packages

To be ready for later, please have installed:

CRAN

```
shiny, shinyjs, shinyBS, dplyr, htmltools, lubridate,
stringr, dygraphs, xts
```

Github

```
install.packages("devtools")
devtools::install_github("hadley/readr")
devtools::install_github("ijlyttle/shinychord")
```

shinychord

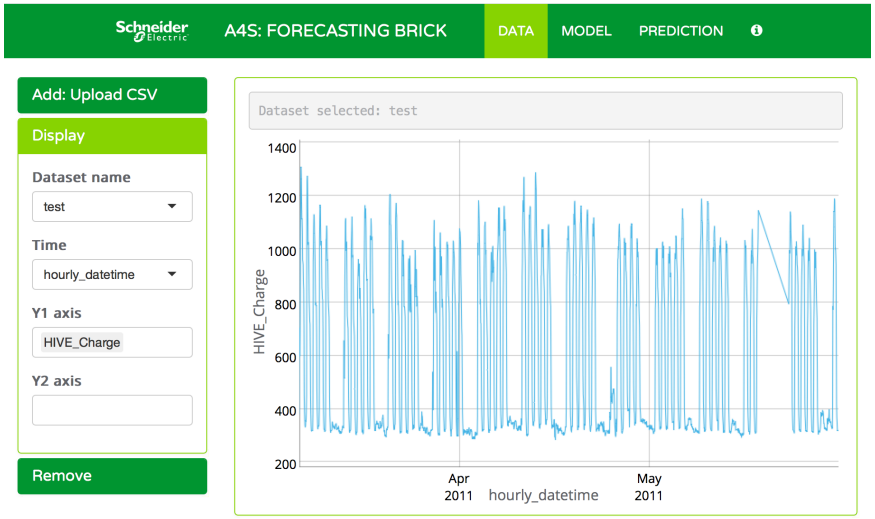
modular shiny code to reduce reactive spaghetti

Ian Lyttle

Thanks: Alex Shum, Andee Kaplan, Eric Hare, Joe Cheng, Garrett Grolemund

how this came about

- This summer, Alex Shum built a complex shiny app.
- The app (thanks to me) always needed “one more thing”.
- Each time I asked for “one more thing”, I got a look of pain.
- However, Alex would figure out how to to it, and get it done.



here's the problem

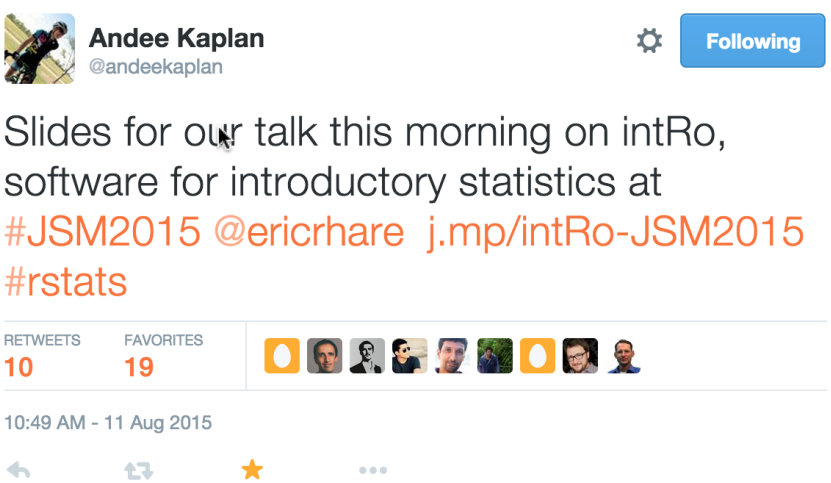
Part of your shiny app makes a dygraph from a dataframe.

The rest of your shiny app does stuff to that dataframe.

Issues:

- You have to keep track of all the id's of all the elements (including the rest of the app).
- You have to manage the server logic (including the server logic for the rest of the app).
- It's not easy to copy-and-paste the parser from this app into a different app.

inspiration!



Andee and Eric's slides:
http://j.mp/intRo-JSM2015

my first response:
https://gist.github.com/ijlyttle/1237cd57d55a40bb47a1

a solution

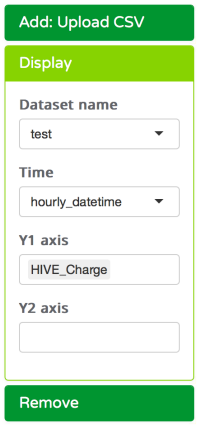
Let's borrow some ideas from the design pattern:

model-view-controller

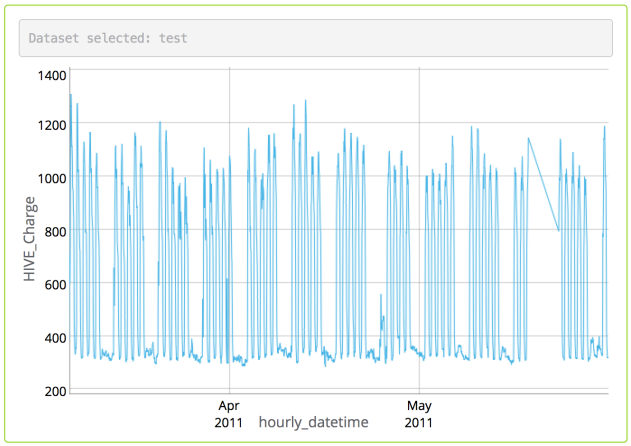
In shiny, these correspond:

- ui inputs - **controller**
- ui outputs - **view**
- server() - **model**

controller



view



model

```
# reactives
rct_data <- reactive({

  shiny::validate(
    shiny::need(rctval_data[[item_data]], "No data")
  )

  rctval_data[[item_data]]
})

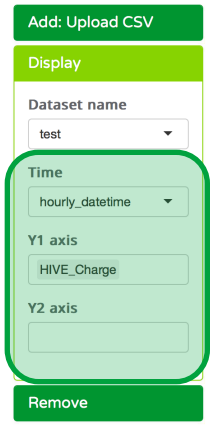
rct_var_time <- reactive({
  df_names_inherits(rct_data(), c("POSIXct"))
})

rct_var_num <- reactive({
  df_names_inherits(rct_data(), c("numeric", "integer"))
})
```

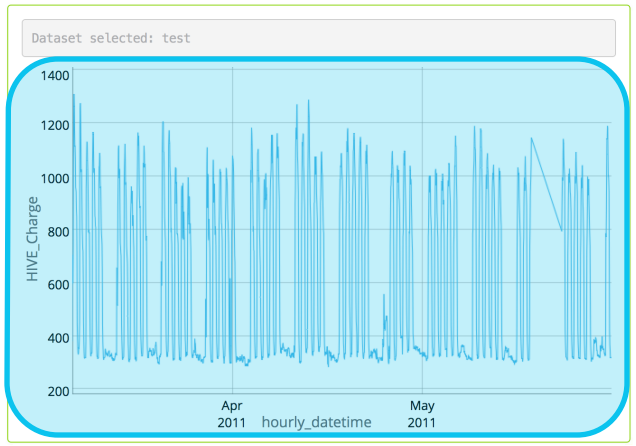
shinychord

- a way to produce a coherent set of model, view, and controller elements
- so, what is a coherent set? (this is the question)
- in this case, a dygraph
- using a shinychord, a dygraph can be integrated, just a little more easily, into a shiny app

controller



view



model

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})
```

how to build a shinychord?

Build a function that:

- takes at least one argument:
  - `id`
- returns a list with three items:
  - `ui_controller`
  - `ui_view`
  - `server_model`
- item names are just “convention”, not strictly mandatory

```
template <- function(id){

  ui_controller <- shiny::tagList()

  ui_view <- shiny::tagList()

  server_model <- function(
    input, output, session
  ){

  }

  list(
    ui_controller = ui_controller,
    ui_view = ui_view,
    server_model = server_model
  )
}
```

what's with the `id`?

You know this:

- ui-element id's must be unique
- non-unique id's -> 😕😠😳

You give each shinychord a unique id

The shinychord function manages the ui-element id's

shinychords << # ui-elements

Easier for you to manage

```
ch_dygraph <- function(id){

  id_name <- function(...){
    paste(list(id, ...), collapse = "_")
  }

  name_out <- function(x){
    paste(x, ".out.", sep = "_")
  }

  ui_controller <- shiny::tagList()

  # time axis
  id_controller_time <-
    id_name("controller", "time")

  ui_controller$time <-
    shiny::uiOutput(
      name_out(id_controller_time)
    )

}
```

ui_controller?

In this case, the controller elements are shiny **uiOutputs**

These are managed by the **server_model()** function

Recall that we use the **id_name()** and **name_out()** functions to manage the **id**s

```
ch_dygraph <- function(id){

  ui_controller <- shiny::tagList()

  # time axis
  id_controller_time <-
    id_name("controller", "time")
  ui_controller$time <-
    shiny::uiOutput(
      name_out(id_controller_time)
    )

  # Y1 axis
  id_controller_y1 <-
    id_name("controller", "y1")
  ui_controller$y1 <-
    shiny::uiOutput(
      name_out(id_controller_y1)
    )

  # Y2 axis
  id_controller_y2 <-
    id_name("controller", "y2")
  ui_controller$y2 <-
    shiny::uiOutput(
      name_out(id_controller_y2)
    )
}
```

ui_view?

This one is simpler

We have only to show the dygraph

```
ch_dygraph <- function(id){

  ui_view <- shiny::tagList()

  # dygraph
  id_view_dygraph <-
    id_name("view", "dygraph")
  ui_view$dygraph <-
    dygraphs::dygraphOutput(id_view_dygraph)

}
```

server_model (!)

`server_model()` function has mandatory arguments:

- `input, output, session`

Additional arguments for the dygraph server function:

- `rctval_data[[item_data]]` input dataframe
- `rctval_dyopt[[item_dyopt]]` list of dygraph options

```
ch_dygraph <- function(id){

   server_model <- function(
    input, output, session,
    rctval_data, item_data,
    rctval_dyopt = rctval_data, item_dyopt
  ){

  }

}
```

```
rctval_data <-
  shiny::reactiveValues(
    df = mtcars
  )

item_data <- "df"
```

Not reactive: `rctval_data, item_data`

Reactive: `rctval_data[[item_data]]`

server_model

`id_controller_time` is defined in the enclosing environment

reactive logic for *this* dygraph is encapsulated in *this* `server_model()` function

```
server_model <- function(
    input, output, session,
    rctval_data, item_data,
    rctval_dyopt = rctval_data, item_dyopt
  ){

  rct_var_time <- reactive({
    df_names_inherits(
      rct_data(), c("POSIXct")
    )
  })

  selection <- reactiveValues(
    time = NULL
  )

  shiny::observe({
    selection$time <-
      input[[id_controller_time]]
  })

  output[[name_out(id_controller_time)]] <-
    renderUI(
      selectizeInput(
        inputId = id_controller_time,
        label = "Time",
        choices = rct_var_time(),
        selected = selection$time
      )
    )
}
```

your turn

using shinychords

Start with just a shell of an app:

- create a new R file
- put this code in there
- run to make sure it works

```
library("shiny")
library("shinychord")

shinyApp(

  ui = fluidPage(
    titlePanel("shell"),
    sidebarLayout(
      sidebarPanel(),
      mainPanel()
    )
  ),

  server = function(
    input, output, session
  ){

  }
)
```

dygraph shinychord

we create the shinychord outside the app

we put `ui_controller` and `ui_view` into ui

we create reactive values
(`wx_ames` is part of shinychord package)

`server_model()` called from `server()`

reactive values:
- are called by-reference (like pointers)
- act as function inputs and/or outputs

```
library("shiny")
library("shinychord")

chord_dygraph <- ch_dygraph(id = "dyg")

shinyApp(

  ui = fluidPage(
    titlePanel("dygraph demo"),
    sidebarLayout(
      sidebarPanel(chord_dygraph$ui_controller),
      mainPanel(chord_dygraph$ui_view)
    )
  ),

  server = function(input, output, session){

    rctval <- reactiveValues(
      data = wx_ames,
      dyopt = list(useDataTimezone = TRUE)
    )

    chord_dygraph$server_model(
      input, output, session,
      rctval_data = rctval, item_data = "data",
      item_dyopt = "dyopt"
    )
  }
)
```

readr + dygraph shinychord

add new packages (should not have to do this, looking for bug)

we add the readr shinychord

we add the ui elements

server function shown on next slide

```
library("shiny")
library("shinychord")
library("dplyr")
library("shinyjs")
library("shinyBS")

chord_readr <- ch_read_delim(id = "readr")
chord_dygraph <- ch_dygraph(id = "dyg")

shinyApp(

  ui = fluidPage(
    titlePanel("readr & dygraph demo"),
    sidebarLayout(
      sidebarPanel(
        chord_readr$ui_controller,
        chord_dygraph$ui_controller
      ),
      mainPanel(
        chord_readr$ui_view,
        chord_dygraph$ui_view
      )
    )
  ),

  server = function(input, output, session){
    ...
  }
)
```

readr + dygraph shinychord

`rctval$data` set by readr shinychord

`rctval_data[[item_data]]`
- acts as an **output** for this function
- will be placed in `rctval[["data"]]`

`rctval_data[[item_data]]`
- acts as an **input** for this function
- will be taken from `rctval[["data"]]`

```
server = function(input, output, session){

  rctval <- reactiveValues(
    data = NULL,
    dyopt = list(useDataTimezone = TRUE)
  )

  chord_readr$server_model(
    input, output, session,
    rctval_data = rctval, item_data = "data"
  )

  chord_dygraph$server_model(
    input, output, session,
    rctval_data = rctval, item_data = "data",
    item_dyopt = "dyopt"
  )

}
```

You may test your app using the csv file found at

https://raw.githubusercontent.com/ijlyttle/shinychord/master/inst/extdata/wx_ames.csv

some sort of summary

- You don't need the shinychord package to write your own.
- It's more of an idea, an idea that can be improved-upon.

- It has allowed us to (confidently) build shiny apps an order-of-magnitude more complex than before.
- How:
  - letting us focus on the parts that are exposed
  - hiding the messiness

reactive ravioli