



R Scripts to Shiny

EdinbR User Group
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This talk will contain:

- the motivation and journey towards using Shiny
- SQA examination data for one Scottish secondary school
- pdf, Rmarkdown, batch rendering, networkD3, ggplotly, Shiny, R Studio Connect

R Newbie to R Novice?

- R user since January 2017
- Teaching in Secondary Schools since 1993
- Previous EdinbR Talks:
 - Breakdown Plots (June 2017)
 - Postcodes on Maps (Sep 2017)
 - Sankey Plots (Nov 2017)
 - Rmarkdown and UCAS (Apr 2018)

RSS 'Significance' Library Loan



Borrow, Read and Bring Back Next Time!

Sources of Code, Help & Inspiration

<https://shiny.rstudio.com/tutorial/>

Shiny Tutorial Video



THE UNIVERSITY
of EDINBURGH

Kerr Fry Award



Jumping Rivers Consultants



stackoverflow

R Packages Used

tidyverse

rmarkdown::render

networkD3

knitr

shiny

shinydashboard

SQA Examination Data

ACADEMIC_YEAR	EXAM_CODE	COURSE_DESCRIPTOR	EXAM_LEVEL	ESTIMATE	RESULT_GRADE
2018	C80775	Biology	75	1	1
2018	C81375	Chemistry	75	2	1
2018	C82175	Drama	75	1	1
2018	C82475	English	75	1	1
2018	C83375	Geography	75	1	1
2018	C84775	Mathematics	75	1	1
2018	C85775	Physics	75	2	2
2018	C86975	Spanish	75	1	1
2018	C72476	English	76	2	1
2018	C74076	Human Biology	76	3	2
2018	C74776	Mathematics	76	5	3
2018	C75776	Physics	76	4	3
2018	C76976	Spanish	76	3	2
2018	C80475	Art and Design	75	4	6
2018	C81675	Computing Science	75	4	2
2018	C82375	Engineering Science	75	4	2
2018	C82475	English	75	3	2

1 = A band 1 = 85%-100%

2 = A band 2 = 70%-85%

3 = B band 3 = 65%-70%

4 = B band 4 = 60%-65%

5 = C band 5 = 55%-60%

6 = C band 6 = 50%-55%

7 = D band 7 = 45%-50%

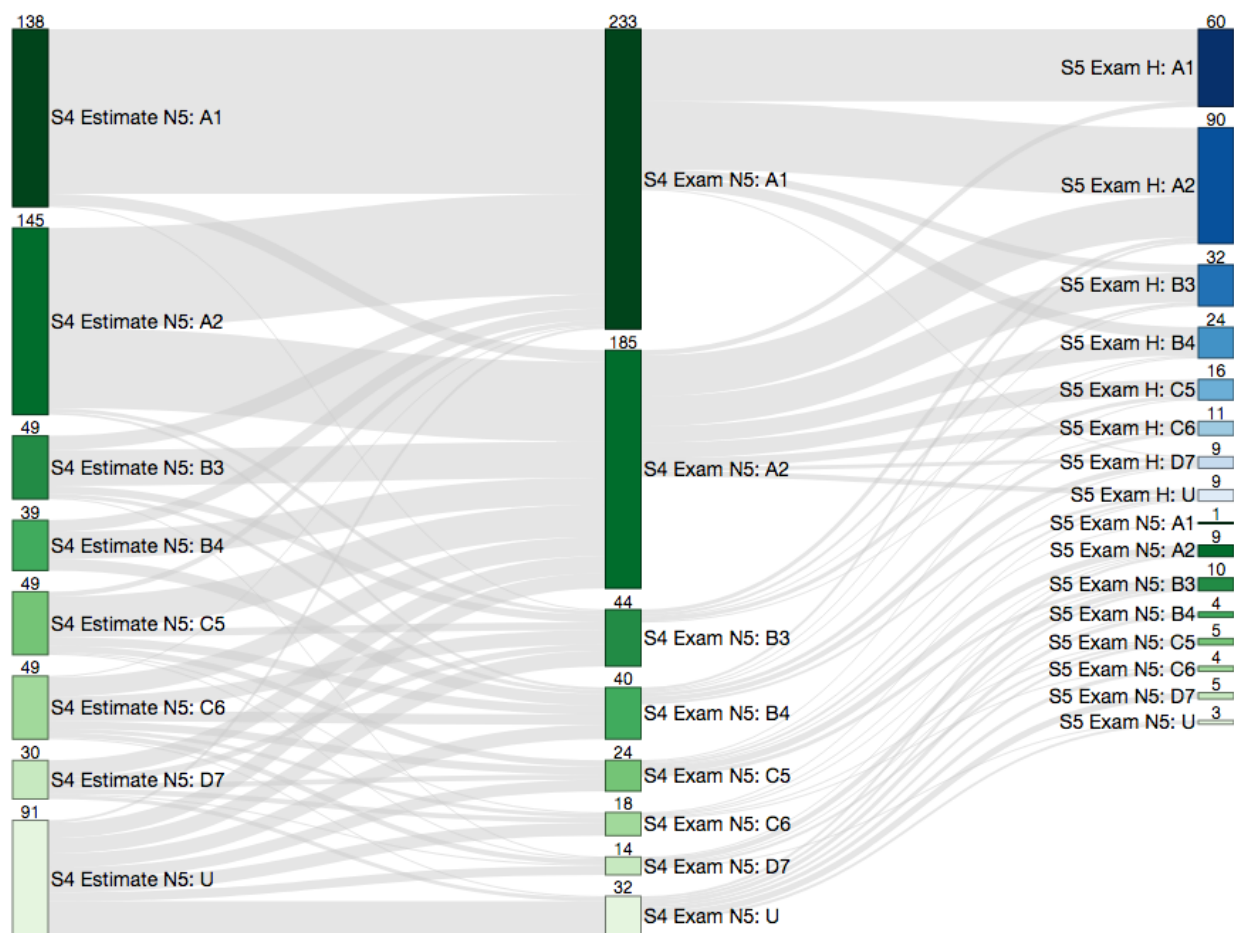
9 = Ungraded

SQA Examination Qualifications

<u>Level</u>	<u>Name</u>	<u>Description</u>
75	National 5	First sat by S4 pupils, aged 15/16 yrs Comparable to GCSEs
76	Higher	First sat by S5 pupils, aged 16/17 yrs Comparable to AS levels
77	Advanced Higher	First sat by S6 pupils, aged 17/18 yrs Comparable to A-Levels

Visualisation from R Scripts

Mathematics: S4 Estimate > S4 Exam > S5 Exam for all pupils



Exporting from R Scripts

```
vplayout <- function(x, y) viewport(layout.pos.row = x, layout.pos.col = y)
```

```
pdf(file= pdf_filename, paper="a4",width=8, height=11, onefile=TRUE)  
grid.newpage()  
rows <- 1  
cols <- 1  
pushViewport(viewport(layout = grid.layout(rows, cols)))  
  
print(summary_graph, vp = vplayout(1,1))  
  
dev.off()
```

Generating Rmarkdown Reports

R script loop to render Rmarkdown html file from a Template.rmd

```
for (subject in subjects) {  
  df <- joined_df %>% filter(COURSE_DESCRIPTION == subject)  
  rmarkdown::render(paste0(wd, '/Progression Riverplots Template.Rmd'),  
                    output_file = paste0('plots_for_', subject, '.html'),  
                    output_dir = paste0(wd, '/html'),  
                    params = list(course = subject,  
                                  fdf = df))  
}
```

Template.rmd file's YAML header, with parameters being passed over

```
---  
title:  
output: html_document  
params:  
  course: subject  
  fdf: df  
---
```

Rmarkdown html Individual Reports

-  plots_for_Accounting.html
-  plots_for_Administration and IT.html
-  plots_for_Art and Design (Design).html
-  plots_for_Art and Design (Expressive).html
-  plots_for_Art and Design.html
-  plots_for_Biology.html
-  plots_for_Business Management.html
-  plots_for_Chemistry.html
-  plots_for_Classical Studies.html
-  plots_for_Computing Science.html
-  plots_for_Design and Manufacture.html
-  plots_for_Drama.html
-  plots_for_Economics.html
-  plots_for_Engineering Science.html
-  plots_for_English.html
-  plots_for_Fashion and Textile Technology.html
-  plots_for_French.html
-  plots_for_Geography.html
-  plots_for_German.html
-  plots_for_Graphic Communication.html
-  plots_for_Health and Food Technology.html

Showcase one of them!

Rmarkdown Limitations

- Not easy to anticipate what other Subject Heads wanted to see
- Adaptive control of graphs' dimensions not possible
- Limit on the number of layers of Tabs – maximum of 3 as each tab needs 2 of the 6 available header styles.
- Too many combinations of viewing variables [exam year, cohort, exam level, gender, etc]
- Filesize of html output was rapidly increasing – each already in excess of 7MB.

We Need Shiny!

- The user controls what they want to see
- Graphs can grow and shrink
- No limit on the number of Tabs (or apps)
- Every variable is now a button/checkbox/slider
- .csv file 9.5MB in size, app.R only 6KB in size

[Showcase file 02](#)

[Showcase file 03 with Shiny Dashboard](#)

[Showcase file 04 with Manual Facet Heights](#)

[Showcase file 05 uses observeEvent for Facet Heights](#)

Fine Tuning

- fluidPage() TABs may re-render output when switching
- fluidPage() to dashboardPage() for better interface
- Nicer error messages when no data....

```
# test for no data. Only proceed if sufficient rows in data frame
if(nrow(rv$df3()) == 0) {
  ggplot(data = NULL) +
    theme_classic()+
    theme(plot.title = element_text(color = "blue"),
          text = element_text(size=14)) +
    labs(title = "Sorry, but no data is available for the selected options.")
}
else {

  ggplot(data = rv$df3(),
        mapping = aes(x = cx,
                      fill = get(input$legend),
```


We Need Plotly!

- Hover over points to get a Pupil's Name
- Current Plotly issue with geom_dotplot.

Bug reported by Julia Silge on 7 Mar 2018.

<https://github.com/ropensci/plotly/issues/1213>

....so I re-coded the graph to use geom_point()

- Current Plotly issue with facets. No solution yet!

Showcase file 06 with Plotly

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Documentation

 n.hopley


All Content

Name	Type	Author	Updated
 Exam_Component_Scores	Application	n.hopley	Yesterday at 8:24 AM
 Exam_Relative_Ratings	Application	n.hopley	Yesterday at 8:35 AM
 Exam_GWC_Tariff	Application	n.hopley	Yesterday at 8:26 AM
 Exam_Results	Application	n.hopley	Yesterday at 8:36 AM
 Exam_Progressions	Application	n.hopley	Yesterday at 8:27 AM
 Trial_Demo	Application	n.hopley	07/27/2018

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Content / Exam_Results

GWCSQA Exam Analysis by Subject Teaching

Subject:
Select Subject ▼

Exam Year:
☐ 2015
☐ 2016
☐ 2017
☒ 2018

Exam Level:
☒ N5
☐ H
☐ AH

Exam or Estimate:
☒ Exam
☐ Estimate

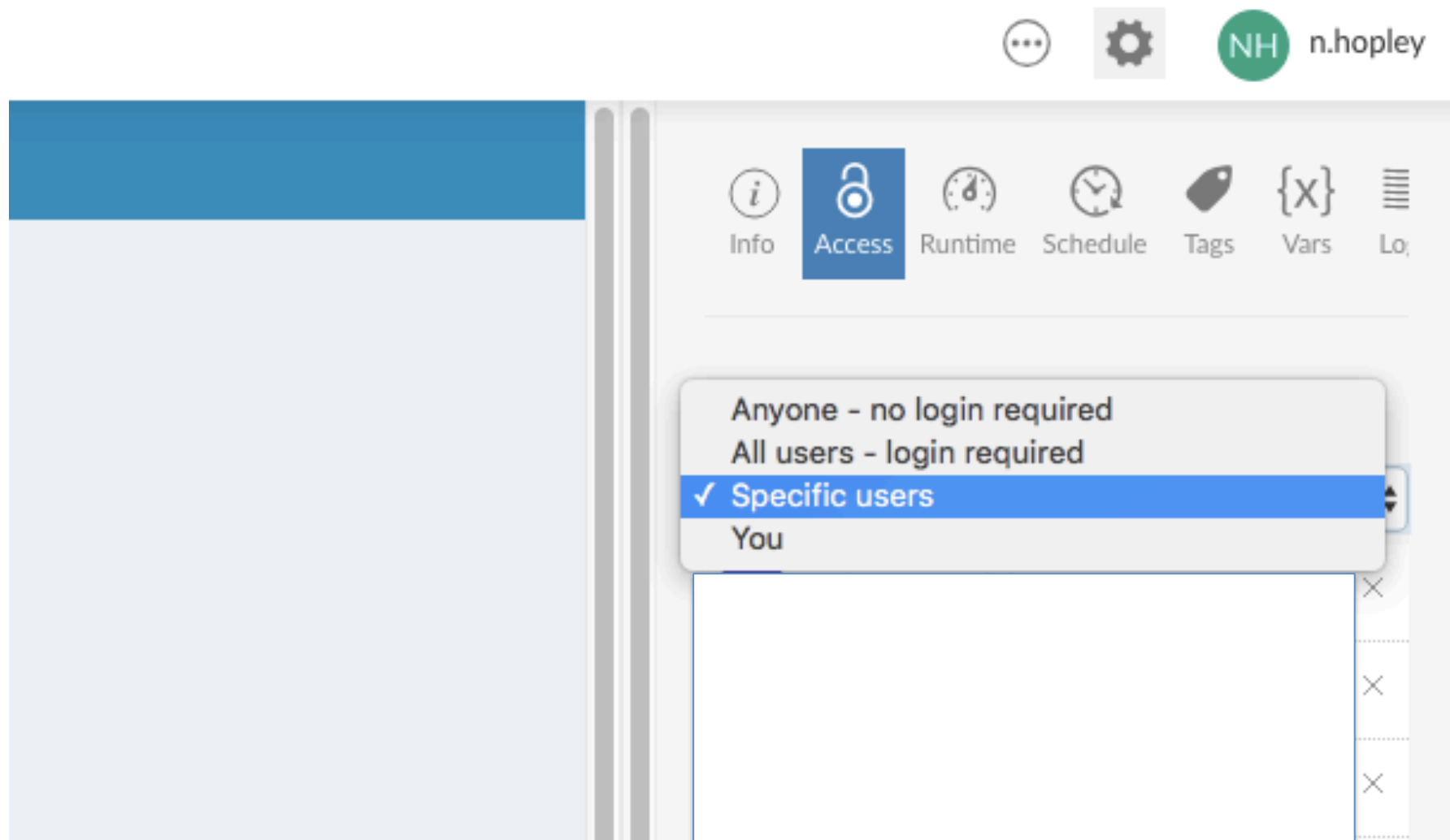
Legend Focus:
☒ Gender
☐ Yeargroup

Info Access Runtime Schedule Tags Vars Lo

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**Do we have time
for questions?**



Next Steps!

- Formatting plotly hover text output when it's a large block of textor have it show elsewhere on the page?
- Tooltips for instructions, instead of a TAB with text
- Shiny app extracts data directly using ODBC
- Git and GitHub version control within R Studio