ceylon: An R package for plotting the maps of Sri Lanka

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Summary

The rapid evolution in the fields of computer science, data science and Artificial Intelligence (AI) has significantly transformed the utilization of data for decision making. Data visualisation plays a critical role in any work that involves data. Visualizing data on maps is frequently encountered in many fields. Visualizing data on maps not only transforms raw data into visually comprehensible representations but also convert complex spatial information into simple understandable form. This paper introduces capabilities of "ceylon" open source R package for mapping Sri Lanka.

Statement of Need

There are two main approaches of mapping: i) given longitude and latitudes draw maps using polygons ii) simple feature mapping.

The `ceylon` R package conveniently packages shapefiles corresponding to the geographic features of Sri Lanka, enhancing user-friendliness for seamless integration and analysis.

State of the Field

Usage

`ceylon` is available on GitHub, and can be installed and loaded into the R session using:

```r
install.packages("devtools")
devtools::install_github("thiyangt/ceylon")
library(ceylon)
```

Additional packages require for plotting are as follows:

```r
library(ggplot2)
library(sp)
library(sf)
library(viridis)
```

Shape files available in the package

```
data(sf_sl_0)
a <- ggplot(sf_sl_0) + geom_sf() + ggtitle ("a: Country")
data(province)
b <- ggplot(province) + geom_sf() + ggtitle("b: Province")
data(district)
c <- ggplot(district) + geom_sf() + ggtitle("c: District")
data(sf_sl_3)
d <- ggplot(sf_sl_3) + geom_sf() + ggtitle("d: Divisional Secretariat")
```

```
library(patchwork)
(a|b|c|d)
```

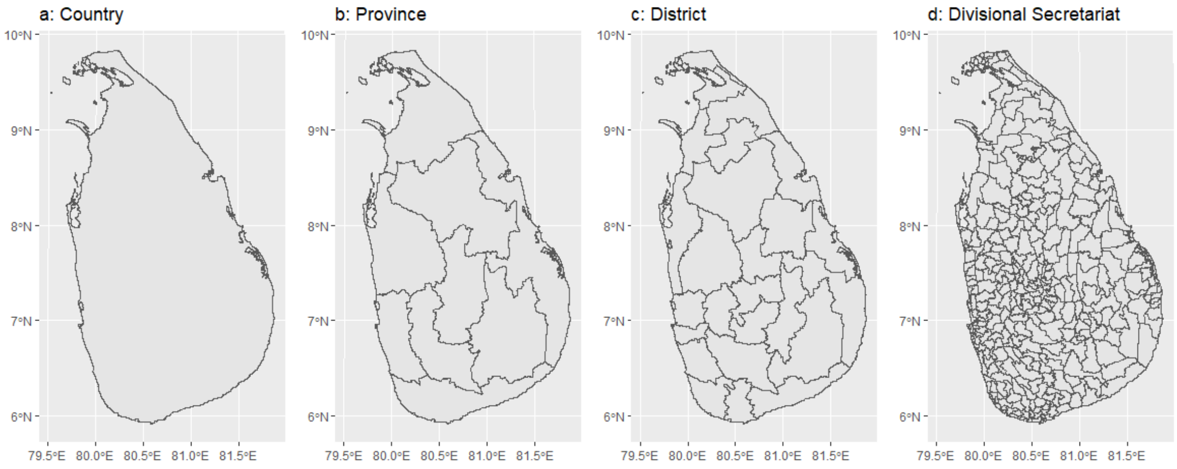

Figure 1: Maps of differnt administrative divisions in Sri Lanka

Point Map: Adding a point to the map

Suppose you are given a lcation with its longitude and latitude. For example, the Global Positioning System (GPS) coordinates of Bandaranaike International Airport, Sri Lanka is Latitude: 7.1753 Longitude: 79.8835. The goal is to plot this point along with the province boundaries. The EPSG:4326 geographic CRS system gives latitude and longitude coordinates to specify a location on the surface of the earth. Hence, before plotting first longitude and latitudes should be converted into sf object to the same coordinate reference system as the province data set. In the following code `st_as_sf` specify the current coordinate reference system for longitude and latitude. The function `st_transform` convert the current CRS to target CRS. The target CRS is the CRS associated with province which is defined as `crs = st_crs(province)` inside the `st_transform` function.

```
airport <- data.frame(lng = 79.8835, lat = 7.1753)
airport.new <- airport |>
  st_as_sf(coords = c("lng", "lat"), crs = 4326) |>
  st_transform(crs = st_crs(province))
```

```
point <- ggplot(province) +
  geom_sf() + geom_sf(data = airport.new, size = 2, col = "darkred") +
  ggtitle("A: Point Map")
```

Line Map: Plot rivers and streams in Sri Lanka

```
data("rivers")
line <- ggplot(data = sf_sl_0) +
  geom_sf(fill="#edf8b1", color="#AAAAAA") +
  geom_sf(data=rivers, colour="#253494") +
  labs(title =  "B: Line Map")
```

Polygon Map: Creating a choropleth map

A choropleth map shows different regions coloured according to the numerical values associated with each individual region.

```
polygon <- ggplot(province) +
  geom_sf(mapping = aes(fill = population)) + scale_fill_viridis() +
  ggtitle("C: Polygon Map")
```

```
(point|line|polygon)
```

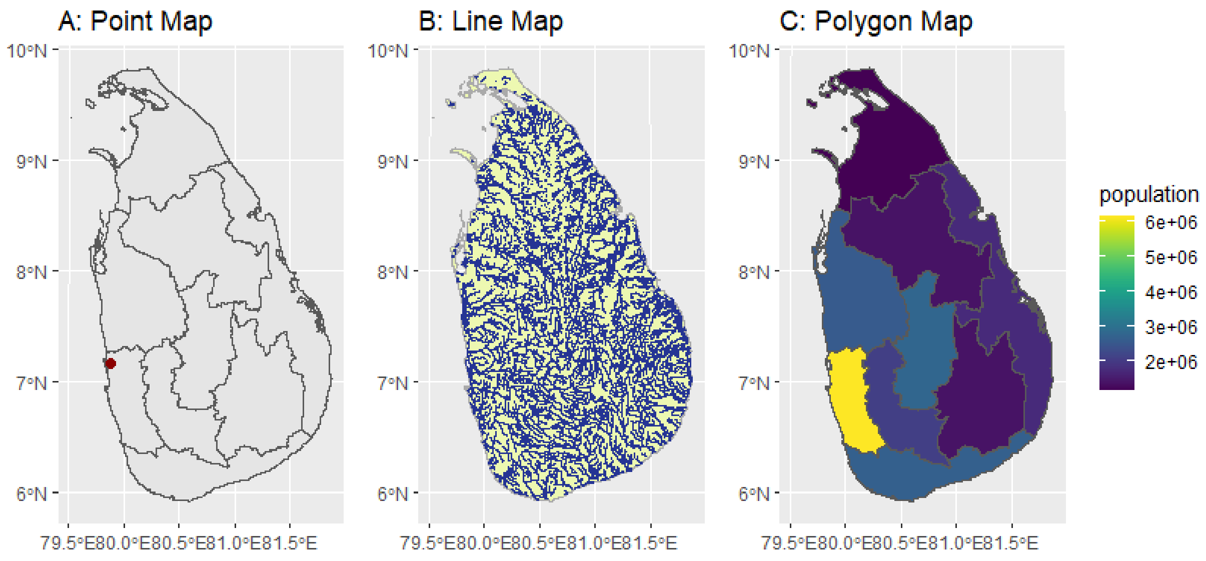

Figure 2: Illustration of point, line and polygon map

Acknowledgements

References