

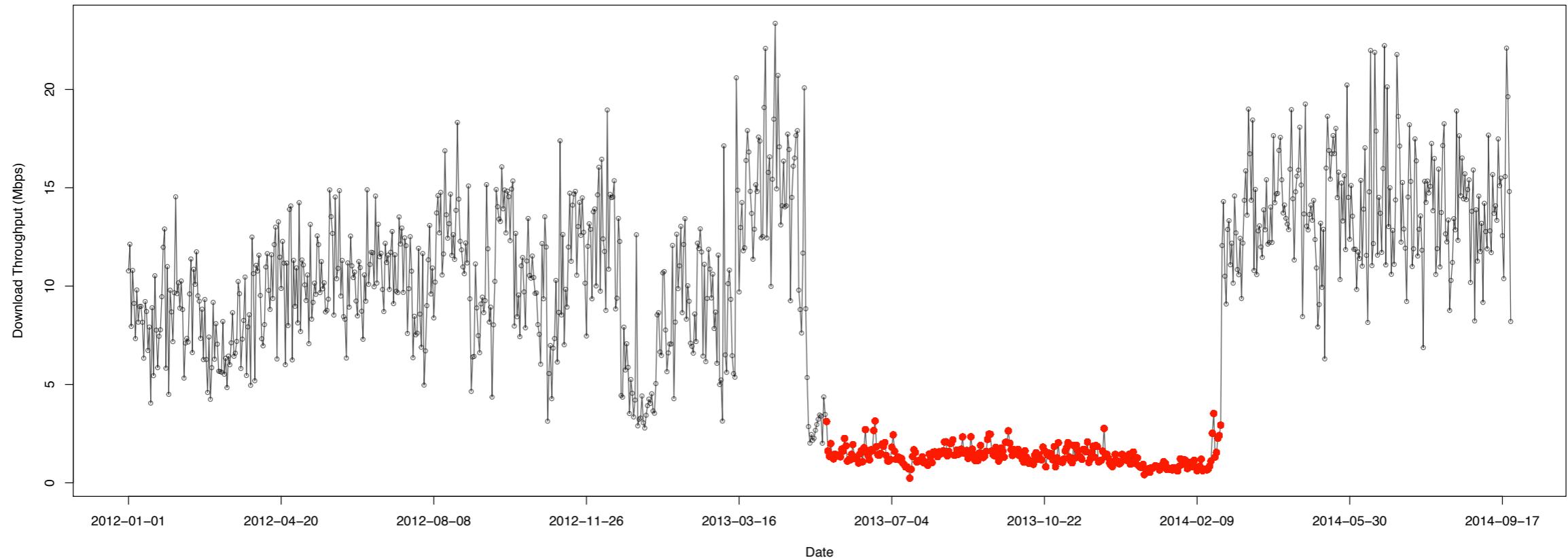
CUSUM Anomaly Detection (CAD) web application using Shiny

What is CAD?

- CAD is applicable to time series resembling a continuous random process.
- CAD searches for anomalous subsequences of a time series that show a subtle shift in the mean relative to the context of the sequence itself.
- CAD uses a sliding window technique to analyze the time series

Example

Verizon Download Throughput Using the Transit ISP Cogent in the New York City Area
Anomalies in Red



Further information on CAD:

[https://www.measurementlab.net/publications/
CUSUMAnomalyDetection.pdf](https://www.measurementlab.net/publications/CUSUMAnomalyDetection.pdf)

<https://github.com/kinga-k-farkas/CAD->

CAD Web App Using Shiny

<http://nthsurn.com/2016/07/19/cusum-anomaly-detection-app/>

My challenges

1. enable the user to upload files
2. have widgets appear and disappear based on the user's input
3. have a message on screen while the app is running in the background

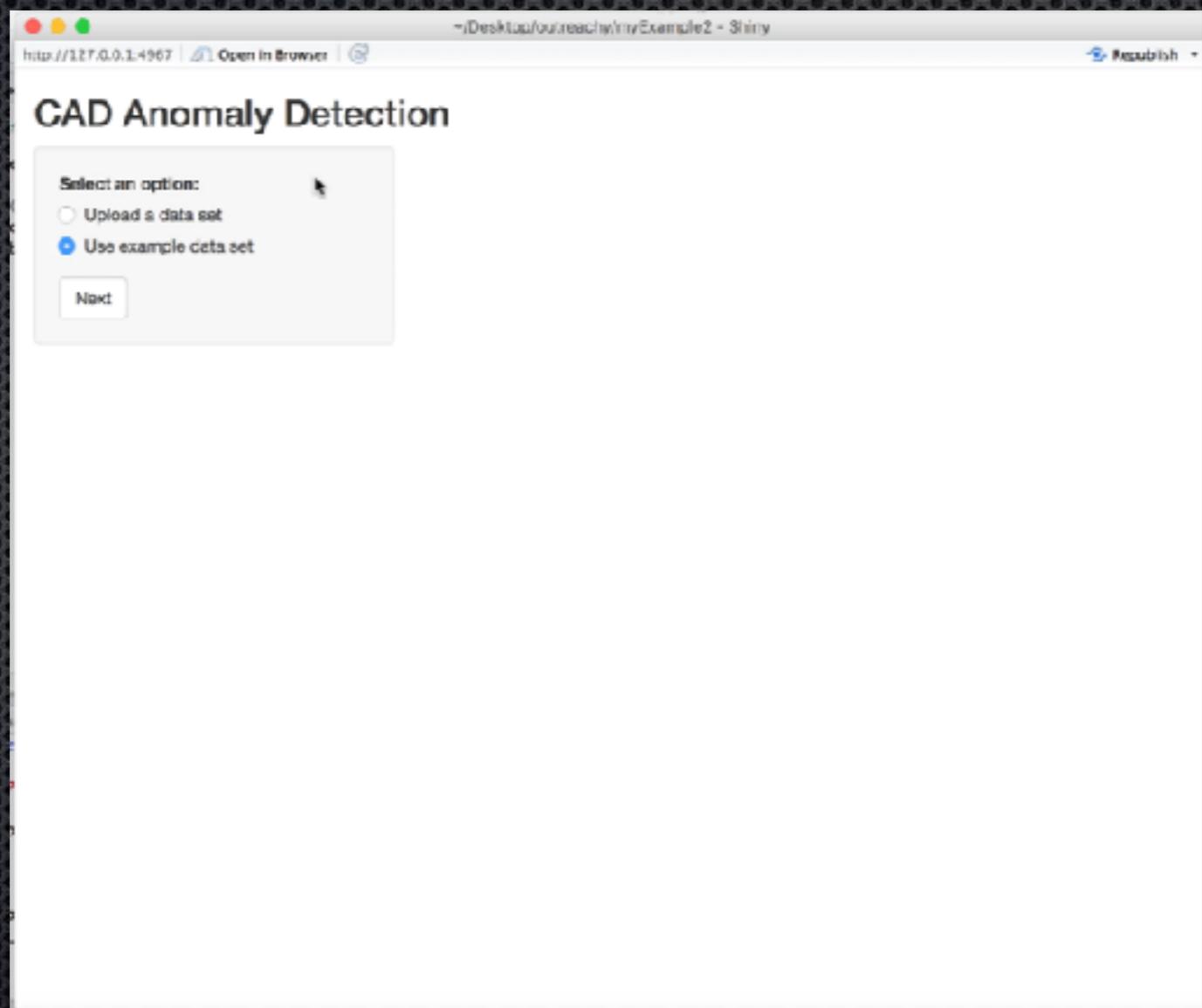
Resources:

- <https://shiny.rstudio.com/gallery/>
- <https://shiny.rstudio.com/reference/shiny/latest/>
- stackoverflow.com 😊
- google.com 😊

1. Enabling users to upload file

In the ui.R file use:

```
fileInput('inputID', 'Display label', accept=c('.csv'))
```



2. Have widgets appear and disappear based on the user's input

In the ui.R file use:

```
>conditionalPanel(condition, ...)
```

where “condition” is a Java Script expression

2. Have widgets appear and disappear based on the user's input - Continued

Example A:

```
> conditionalPanel("input.radio == 2", dateInput('date',label =  
'Date',value = Sys.Date()))
```

CAD Anomaly Detection

Select an option:
 Upload a data set
 Use example data set

Upload the csv file containing the time series
Choose File
Upload complete

Process Upload

Choose the column that is to be analyzed:
1

Choose the unit of time:
 Generic
 Days

Enter the type of anomaly:
 Upper
 Lower

Choose the parameter lambda
5 100
1 11 21 31 41 51 61 71 81 91 100

Choose the parameter delta
0 20
0 2 4 6 8 10 12 14 16 18 20

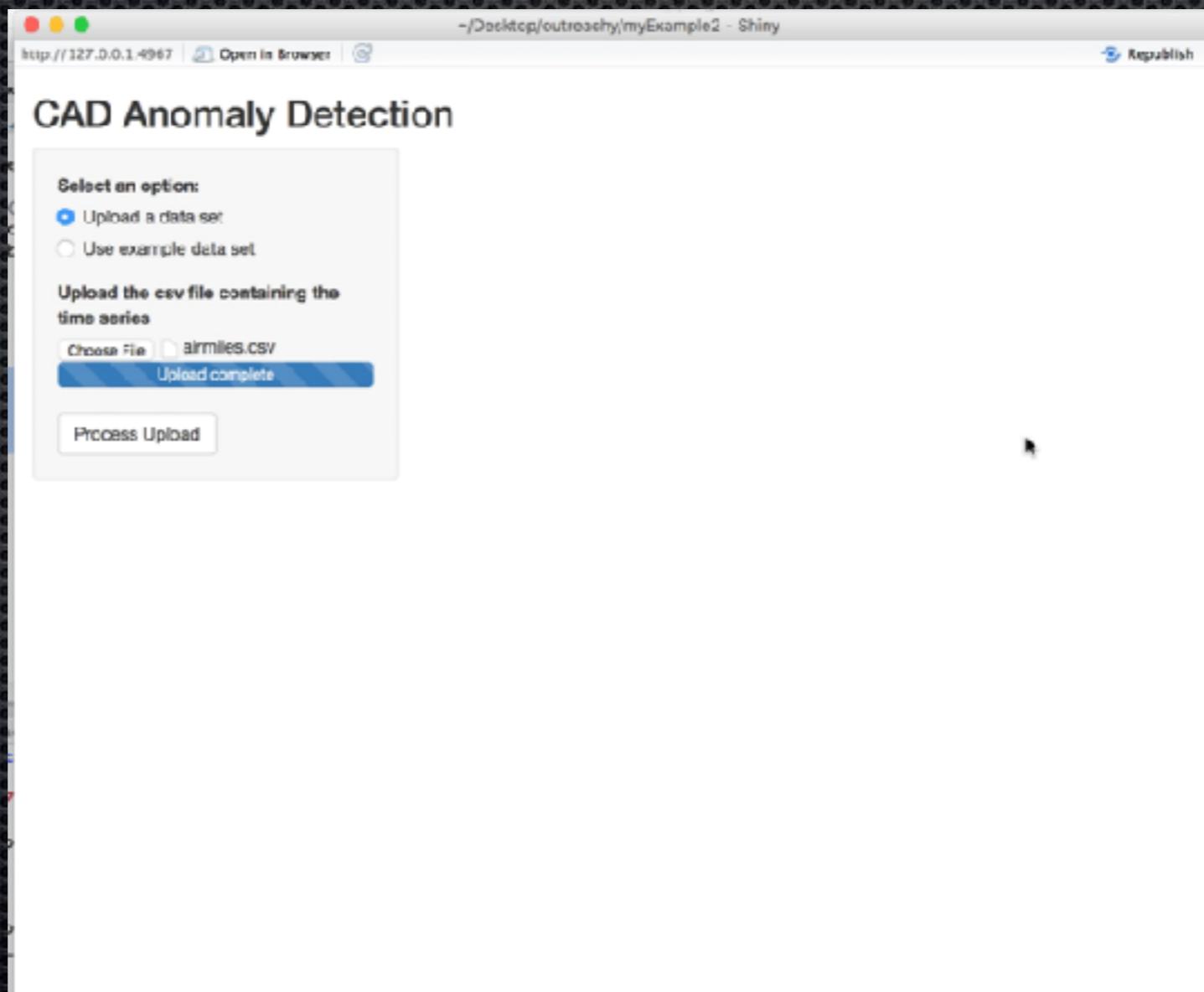
The uploaded data frame's first few rows are:
Show 5 entries
X time airmiles
1 1527 412
2 1528 480
3 1529 683
4 1940 1052
5 1941 1385

Showing 1 to 5 of 24 entries
Previous 1 2 3 4 5 Next

2. Have widgets appear and disappear based on the user's input - Continued

Example B:

```
> actionButton("enter_upload", "Process Upload"),  
  
> conditionalPanel("input.enter_upload", numericInput("col_number",  
"Choose Column:", 1))
```



3. Have a message on screen while the app is running in the background

In the Ui.R file use:

```
>conditionalPanel(condition="$
('html').hasClass('shiny-busy')",tags$div("Your
message",id="loadmessage"))
```

We are using tags and id's now...

3. Have a message on screen while the app is running in the background- continued

Example:

The screenshot shows a web-based application titled "CAD Anomaly Detection". On the left, there is a configuration sidebar with the following settings:

- Select an option:
 - Upload a data set
 - Use example data set
- Next button
- Choose the column to be analyzed:
1
- Choose the unit of time:
 - Generic
 - Days
- Enter the type of anomaly:
 - Upper
 - Lower
- Choose the parameter lambda:
A slider with a value of 5, ranging from 1 to 100.
- Choose the parameter delta:
A slider with a value of 3, ranging from 0 to 20.
- Find the Anomalies and Reset buttons

The main right panel displays the first few rows of the uploaded data frame:

The uploaded dataframe's first few rows are:

Show 5 entries Search:

synthetic_vals
48.9069404929106
49.8259155382192
47.1589699323052
47.1801365202406
52.5214102049245

Showing 1 to 5 of 701 entries

Previous 1 2 3 4 5 ...

141 Next

My Shiny Code:

<https://github.com/kinga-k-farkas/CAD-web-app>

SO SHINY!