

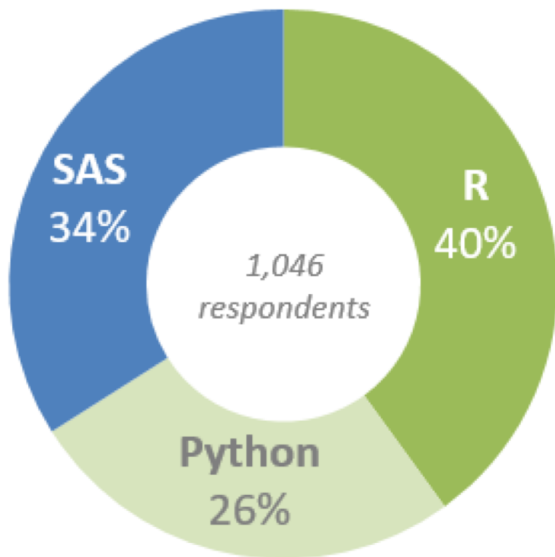
Efficacy endpoint visualization of investigational products for cancer patients using R Shiny

Mukul K Mittal, PhD

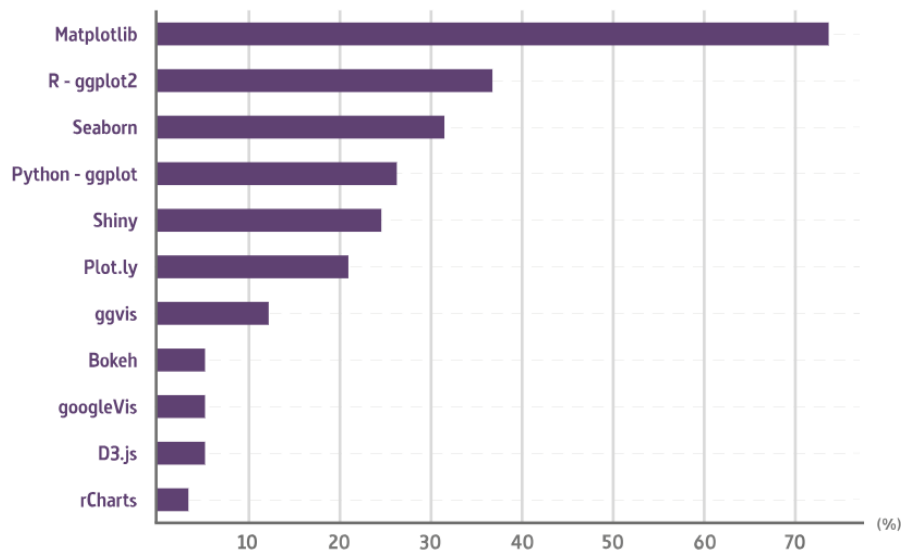
R/SHINY

- R is a open-source programming language that first appeared in 1993 and has gained recent popularity by analytics professionals and data scientists.

Programming language usage



Visualization library ranking



www.burtchworks.com/2017/06/19

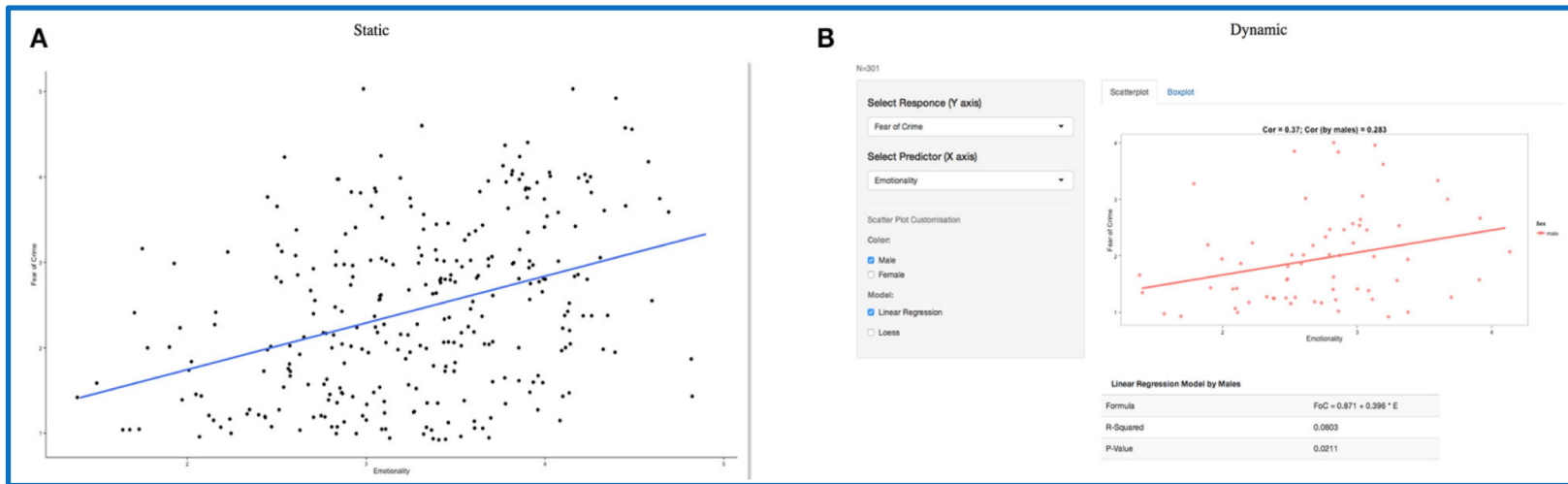
www.keedio.org

R/SHINY

- R has great packages (libraries) for statistics and graphs/plots e.g. Mediana, compareGroups, ggplot2, ggvis and Plotly.
- **Shiny** is a R package to make interactive web apps directly from R.
- **Shiny** combines the computational power of R with the interactivity of the modern web.
- **Shiny** helps you turn your analyses into interactive web applications without requiring HTML, CSS, or JavaScript knowledge.
- Once developed Shiny app can be deployed on Shinyapps.io and it's available to anyone.

STATIC VS DYNAMIC VISUALIZATION

- Figures are part of any submission to a regulatory authority in clinical trials, however, these usually do not include interactive clinical data visualizations.
- Interactive data visualization is a powerful tool to investigate data and share detailed insights in an efficient way. It allows slicing and drilling through the data and interactively changing the level of detail you want to see.



STATIC VS DYNAMIC VISUALIZATION

- It renders many options to subset the data.
- Interactive clinical data visualizations can add tremendous value during the conduct of a clinical trial and interactive clinical data visualizations are also useful for domains that are often not presented graphically, e.g. adverse events or disposition data.
- For endpoint visualization using these advantages, we used R Shiny to make: (1) **Bubble plot** to visualize change in tumor size over time and (2) **Waterfall plot** to depict result of a drug response .

CHANGE IN TUMOR SIZE: BUBBLE PLOT

~/R/bubblewater011719 - Shiny

http://127.0.0.1:3570

Open in Browser



Publish

End point Visualization

Color by:

Overall_response

Shape by:

Primary_diagnosis

Subsetting

Cohort type(s):

☒ Cohort 1

☐ Cohort 2

☐ Cohort 3

☐ Cohort 4

Lesion type(s)

☐ NEW

☐ NON-TARGET

☒ TARGET

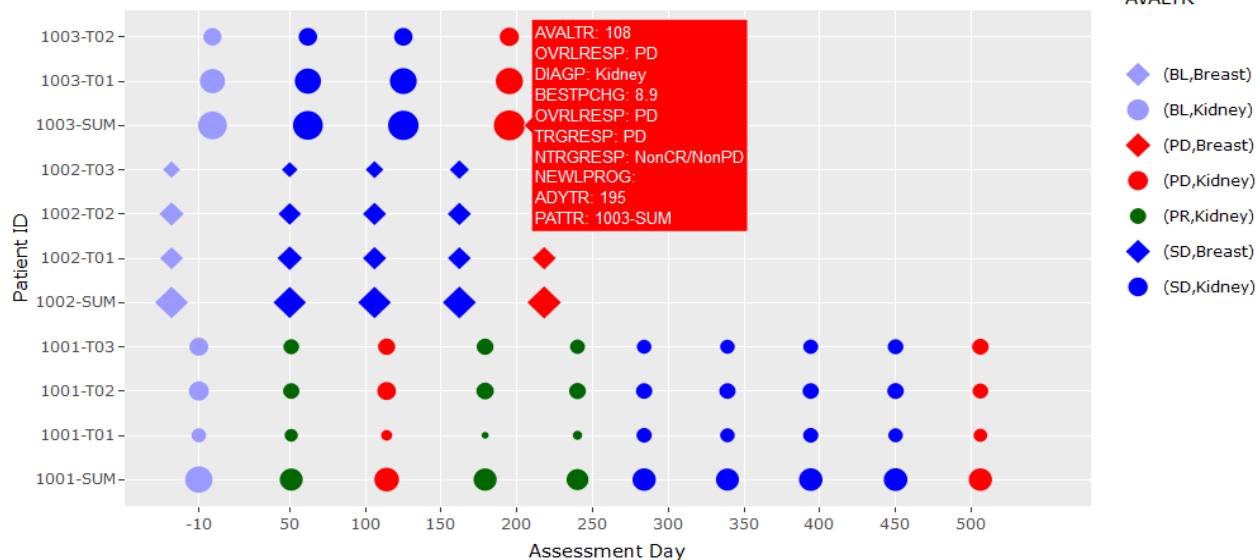
☒ Show data table

Bubble plot

Waterfall plot

Dataset

Change in tumor size

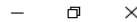


WATERFALL PLOT

~/R/bubblewater011719 - Shiny

http://127.0.0.1:3570

Open in Browser



Publish

End point Visualization

Color by:

Overall_response

Shape by:

Primary_diagnosis

Subsetting

Cohort type(s):

☒ Cohort 1

☒ Cohort 2

☒ Cohort 3

☒ Cohort 4

Lesion type(s)

☐ NEW

☐ NON-TARGET

☒ TARGET

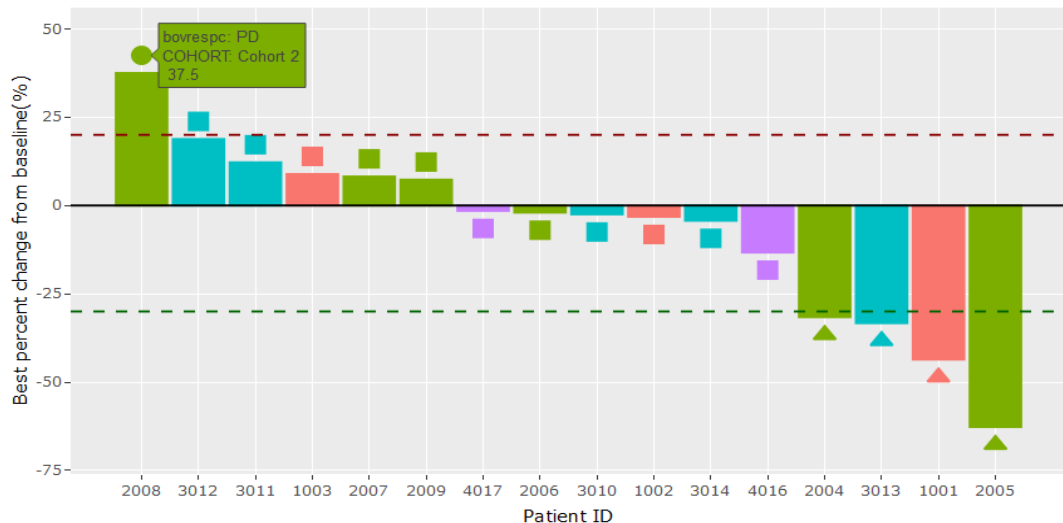
☒ Show data table

Bubble plot

Waterfall plot

Dataset

Waterfall plot for best percent change from baseline in tumor size



GETTING THE DATA

End point Visualization

Color by:
Overall_response

Shape by:
Primary_diagnosis

Subsetting

Cohort type(s):
☒ Cohort 1
☐ Cohort 2
☐ Cohort 3
☐ Cohort 4

Lesion type(s)
☐ NEW
☐ NON-TARGET
☒ TARGET

☒ Show data table

Bubble plot Waterfall plot Dataset

Copy CSV Excel PDF Print

Search:

patid	ADYTR	AVALTR	COHORT	DIAGP	TRGRPID	TRLINKID	BOVRESP	NEWLPROG	NTRGRES	OVLRESP	TRGRES	trtdur	PATTR
1001	-10	78	Cohort 1	Kidney	TARGET	SUM	BL		BL	BL	BL		1001-SUM
1001	51	50	Cohort 1	Kidney	TARGET	SUM	PR		NonCR/NonPD	PR	PR	399	1001-SUM
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SUMMARY

- Interactive visualization help communication of the data to all stake holders.
- Server based visualizations let users have access to most recent data and can be seen by different users at the same time.
- R/Shiny along with Plotly renders interactivity to the graphs, which in turn help reviewers to visualize data at more granular levels.

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Development Innovations

Thank You!

Questions?

Comments?

Suggestions?