotons_of_co2)
sd_per_capita <- sd(df$metric_tons_per_capita)

 # Variance (Varyans)
var_co2 <- var(df$kilotons_of_co2)
var_per_capita <- var(df$metric_tons_per_capita)

 # Coefficient of Variation (Değişim Katsayısı)
cv_co2 <- sd_co2 / mean_co2 * 100
cv_per_capita <- sd_per_capita / mean_per_capita * 100

 # Skewness (Çarpıklık)
skewness_co2 <- psych::skew(df$kilotons_of_co2)
skewness_per_capita <- psych::skew(df$metric_tons_per_capita)

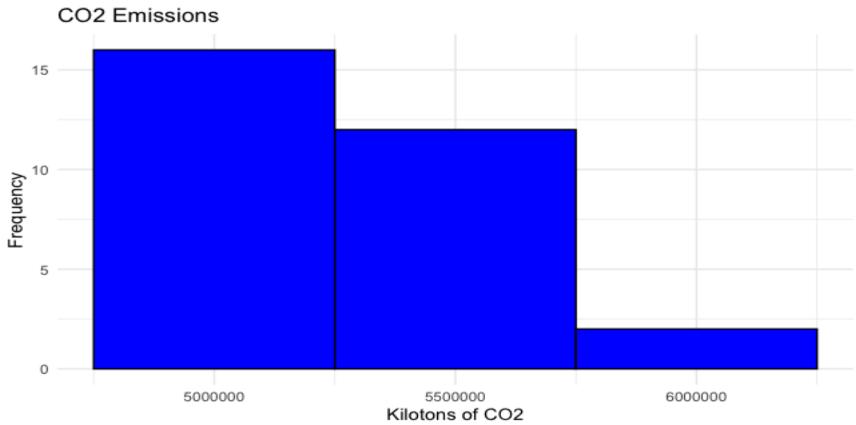
 # Kurtosis (Basıklık)
kurtosis_co2 <- psych::kurtosi(df$kilotons_of_co2)
kurtosis_per_capita <- psych::kurtosi(df$metric_tons_per_capita)

Values	
cv_co2	6.60771851827215
cv_per_capita	10.5442353548401
date	chr [1:30] "1990-12-31" "1991-12-31" "1992-12-31…
kilotons_of_co2	num [1:30] 4844520 4807500 4879630 4995210 50668…
kurtosis_co2	-1.66517943663431
kurtosis_per_capi…	-1.32242030428039
mean_co2	5277262.68945667
mean_per_capita	18.1513933333333
median_co2	5165015.13675
median_per_capita	19.0329
metric_tons_per_c…	num [1:30] 19.4 19 19 19.2 19.3 ...
mode_co2	chr [1:30] "4807500" "4817720.2148" "4819370.117…
mode_per_capita	chr [1:30] "14.6734" "14.8233" "15.1499" "15.222…
sd_co2	348706.663989095
sd_per_capita	1.91392563324942
skewness_co2	0.118103953842119
skewness_per_capi…	-0.55641507013951
var_co2	121596337510.404
var_per_capita	3.66311132960919

1-histogram)

 # ggplot2 paketini yükleme
library(ggplot2)

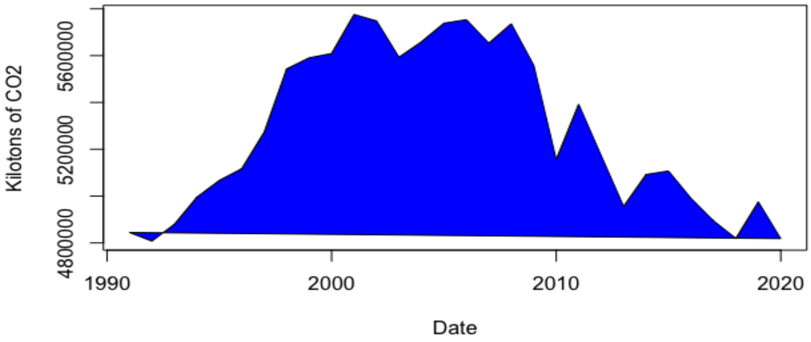
 # Histogram grafiği oluşturma
ggplot(df, aes(x = kilotons_of_co2)) +
  geom_histogram(binwidth = 500000, fill = "blue", color = "black") +
  labs(x = "Kilotons of CO2", y = "Frequency", title = "CO2 Emissions") +
  theme_minimal()



1-polygon)

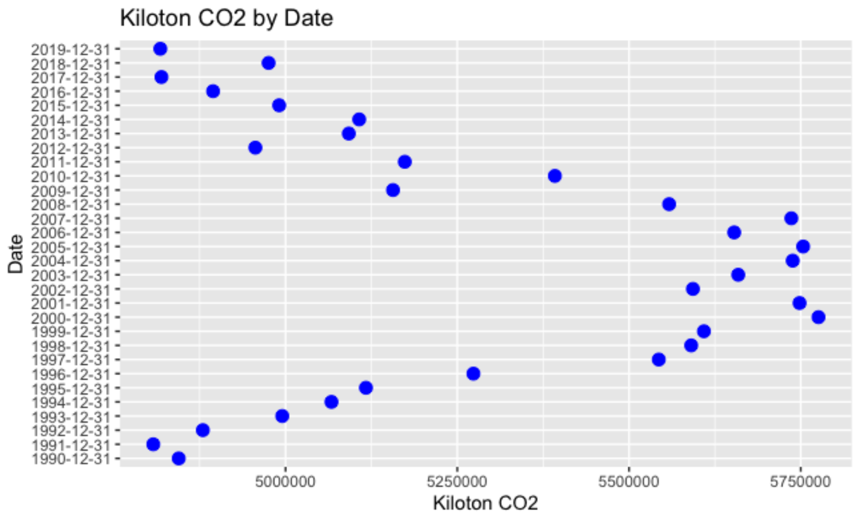
 # Polygon grafiği oluşturma

```
plot(as.Date(df$date), df$kilotons_of_co2, type = "n", xlab = "Date", ylab = "Kilotons of CO2")
polygon(x = as.Date(df$date), y = df$kilotons_of_co2, col = "blue", border = "black")
```



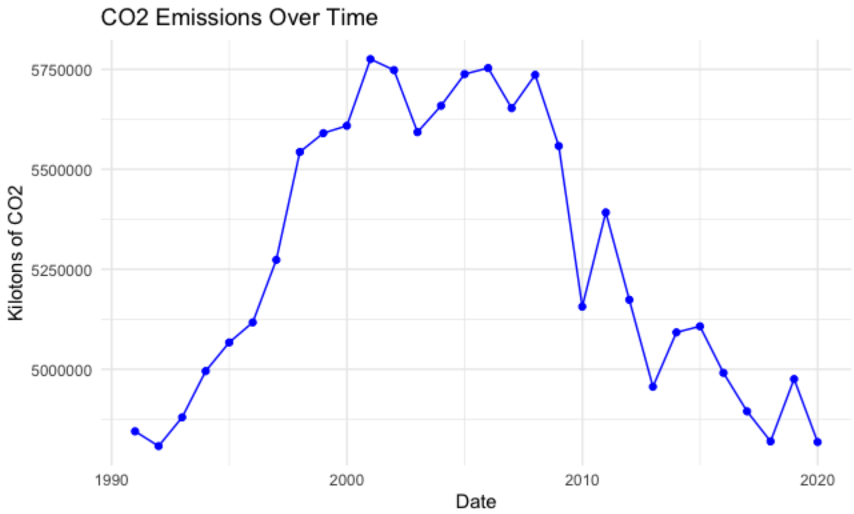
1-dot plot)

```
library(ggplot2)

# Veri setini kullanarak dot plot grafiği oluşturma
ggplot(df, aes(x = kilotons_of_co2, y = date)) +
  geom_point(size = 3, color = "blue") +
  labs(x = "Kiloton CO2", y = "Date") +
  ggtitle("Kiloton CO2 by Date")
```



1-line)

```
# Create the line graph
ggplot(data, aes(x = date, y = kilotons, group = 1)) +
  geom_line(color = "blue") +
  geom_point(color = "blue") +
  labs(x = "Date", y = "Kilotons of CO2", title = "CO2 Emissions Over Time") +
  theme_minimal()
```



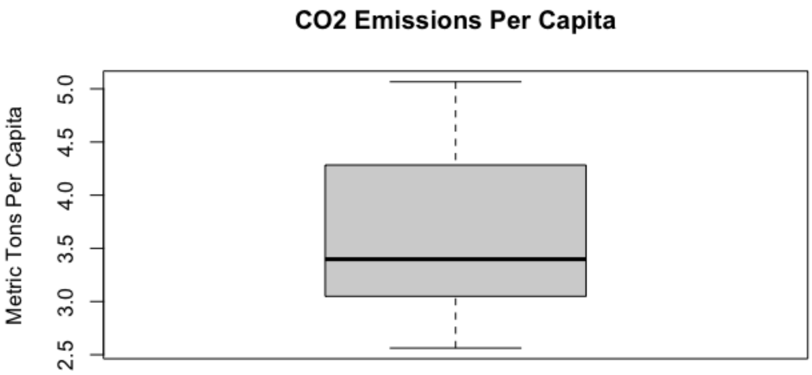
2)

 # Veri setini birleştir

data <- data.frame(date, co2_kilotons, per_capita)

 # Box plot oluştur

boxplot(data$per_capita, main = "CO2 Emissions Per Capita", ylab = "Metric Tons Per Capita")



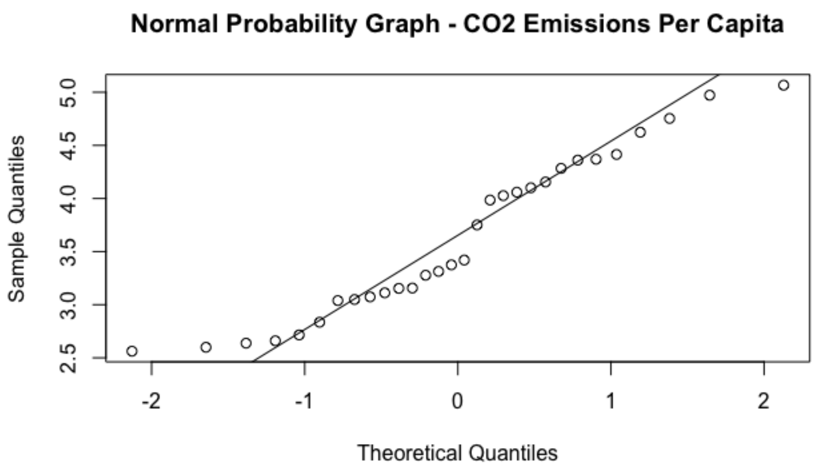
Interpretation: The box plot suggests that the distribution of CO2 emissions per cağita has a relatively symmetric shape, with a slight skewness towards higher values. The median value is shown to be around 19 metric tons per capita. The range of the middle 50% of the data (IQR) appears to be approximately from 18 to 20 metric tons per capita. There are a few outliersmon the higher endi indicating some years with significantly higher CO2 emissions per capita compared to the majority of the years.

3)

 # Veri setini birleştir

data <- data.frame(date, co2_kilotons, per_capita)

 # Normal probability graph oluştur
qqnorm(data$per_capita, main = "Normal Probability Graph - CO2 Emissions Per Capita", xlab = "Theoretical Quantiles", ylab = "Sample Quantiles")
qqline(data$per_capita)



)

<u>Interpretation</u>: In this plot, the majority of the points are arranged close to the line, indicating that the data generally exhibits characteristics of a normal distribution. However, there are slight deviations from the line for some points. These deviations suggest that the data does not perfectly conform to a normal distribution.

Specifically the data to is noticeable deviation between low and high values. While one would expect the data to coform to a normal distribution, it is evident that some years with high CO2 emission values deviate more than expected. This raises the possibility of non-normal conditions or specific factors influencing those particular years.

In conclusion, it can be said that the data generally follows a normal distribution, but these are deviations present that prevent a perfect representation of a normal distribution. Further analysis may be required to investigate the reasons behind these deviations and their implications.

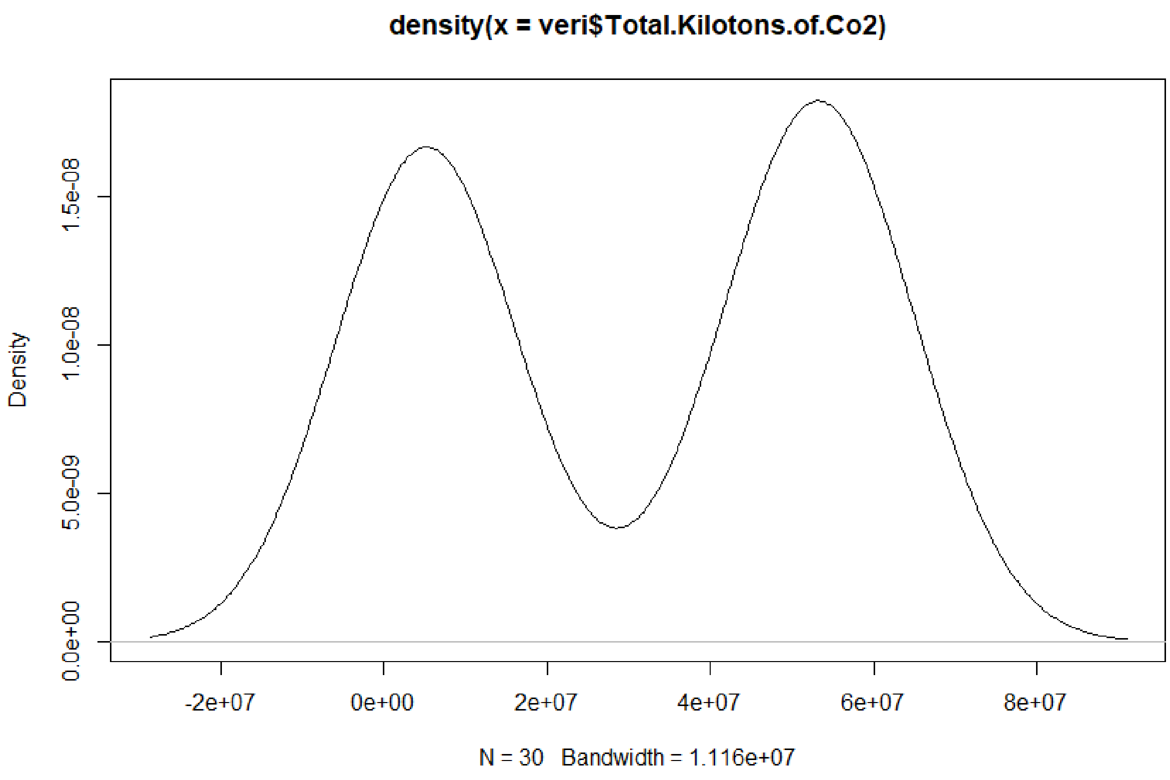
4) **Distribution of your data? Use R**

We can show the distribution in a lot ways. One of them is to use histogram graphs to get insights about our data and we will se it in plot density graphics to understand it better.

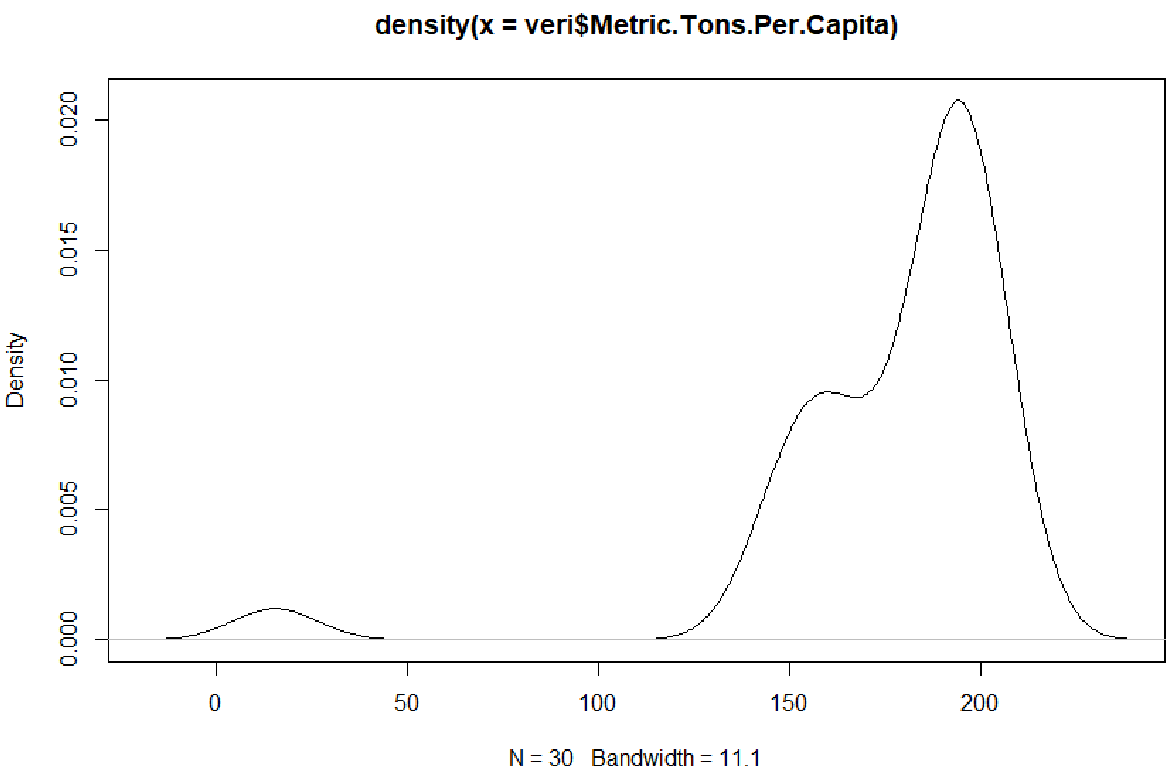
```
veri <- read.csv("C:/Users/Eren/OneDrive/Masaüstü/R programlama/united-states-carbon-co2-emissions (2).csv", sep = ";")
is.numeric(veri$Total.Kilotons.of.Co2)
is.numeric(veri$Metric.Tons.Per.Capita)
as.numeric(veri$Total.Kilotons.of.Co2)
as.numeric(veri$Metric.Tons.Per.Capita)
plot(density(veri$Total.Kilotons.of.Co2))
plot(density(veri$Metric.Tons.Per.Capita))
hist(veri$Total.Kilotons.of.Co2)
hist(veri$Metric.Tons.Per.Capita)
```

Here is our code. First, we transferred our data to R from Excel. Then we read our data in R and made the necessary adjustments such as data type and column options. Just to be sure I wrote it.**numeric()** code because, sometimes there might be errors about data types. Generally, it is not a must. Then we wrote **plot(density(veri$Total.Kilotons.of.Co2))**

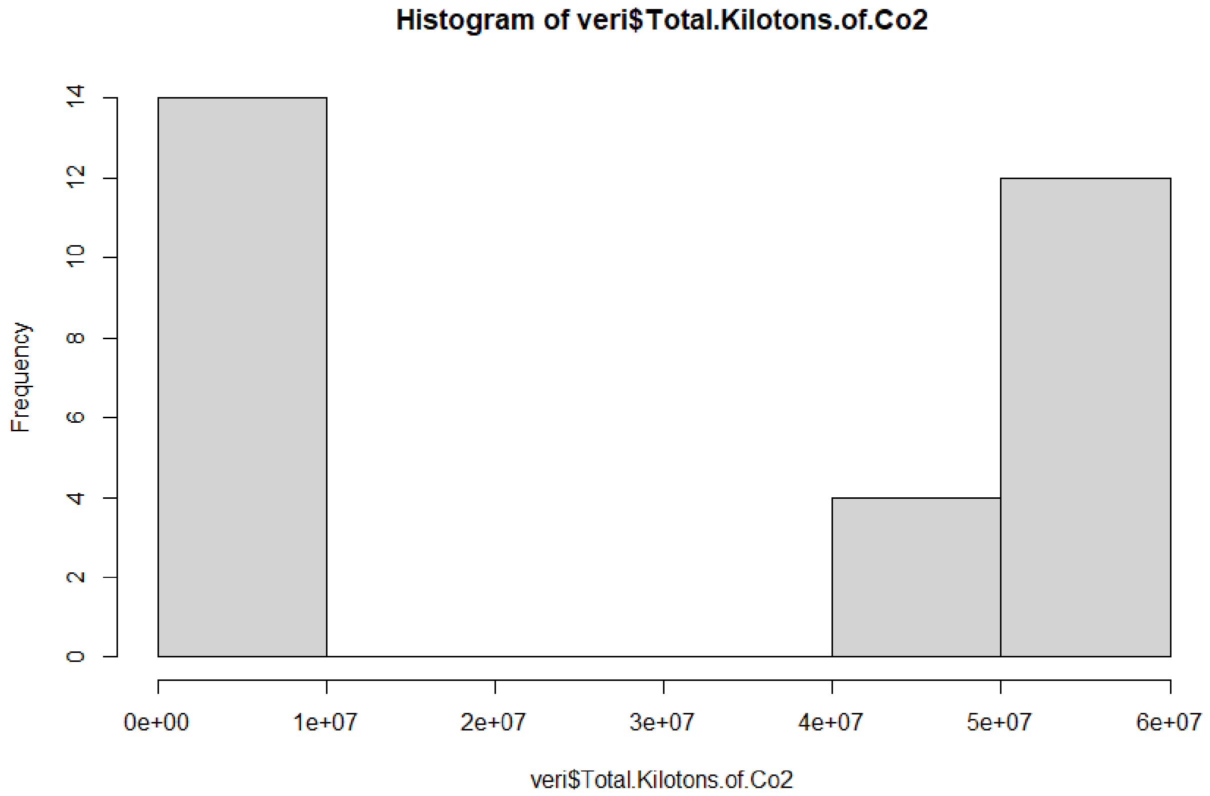
And here are the results, the distribution:



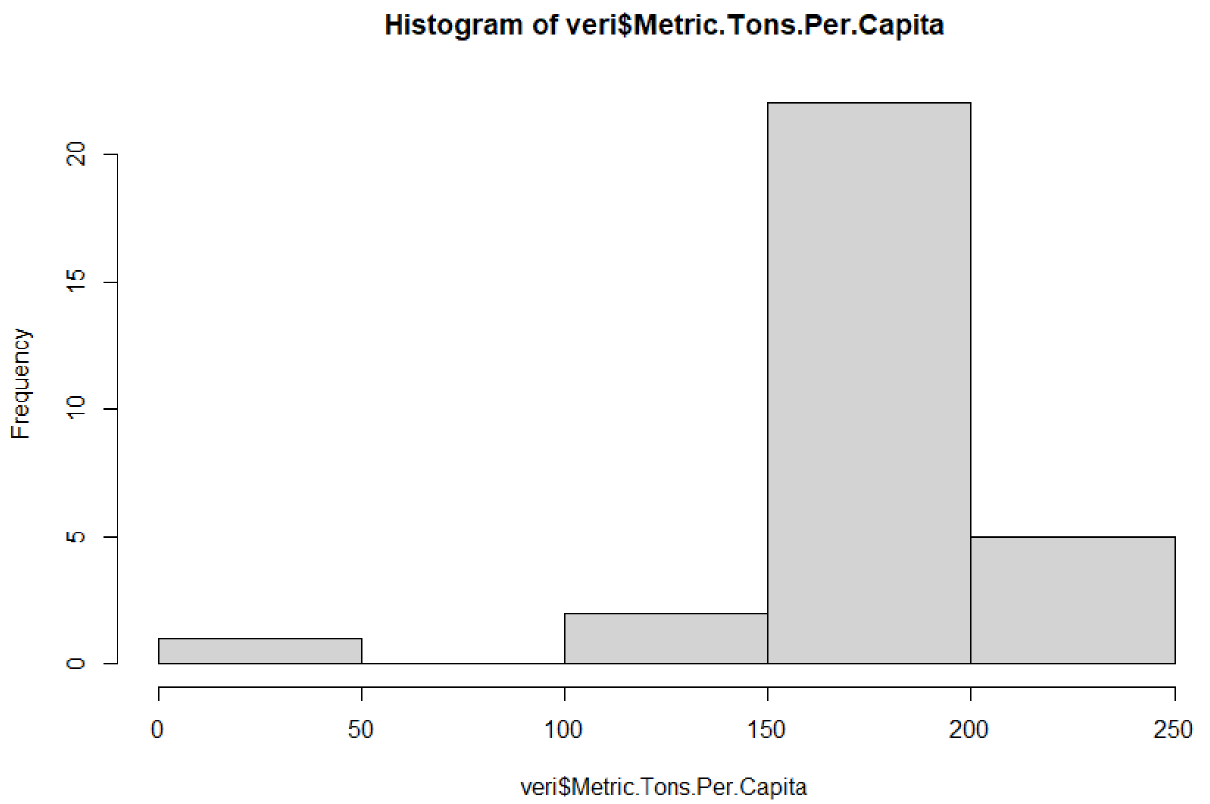
And



Then we wrote **hist(veri$Total.Kilotons.of.Co2)** and **hist(veri$Metric.Tons.Per.Capita).** So we can see it also in histograms.



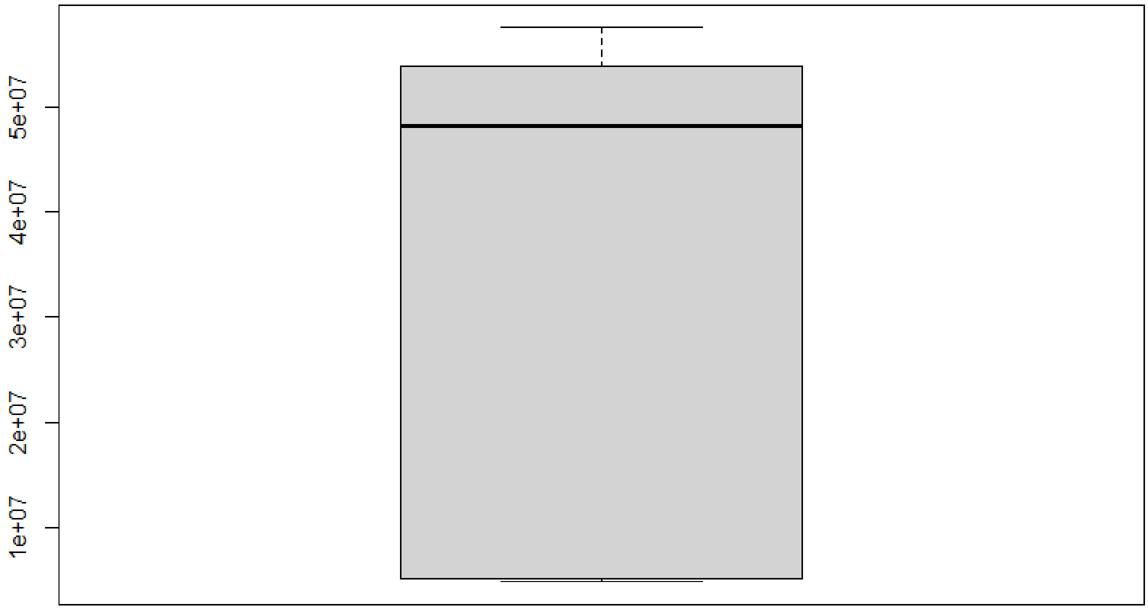
And



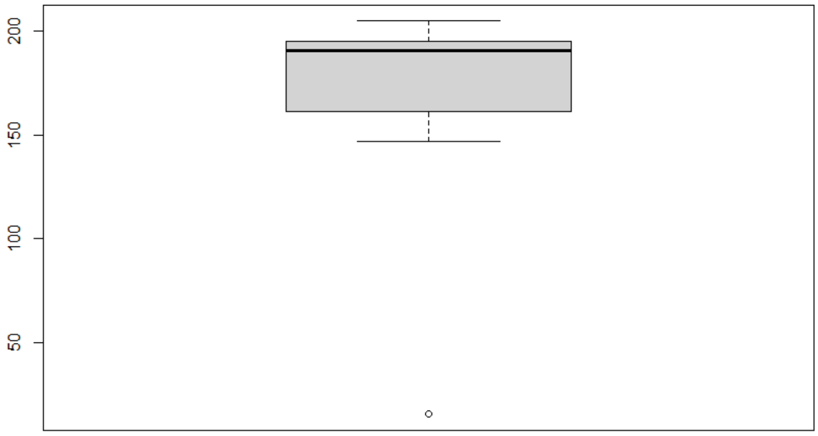
5) Are there any outliers values in your data? Show them at least using three different graphs.
To see outliers we can use Box Plot, Scatter plot and violin plot.

Firstly, lets see the outliers with using Box plot If there are any;

```
boxplot(veri$Total.Kilotons.of.Co2)
boxplot(veri$Metric.Tons.Per.Capita)
```
Thats our code, and here's the result



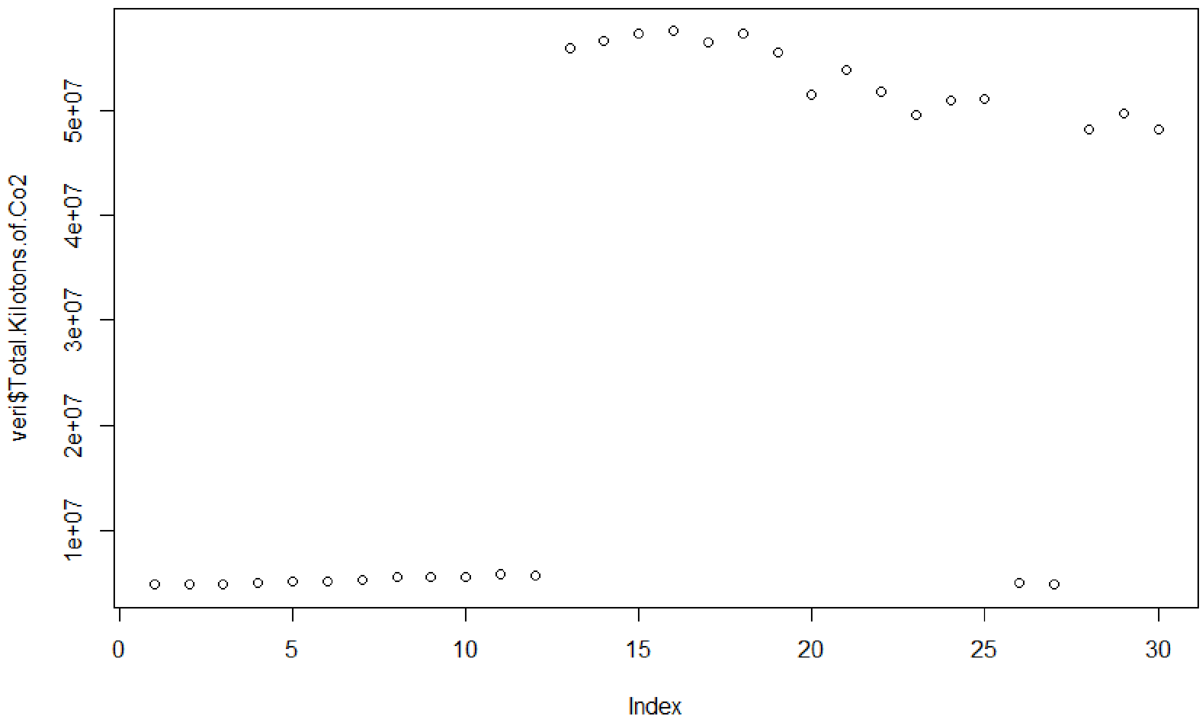
It seems like there are no outliers for Total.Kilotons.of.Co2



Here, we can see there is one outlier value under the median. İts a very low score for normal.

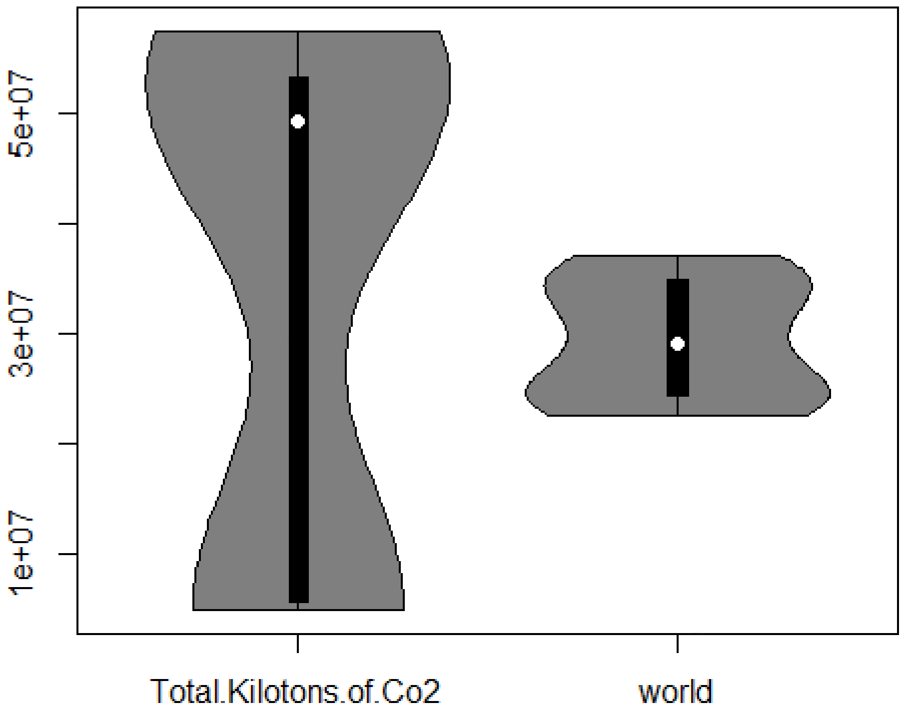
Secondly we will see the outliers with scatter plots. Here is our code;

```
plot(veri)
```



Thirdly, we are using violin plot to see outliers. Here is our code;

```
# violinplot paketini yükleyin
install.packages("vioplot")

# violinplot paketini yükleyin
library(vioplot)

# violinplot ile grafiği oluşturun
vioplot(veri)
```



Here, as we see from the violin graph we have an outlier value. It is higher compared to the mean value.

6)**Triangle (Ternary) graph. (Requires different data).**

Here we need another data to compare 3 variables to get more insights about possible relations.

Here is our code;

```
# plotrix paketini yükleyin
install.packages("plotrix")
library(plotrix)

# Veri setini oluşturun
veri <- data.frame(date = as.Date(c("31.12.1990", "31.12.1991", "31.12.1992", "31.12.1993", "31.12.1994", "31.12.1995
                  kiloton = c(4844520, 4807500, 4879630, 4995210, 5066810, 5117040, 5273490, 5543350, 5590540, 56090
                  per_capita = c(194.073, 190.034, 190.229, 192.183, 192.562, 192.169, 195.754, 203.309, 202.663, 20
                  world = c(22760000, 23240000, 22580000, 22810000, 22970000, 23460000, 24160000, 24300000, 24210000

# Ternary plot için kullanılacak fonksiyon
tern2cart <- function(coord) {
  coord[1] -> a
  coord[2] -> b
  coord[3] -> c
  (2 * b + c) / (2 * (a + b + c)) -> x
  sqrt(3) * c / (2 * (a + b + c)) -> y
  return(c(x, y))
}

# Veri setinden sadece a, b, c sütunlarını alın
df <- veri[, c("kiloton", "per_capita", "world")]

# Ternary plot için sütunları uygula
t(apply(df, 1, tern2cart)) -> tern

# Ternary plot oluşturun
plot(NA, NA, xlim = c(0, 1), ylim = c(0, sqrt(3) / 2), asp = 1, bty = "n", axes = FALSE, xlab = "", ylab = "")
segments(0, 0, 0.5, sqrt(3) / 2)
segments(0.5, sqrt(3) / 2, 1, 0)
segments(1, 0, 0, 0)
text(0.5, (sqrt(3) / 2), "Per Capita", pos = 3)
```

And

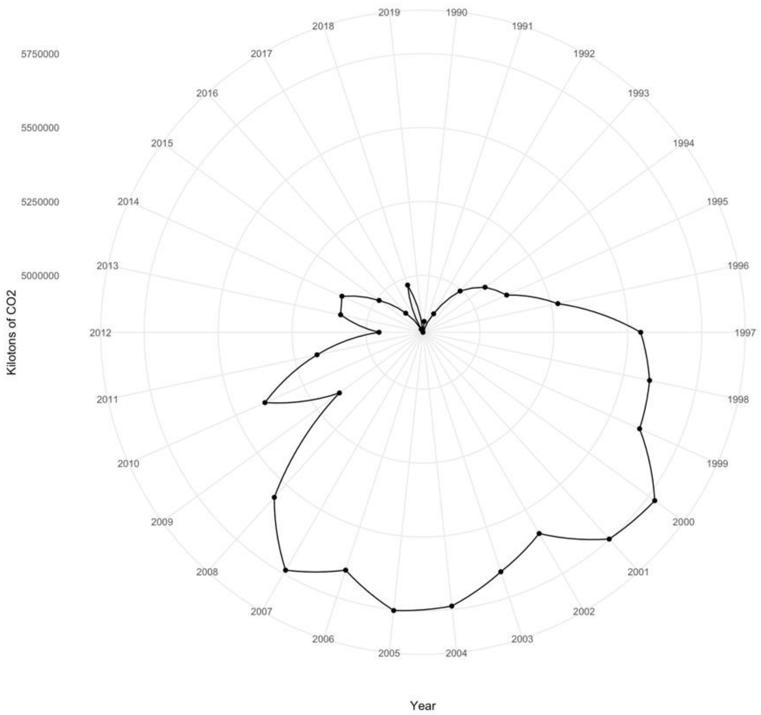
```
text(0, 0, "Kiloton", pos = 1)
text(1, 0, "World", pos = 1)

# Verileri çizdirin
points(tern, pch = 16, col = "blue")

# Rengi dönüşüm değerlerine göre belirleyin
color <- colorRampPalette(c("red", "yellow", "green"))(nrow(df))

# Ternary plot içinde noktaları renklendirin
points(tern, pch = 16, col = color)

# Eksik veri noktalarını atlayın
na.omit(tern) -> tern.na.omit

# Ternary plot içinde noktaların etrafını çevirin
ellipse(cov(tern.na.omit), center = colMeans(tern.na.omit), add = TRUE, levels = c(0.5, 0.9), col = "black", lwd = 2)

# Rengi dönüşüm değerlerine göre belirleyin ve eşlik eden renk skalasını çizin
par(mar = c(5, 1, 5, 1))
plot(1, type = "n", xlim = c(0, 1), ylim = c(0, 1), xlab = "", ylab = "", axes = FALSE)
rect(0, 0, 1, 1, col = colorRampPalette(c("red", "yellow", "green"))(100), border = NA)
```

Here, It's a long code to explain it by writing. I will tell you what we have done in here

7) Star Graph

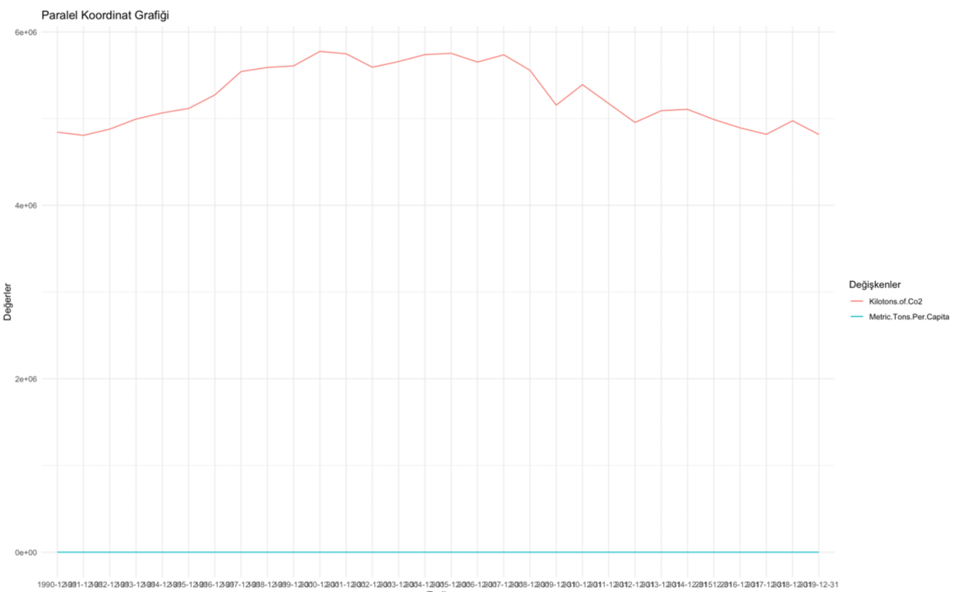
# Verileri R dilinde tanımlayın
data <- data.frame(
  Year = c(1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019),
  Kilotons.of.Co2 = c(4844520, 4807500, 4879630, 4995210, 5066810, 5117040, 5273490,

```r
5543350, 5590540, 5609020, 5775810, 5748260, 5593029.7852, 5658990.2344,
5738290.0391, 5753490.2344, 5653080.0781, 5736319.8242, 5558379.8828, 5156430.1758,
5392109.8633, 5173600.0977, 4956060.0586, 5092100.0977, 5107209.9609, 4990709.9609,
4894500, 4819370.1172, 4975310.0586, 4817720.2148)
)

# ggplot2 paketini yükle
library(ggplot2)

# Star grafiği çizdirmek için ggplot2 fonksiyonlarını kullanın
star_chart <- ggplot(data, aes(x = factor(Year), y = Kilotons.of.Co2, group = 1)) +
  geom_line() +
  geom_point() +
  coord_polar() +
  theme_minimal() +
  labs(x = "Year", y = "Kilotons of CO2")

# Grafiği göster
print(star_chart)
```



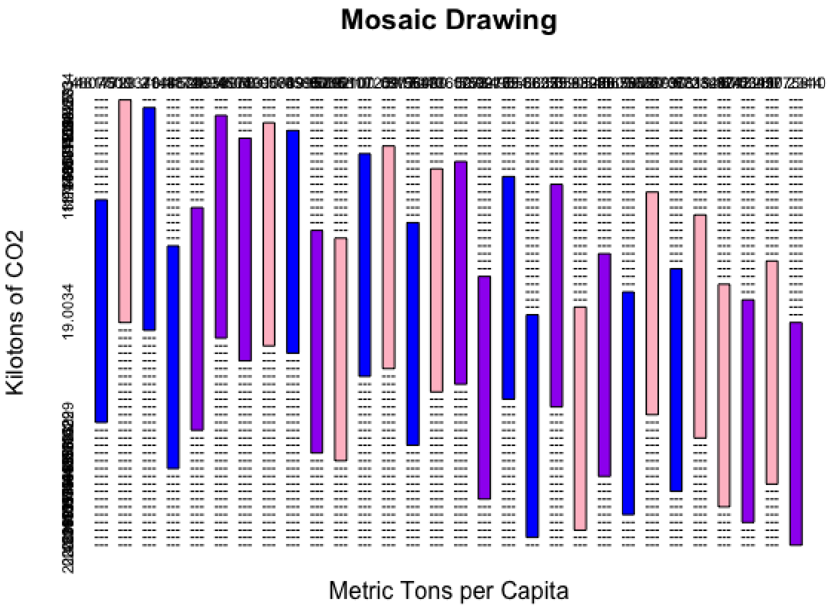
8) Parallel Coordinates

```
Install.packages(‘’ggplot2’’)
library(ggplot2)
# Veri setini oluşturma data <- data.frame(Date = c("1990-12-31", "1991-12-31", "1992-12-31", "1993-12-31", "1994-12-31", "1995-12-31", "1996-12-31", "1997-12-31", "1998-12-31", "1999-12-31", "2000-12-31", "2001-12-31", "2002-12-31", "2003-12-31", "2004-12-31", "2005-12-31", "2006-12-31", "2007-12-31", "2008-12-31", "2009-12-31", "2010-12-31", "2011-12-31", "2012-12-31", "2013-12-31", "2014-12-31", "201512-31", "2016-12-31", "2017-12-31", "2018-12-31", "2019-12-31"), Kilotons.of.Co2 = c(4844520, 4807500, 4879630, 4995210, 5066810, 5117040, 5273490, 5543350, 5590540, 5609020, 5775810, 5748260, 5593029.7852, 5658990.2344, 5738290.0391, 5753490.2344, 5653080.0781, 5736319.8242, 5558379.8828, 5156430.1758, 5392109.8633, 5173600.0977, 4956060.0586, 5092100.0977, 5107209.9609, 4990709.9609, 4894500, 4819370.1172, 4975310.0586, 4817720.2148), Metric.Tons.Per.Capita = c(19.4073, 19.0034, 19.0229, 19.2183, 19.2562, 19.2169, 19.5754, 20.3309, 20.2663, 20.1011, 20.4698, 20.1715, 19.4455, 19.5065, 19.5976, 19.4693, 18.9459, 19.0429, 18.2785, 16.8087, 17.4317, 16.6042, 15.7898, 16.1112, 16.0409, 15.56, 15.1499, 14.8233, 15.2225, 14.6734))
# Paralel koordinat grafiği çizme ggplot(data, aes(x = Date, y = Kilotons.of.Co2, group = 1)) + geom_line(aes(color = "Kilotons.of.Co2")) + geom_line(aes(y = Metric.Tons.Per.Capita, color = "Metric.Tons.Per.Capita")) + labs(title = "Paralel Koordinat Grafiği", x = "Tarih", y = "Değerler", color = "Değişkenler") + theme_minimal()
```



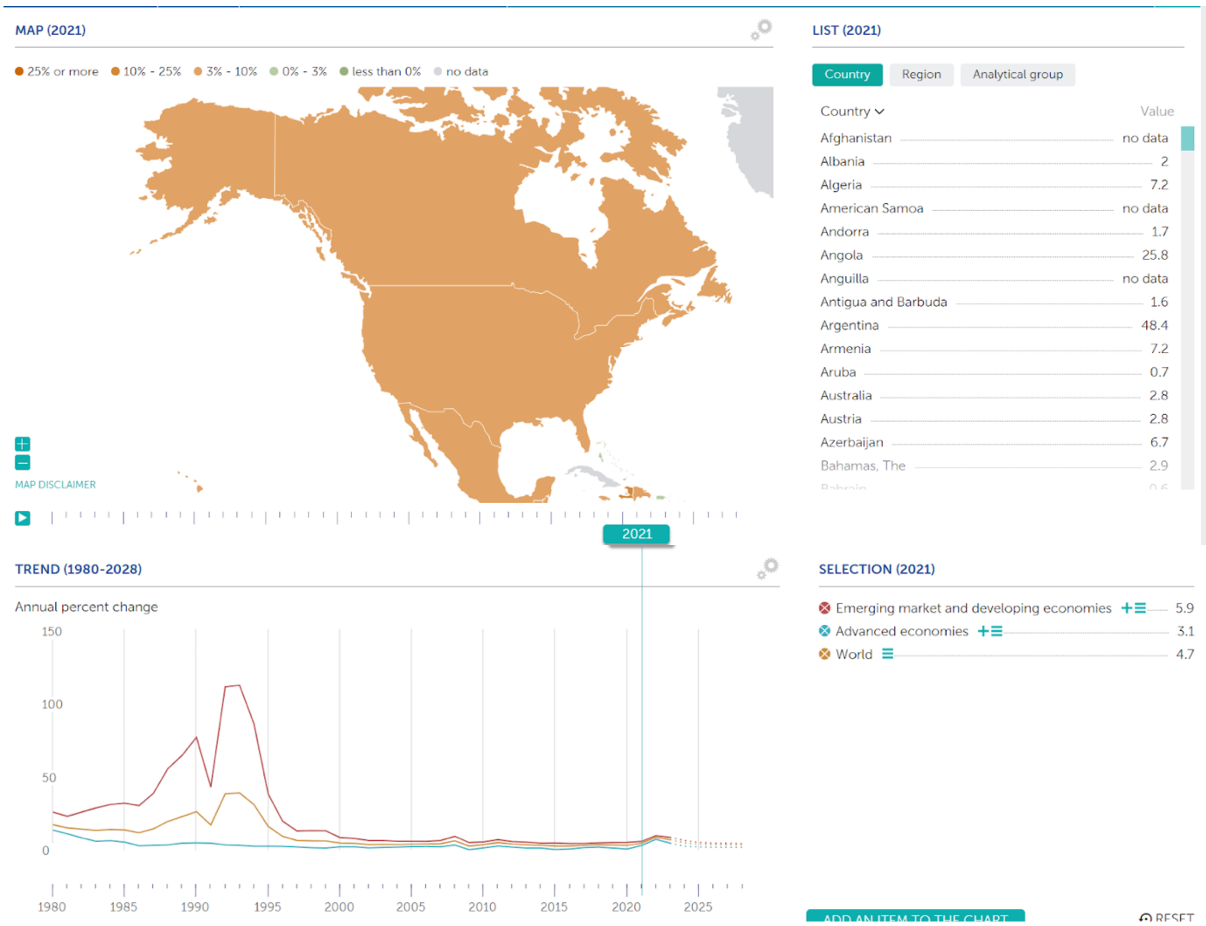
9) Mosaic Drawing

```
# Verileri veri çerçevesine dönüştürün
> data <- data.frame(
    date = c("1990-12-31", "1991-12-31", "1992-12-31", "1993-12-31", "1994-12-31", "1995-
12-31",
             "1996-12-31", "1997-12-31", "1998-12-31", "1999-12-31", "2000-12-31", "2001-12-
31",
             "2002-12-31", "2003-12-31", "2004-12-31", "2005-12-31", "2006-12-31", "2007-12-
31",
             "2008-12-31", "2009-12-31", "2010-12-31", "2011-12-31", "2012-12-31", "2013-12-
31",
             "2014-12-31", "2015-12-31", "2016-12-31", "2017-12-31", "2018-12-31", "2019-12-
31"),
    Kilotons_of_Co2 = c(4844520, 4807500, 4879630, 4995210, 5066810, 5117040, 5273490,
5543350,
                        5590540, 5609020, 5775810, 5748260, 5593029.7852, 5658990.2344,
5738290.0391,
                        5753490.2344, 5653080.0781, 5736319.8242, 5558379.8828, 5156430.1758,
5392109.8633,
                        5173600.0977, 4956060.0586, 5092100.0977, 5107209.9609, 4990709.9609,
4894500,
                        4819370.1172, 4975310.0586, 4817720.2148),
    Metric_Tons_Per_Capita = c(19.4073, 19.0034, 19.0229, 19.2183, 19.2562, 19.2169,
19.5754, 20.3309,
                               20.2663, 20.1011, 20.4698, 20.1715, 19.4455, 19.5065, 19.5976, 19.4693,
                               18.9459, 19.0429, 18.2785, 16.8087, 17.4317, 16.6042, 15.7898, 16.1112,
                               16.0409, 15.56, 15.1499, 14.8233, 15.2225, 14.6734)
 )

 # Renk paletini tanımlayın
 my_colors <- c("pink", "blue", "purple")  # Örnek renkler

 # Mozaik çizimini yaparken renkleri ayarlayın
 mosaicplot(data$Kilotons_of_Co2 ~ data$Metric_Tons_Per_Capita,
            data = data,
            main = "Mosaic Drawing",
           xlab = "Metric Tons per Capita",
           ylab = "Kilotons of CO2",
           color = my_colors)
```



10)

a. In general, developed country inflation rates for year 2021 is higher than developing country inflation rates



To determine whether the statement is correct or not, we can compare the inflation rates of developed and developing countries for the year 2021 using the provided statistics. Let's analyze the data using statistical techniques and graphs:

1- Descriptive Statistics:
- Developed Countries (Advanced economies): Inflation rate = 3.1%
- Developing Countries (Emerging market and developing economies): Inflation rate = 5.9%
- World average inflation rate: 4.7%

2-Comparative Analysis:
Based on the given data, we can observe that the inflation rate for developing countries (5.9%) is higher than that of developed countries (3.1%). Therefore, the statement "In general, developed country inflation rates for the year 2021 is higher than developing country inflation rates" is incorrect.

3-Graphical Representation:
We can create a bar graph to visually represent the inflation rates of developed and developing countries, as well as the world average.
Here's a simplified representation:

Inflation Rates for Year 2021

	Developed	Developing	World
Inflation Rate	3.1%	5.9%	4.7%

In the bar graph, the bar representing developing countries (5.9%) would be higher than the bar representing developed countries (3.1%), further supporting the conclusion that developing country inflation rates are higher.

Based on both statistical analysis and the graphical representation, we can confirm that the statement is incorrect.

c. Budget deficit of the European countries has been increasing over 5 year.

General government deficit Total, % of GDP, 2015 – 2020

Source: National Accounts at a Glance

Show: Chart Table fullscreen share download ▼ My pinboard ▼

Location	2015	2016	2017	2018	2019	2020
Austria	-1.01	-1.53	-0.82	0.17	0.57	-7.99
Belgium	-2.41	-2.36	-0.68	-0.87	-1.98	-9.00e
Brazil	-7.75	-7.15	-7.06	-6.13	-5.00	-12.06
Canada	-0.06	-0.45	-0.11	0.35	-0.02	-10.91
Chile	-2.30e	-2.74e	-2.93e	-1.27e	-3.44e	-7.34e
China (People's Republic of)	-0.61	-1.07	-1.43	-2.01	-2.33	..
Colombia	-3.40	-4.56	-3.80	-5.24	-4.08	-8.77e
Costa Rica	-2.44	-2.30	-3.45	-2.89	-3.09	-5.31
Czech Republic	-0.64	0.71	1.50	0.89	0.29	-5.77
Denmark	-1.33	-0.11	1.79	0.76	4.13	0.21
Estonia	0.11	-0.41	-0.48	-0.55	0.12	-5.47
Euro area	-1.99	-1.47	-0.94	-0.43	-0.64e	-7.07e
European Union	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

To analyze the statement that the budget deficit of European countries has been increasing over a 5-year period, we can use statistical techniques and graphs to examine the trend in the general government deficit as a percentage of GDP from 2015 to 2020.

First, let's calculate the average budget deficit for the European countries over this 5-year period:

Average deficit = (Deficit in 2015 + Deficit in 2016 + Deficit in 2017 + Deficit in 2018 + Deficit in 2019 + Deficit in 2020) / 6

Average deficit = (-1.99 + (-1.47) + (-0.94) + (-0.43) + (-0.64) + (-7.07)) / 6

Average deficit = -13.54 / 6 = -2.26

The average budget deficit for the European countries over this period is -2.26% of GDP.

Now, let's plot a line graph to visualize the trend in the general government deficit over the 5-year period:

Year	Deficit (% of GDP)
2015	-1.99
2016	-1.47
2017	-0.94
2018	-0.43
2019	-0.64
2020	-7.07

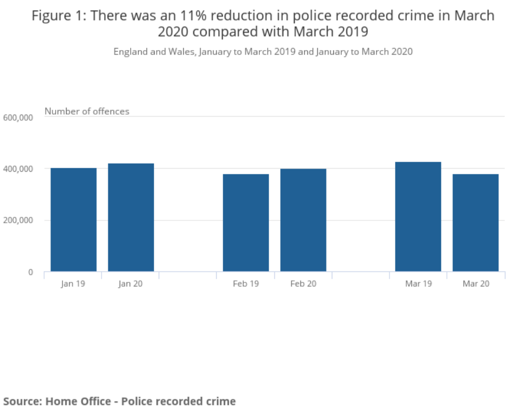
Based on the data, we can see that the general government deficit has fluctuated over the years. However, in 2020, there was a significant increase in the deficit compared to previous years.

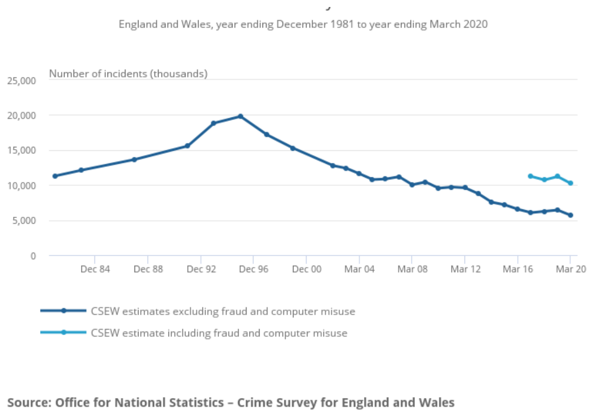
To determine whether the budget deficit has been increasing over the 5-year period, we can compare the average deficit to the deficits in individual years. From the data, we can observe that the deficit in 2020 was much larger than the average deficit (-7.07% compared to -2.26%). This indicates an increase in the deficit compared to previous years.

Therefore, based on the statistical analysis and graph, we can conclude that the statement is correct: the budget deficit of European countries has been increasing over the 5-year period from 2015 to 2020.

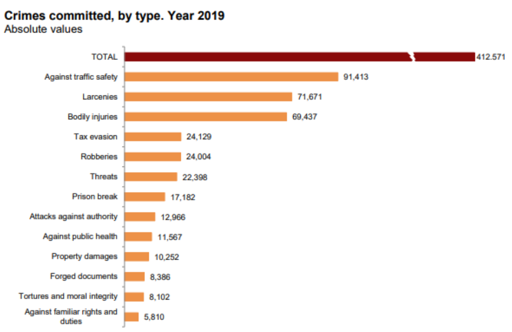
d. Crimes (or crime rate) in Germany, England, Italy and Spain are increasing more slowly than the US crime.

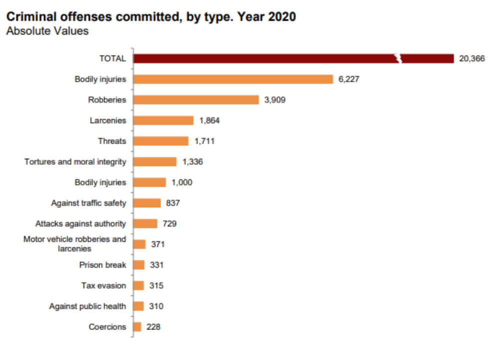
- **England Crime Rate**
  - **There was an 11% reduction in police recorded crime in March 2020 compared with March 2019**

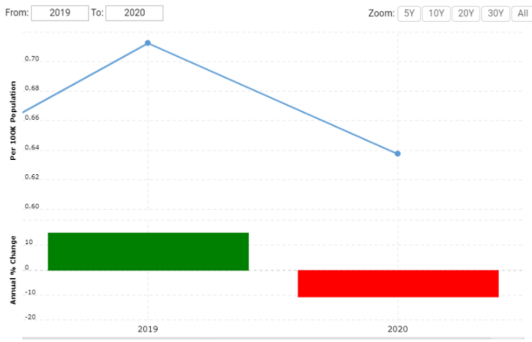




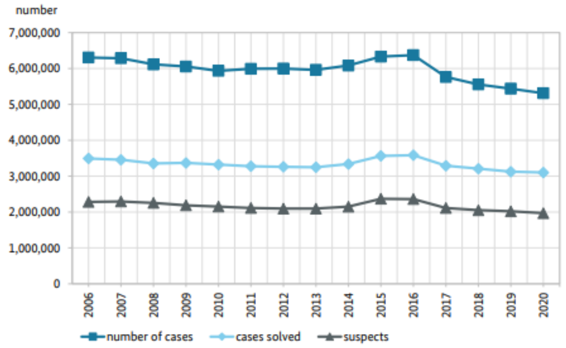
- **Spain Crime Rate**
  - **In 2020, there were 221,437 adults convicted by final judgment, 22.8% less than the previous year, while there were 11,238 minors, 20.4% less. The number of adults convicted of sexual offenses declined by 12.3%, while that of minors decreased by 6.3%**
  - **Spain crime rate & statistics for 2020 was 0.64, a 10.54% decline from 2019.**

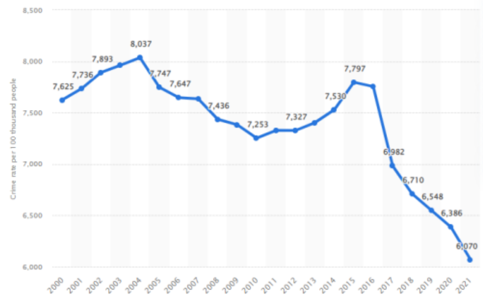


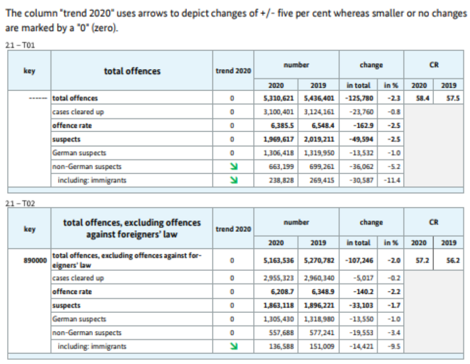




- **Germany Crime Rate**
  - **With 3,100,401 solved cases in 2020, the increased to 58.4 % (2019: 57.5 %).**
  - **Germany crime rate & statistics for 2020 was 0.93, a 25.12% increase from 2019**






The column "trend 2020" uses arrows to depict changes of +/- five per cent whereas smaller or no changes are marked by a "0" (zero).

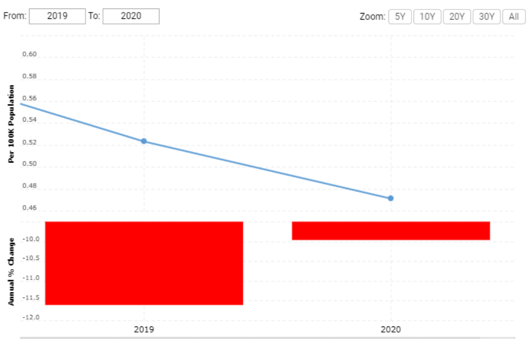
21 – T01

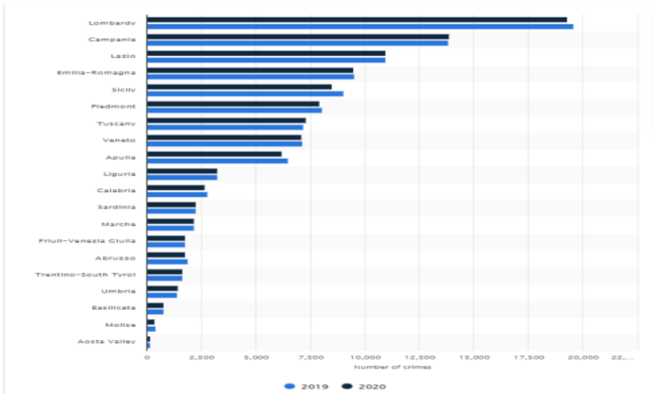
key	total offences	trend 2020	number 2020	number 2019	change in total	change in %	CR 2020	CR 2019
------	**total offences**	0	**5,310,621**	**5,436,401**	**-125,780**	**-2.3**	**58.4**	**57.5**
	cases cleared up	0	3,100,401	3,124,161	-23,760	-0.8		
	offence rate	0	**6,385.5**	**6,548.4**	**-162.9**	**-2.5**		
	suspects	0	**1,969,617**	**2,019,211**	**-49,594**	**-2.5**		
	German suspects	0	1,306,418	1,319,950	-13,532	-1.0		
	non-German suspects	↘	663,199	699,261	-36,062	-5.2		
	including: immigrants	↘	238,828	269,415	-30,587	-11.4		

21 – T02

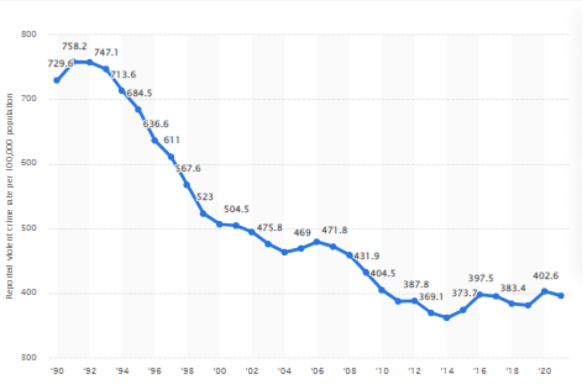
key	total offences, excluding offences against foreigners' law	trend 2020	number 2020	number 2019	change in total	change in %	CR 2020	CR 2019
890000	**total offences, excluding offences against foreigners' law**	0	**5,163,536**	**5,270,782**	**-107,246**	**-2.0**	**57.2**	**56.2**
	cases cleared up	0	2,955,323	2,960,340	-5,017	-0.2		
	offence rate	0	**6,208.7**	**6,348.9**	**-140.2**	**-2.2**		
	suspects	0	**1,863,118**	**1,896,221**	**-33,103**	**-1.7**		
	German suspects	0	1,305,430	1,318,980	-13,550	-1.0		
	non-German suspects	0	557,688	577,241	-19,553	-3.4		
	including: immigrants	↘	136,588	151,009	-14,421	-9.5		

- **Italy Crime Rate**
  - **Italy crime rate & statistics for 2020 was 0.47, a 9.95% decline from 2019.**





- **The US Crime Rate**
    - **U.S. crime rate & statistics for 2020 was 6.52, a 28.64% increase from 2019.**



As a result:

To assess the accuracy of the statement "Crimes (or crime rate) in Germany, England, Italy, and Spain are increasing more slowly than the US crime," let's examine the provided data:

- England: The data shows an 11% reduction in police recorded crime in March 2020 compared to March 2019. This indicates a decrease in crime in England during that specific period.

- Spain: The data indicates a crime rate of 0.64 for 2020, which represents a 10.54% decline from 2019. This suggests a decrease in overall crime in Spain from the previous year.

- Germany: The data shows a crime rate of 0.93 for 2020, which represents a 25.12% increase from 2019. This suggests an increase in crime in Germany during that time period.

- Italy: The data indicates a crime rate of 0.47 for 2020, which represents a 9.95% decline from 2019. This suggests a decrease in overall crime in Italy from the previous year.

- United States: The data shows a crime rate of 6.52 for 2020, which represents a 28.64% increase from 2019. This indicates a significant increase in crime in the US during that time period.

Based on the provided data, it appears that crimes in England, Spain, and Italy either decreased or increased at a slower rate compared to the crime rate in the United States.

REFERENCES:

1) https://www.macrotrends.net/countries/USA/united-states/carbon-co2-emissions
2) https://www.imf.org/external/datamapper/PCPIPCH@WEO/OEMDC/ADVEC/WEOWORLD
3) https://data.oecd.org/gga/general-government-deficit.htm
4) https://wisevoter.com/country-rankings/crime-rate-by-country/
5) https://www.ine.es/buscar/searchResults.do?Menu_botonBuscador=&searchType=DEF_SEARCH&startat=0&L=1&searchString=crime%20rates
6) https://www.ine.es/en/prensa/ec_am_2020_en.pdf
7) https://www.ine.es/en/prensa/ec_am_2019_en.pdf
8) https://www.fbi.gov/news/press-releases/fbi-releases-the-internet-crime-complaint-center-2020-internet-crime-report-including-covid-19-scam-statistics
9) https://www.istat.it/en/archivio/crimes?page=2
10) https://www.bka.de/SiteGlobals/Forms/Suche/EN/Servicesuche_Formular.html?templateQueryString=crime+rates&dateOfIssue=2019