

Exploring the use of Shiny in R Markdown

Shinygroup
2022

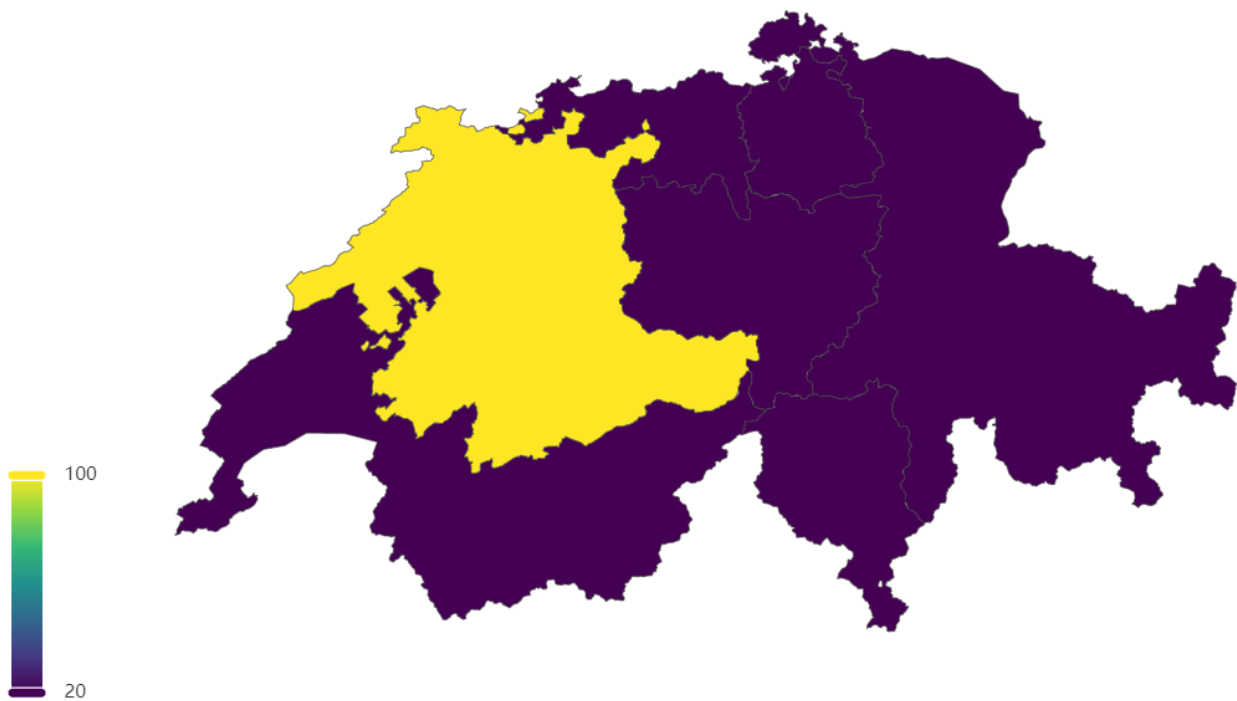
The goal of this R Markdown document is to explore the use of Shiny for making interactive documents. Two topics are discussed in this document. The first chapter is dedicated to visualize how railway bridge components deteriorate overtime. This will provide asset managers with an overview of the how their assets behave overtime and what maintenance actives are needed. The second chapter visualizes the emission of CO2. The markdown will provide a countrywise emissions data and then provide a projected amount to be removed from the atmosphere by the year 2050. Also, it can show the user the percentage contribution of their carbon removal efforts in the total carbon dioxide curbs required by the year 2050.

Multiple packages are used to maximize the interactivity of this document and bring the result of analysis at the tips of user fingers.

Chapter 1: Visualising the deterioration of railway bridges

This document considers an illustrative example railway network located in the canton of Bern, Switzerland. Different visualizations are created to assist infrastructure mangers in their intervention planning process. The figure below shows the approximate location of the canton of Bern.

In a first step, we will try to visualize the locations of the bridges in Switzerland. For this, we first read in the data pertaining to the bridges themselves, and then the data linking these bridges with their longitude and latitude.



In Switzerland asset managers use a scale of 1-5 to keep track of the condition of their asset. An example of the condition state definition are shown in the table below:

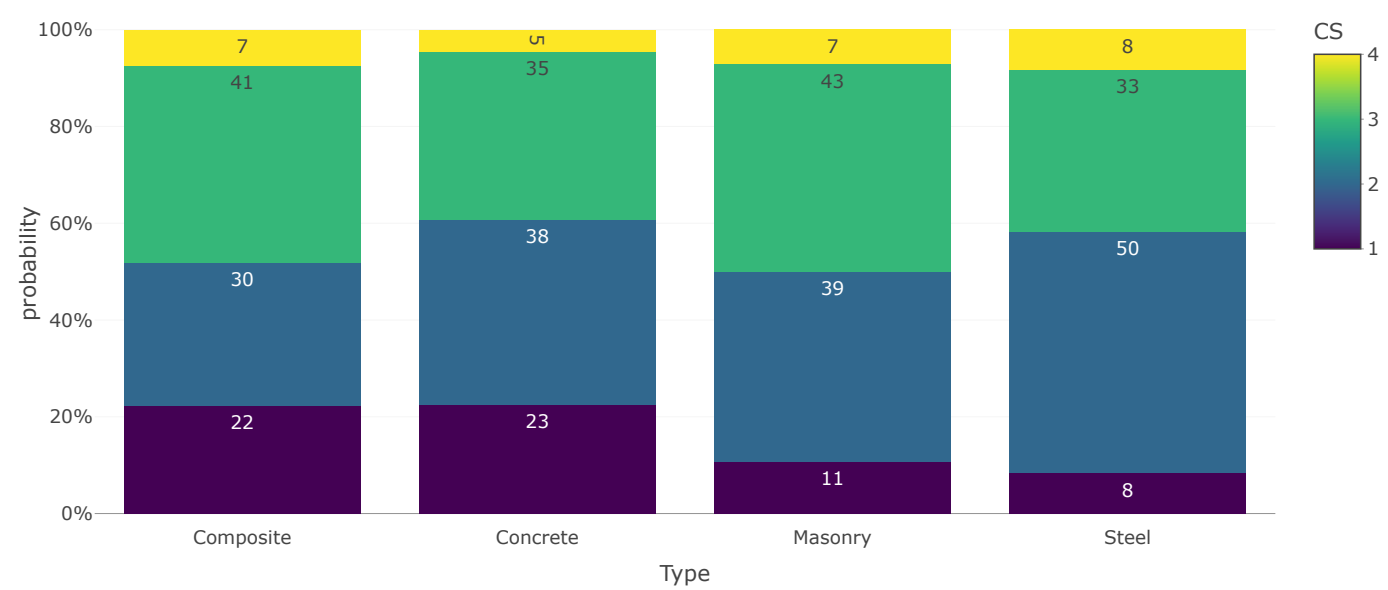
Definition of the condition states

Condition state	Condition description	Damage description
1	Good	None
2	Acceptable	Minor
3	Damaged	Significant
4	Poor	Extensive
5	Alarmin	Safety is endangered

The first insight an asset manager wants to have is knowing the current condition of the assets. Such information also provides a basis for the predicting the evolution of the condition states over time. By having an interactive document, asset managers can easily get the latest overview of the condition of their assets. For example, the latest overall condition of the bridges in the mentioned line can be observed per each bridge category using the dynamic bar chart below.

Please specify the type of the bridges

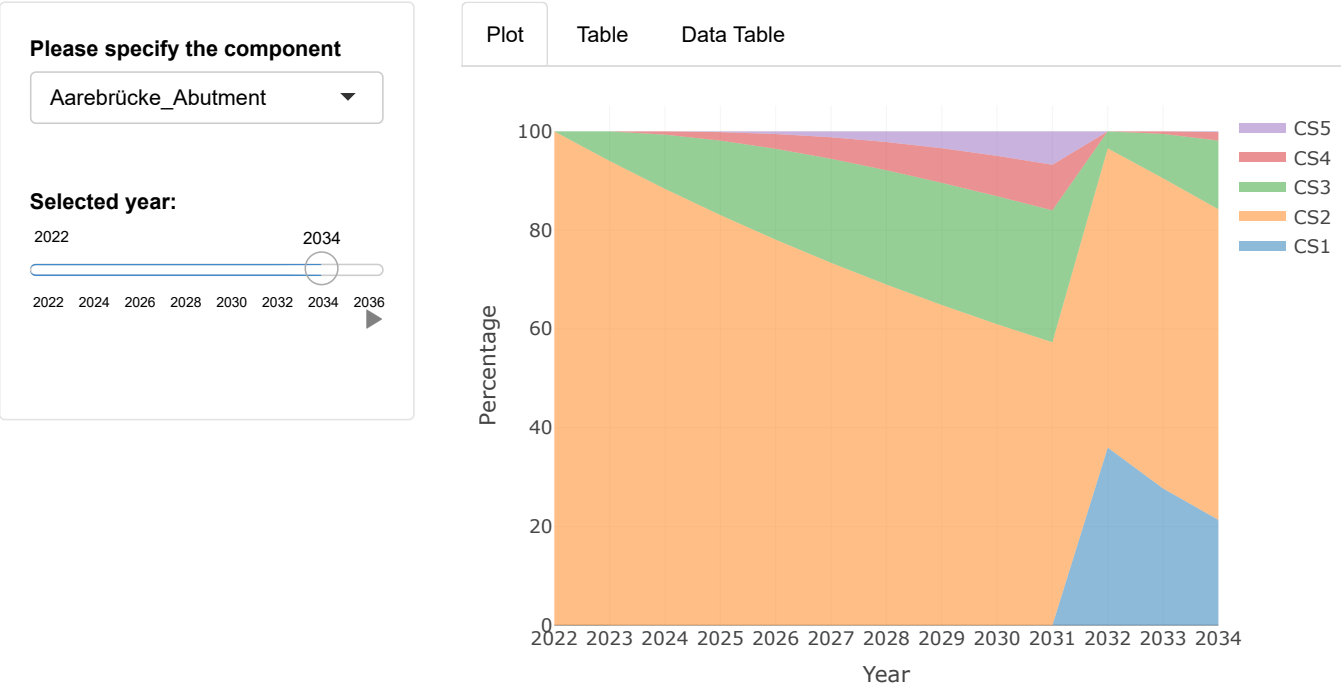
ALL



The evolution of the condition states overtime are predicted using Markov chain modelling.

The evolution of the condition states overtime can be easily seen by moving the slide.

Overview of evolution of conditon states over time



Chapter 2: Worldwide CO2 Emissions

World Map to show various countries and their emissions in the year 2016.

```

data <- read.csv(paste(location,"Data/emissions.csv", sep = "/"))

#Filling any left coordinates
data <- data[complete.cases(data),]

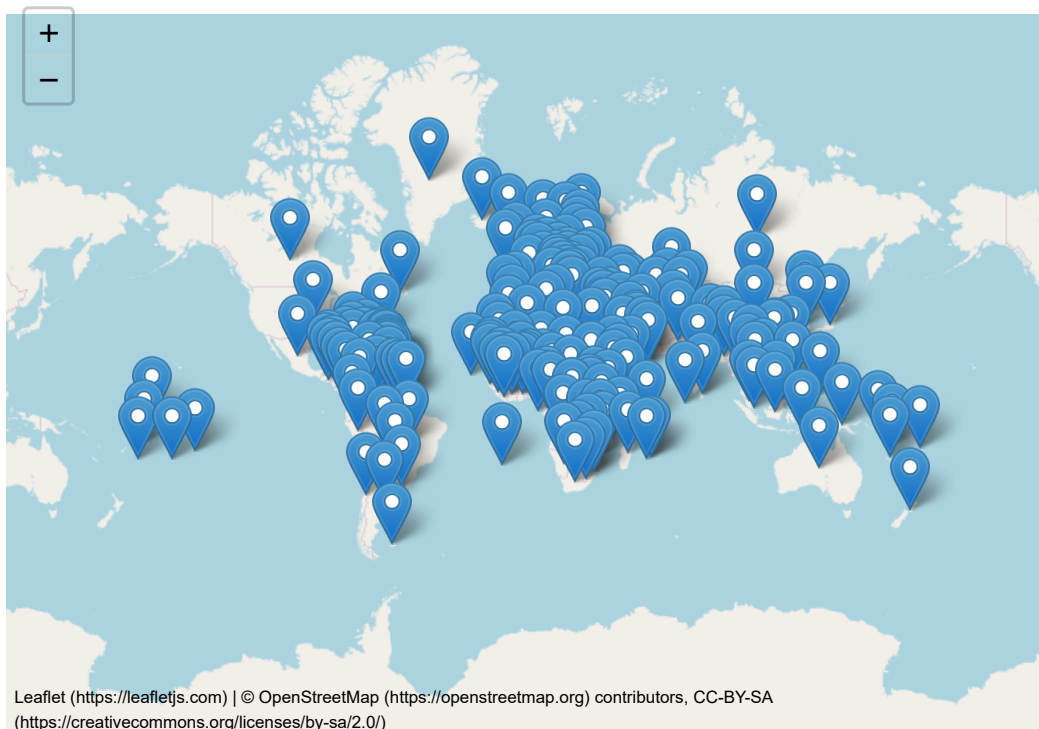
#ensuring lat and long are numbers
data$longitude <- as.numeric(data$longitude)
data$latitude <- as.numeric(data$latitude)

#creating new spatial point dataframe
data.SP <- SpatialPointsDataFrame(data[,c(7,8)], data[, -c(7,8)])

m <- leaflet() %>%
  addTiles() %>%
  addMarkers(data = data, lng= ~longitude, lat= ~latitude, popup= paste(data$Country, "<br>", data$Emissions) )

m

```

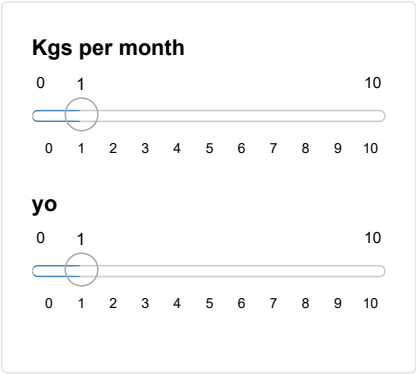


```

# @hitesh: I moved this shiny app into the app folder to keep the document more tidy! (Location/apps/emission)
shinyAppDir(
  paste(location, "apps", "emission", sep = "/"),
  options = list(
    width = "100%", height = 550
  )
)

```

CO2 Emissions Projection by 2050



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