

Practical 1: US Population Time Series Analysis

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1. Title

For a given dataset of the US Population (in millions), perform the following tasks in the R environment:

- (a) Entered the data into an Excel file.
- (b) Import the data from the Excel file into the R working directory.
- (c) Call the suitable package from the R library for time series analysis.
- (d) Convert the dataset into a time series object and explain the nature of the data in terms of its sampling frequency.
- (e) Plot the data and identify the dominating component(s) in the data set.

[Data: 3929214, 5308483, 7239881, 9638453, 12860702, 17063353, 23191876, 31443321, 38558371, 50189209, 62979666, 76212168, 92228496, 106021537, 123202624, 132164569, 151325798, 179323175, 203302031, 226542203, 248709873]

2. Objective

To create an Excel dataset of US population, import it into R, convert it into a time series object, and analyze its trend using graphical representation.

3. R Code

```

# Creating Excel file

Year <- seq(1790, 1990, by = 10)

US_Population <- c(
  3929214, 5308483, 7239881, 9638453, 12860702,
  17063353, 23191876, 31443321, 38558371, 50189209,
  62979666, 76212168, 92228496, 106021537, 123202624,
  132164569, 151325798, 179323175, 203302031,
  226542203, 248709873
)

population_df <- data.frame(
  Year = Year,
  Population = US_Population
)

write.xlsx(population_df, "US_Population.xlsx")

# Importing Excel file
dataset <- read_excel("US_Population.xlsx")

# Converting to time series
us_pop_ts <- ts(
  dataset$Population,
  start = 1790,
  frequency = 1
)

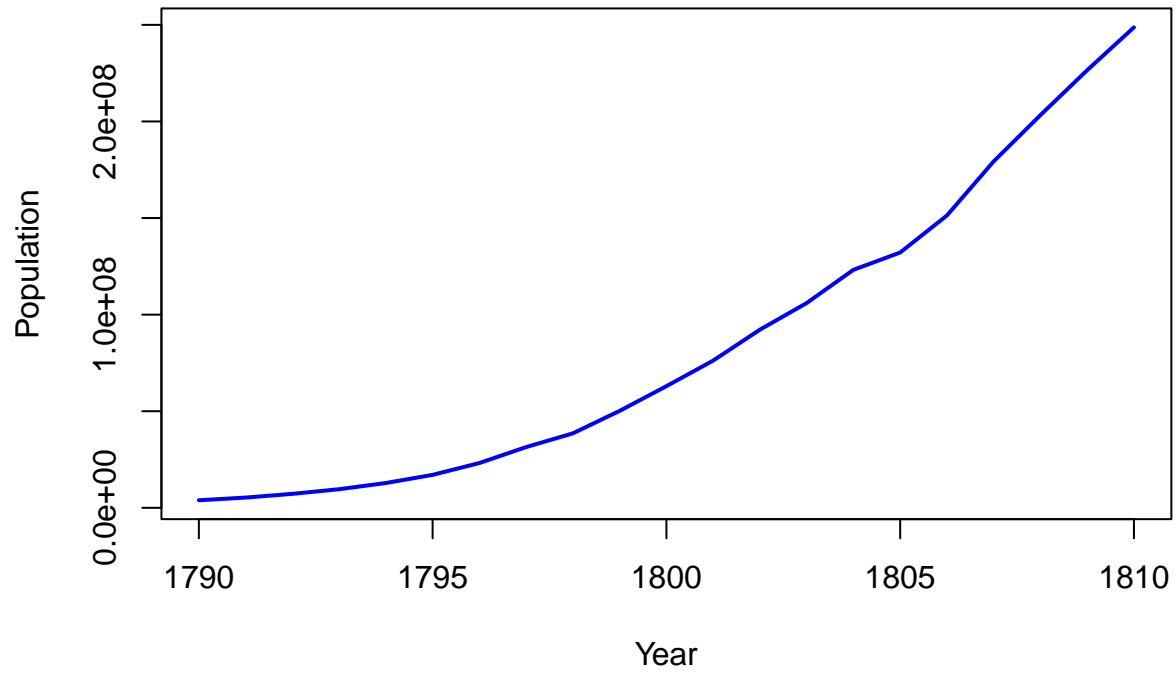
# Plotting time series
plot(
  us_pop_ts,
  main = "US Population Growth (1790-1990)",
  xlab = "Year",
  ylab = "Population",
  col = "blue",
  lwd = 2
)

```

4. Output

The time series plot of US population is shown below:

US Population Growth (1790–1990)



5. Conclusion

The time series graph shows a continuous upward trend in US population from 1790 to 1990. The dominant component observed is the trend component, indicating steady long-term population growth.