

APOPO Shiny App User Guide

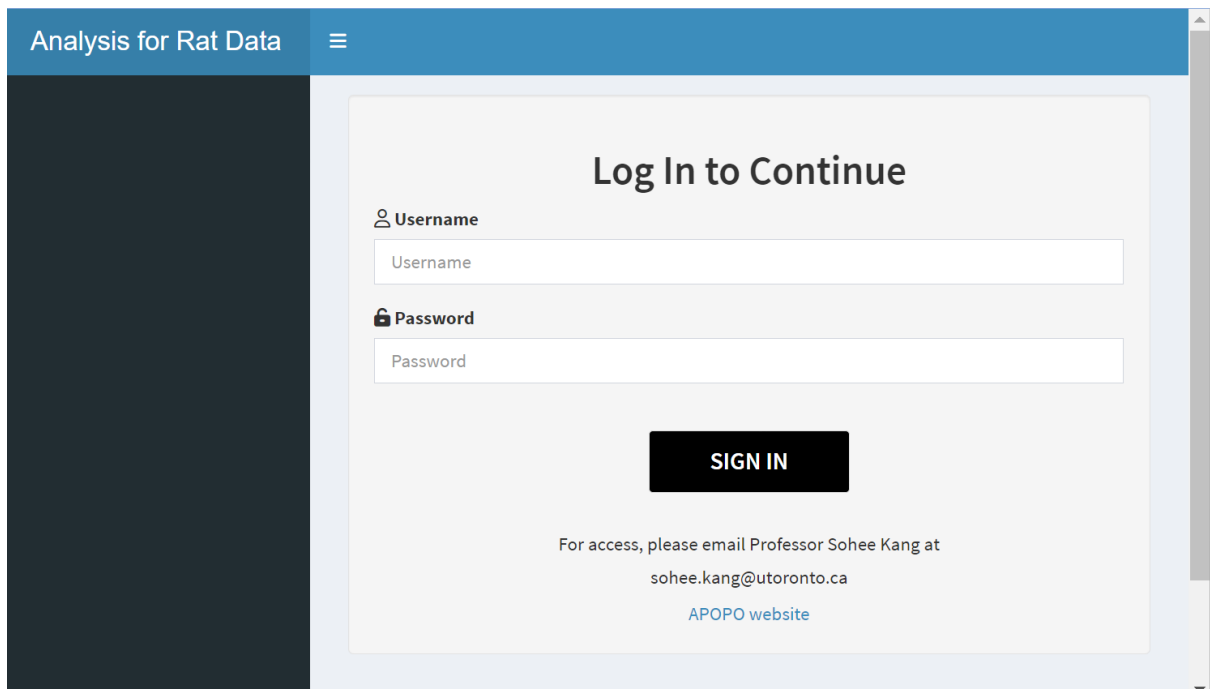
1. Introduction

This Shiny app has been developed to support APOPO lab's data analysis process. APOPO lab specializes in training rats to diagnose tuberculosis (referred to as TB in the following text).

2. Accessing the App

2.1. Log in system

In the initial user interface (UI) of this app, you will encounter the login page. Access to the app's functionalities is restricted and requires a specific Username and Password. We have not implemented a sign-up system to ensure that only authorized individuals can use the app. If you do not have access to the app and need it, please contact Professor Sohee Kang at sohee.kang@utoronto.ca for further assistance and information.



Analysis for Rat Data

Log In to Continue

Username

Password

SIGN IN

For access, please email Professor Sohee Kang at sohee.kang@utoronto.ca

[APOPO website](#)

2.2. File Upload

Once you log in, it will be directed to the file upload section. It is crucial to know that for the tool to work correctly, the file format should match the one we have been previously using. This consistency ensures our app can accurately interpret and process the data. For reference, this is what the acceptable format looks like.

SESSION DATE	PROGRAM	ID	EVALUATION	SESSION	ID	SAMPLE RUN	HOLE	Total	Rat	Hit	STATUS	BLIND	POS	ID	PATIENT	POT	NUMBER	DOTS	NAME	DATE	INCOMING	ID	BL	DOTS	ID	GXP	DOTS	ID	BL	APOPO	ID	GXP	APOPO	ID	STORAGE	REUSED
2022/9/15	DAR		14343		826994	H	10	5	0	FALSE			412869		2	Crugambwa				2022/9/15															62	1
2022/9/15	DAR		14344		827022	A	1	5	2	FALSE			412886		1	Mnazi mmoja				2022/9/15															9	1
2022/9/15	DAR		14344		827023	A	2	5	0	FALSE			412886		2	Mnazi mmoja				2022/9/15															9	1
2022/9/15	DAR		14344		827013	A	3	5	0	FALSE			412880		1	Mnazi mmoja				2022/9/15															9	1
2022/9/15	DAR		14344		827018	A	4	5	3	FALSE			412883		1	Mnazi mmoja				2022/9/15															9	1
2022/9/15	DAR		14344		826772	A	5	5	2	FALSE			412704		1	Ilala IDC				2022/9/14															8	2
2022/9/15	DAR		14344		827015	A	6	5	2	TRUE			412881		2	Mnazi mmoja				2022/9/15															9	1
2022/9/15	DAR		14344		827027	A	7	5	0	FALSE			412888		2	Mnazi mmoja				2022/9/15															9	1
2022/9/15	DAR		14344		827001	A	8	5	1	FALSE			412874		1	Kiwilani				2022/9/15															28	1
2022/9/15	DAR		14344		827026	A	9	5	0	FALSE			412888		1	Mnazi mmoja				2022/9/15															9	1
2022/9/15	DAR		14344		827012	A	10	5	1	FALSE			412879		2	Mnazi mmoja				2022/9/15															9	1
2022/9/15	DAR		14344		827003	B	1	5	2	FALSE			412875		1	Kiwilani				2022/9/15															28	1
2022/9/15	DAR		14344		827024	B	2	5	0	FALSE			412887		1	Mnazi mmoja				2022/9/15															9	1
2022/9/15	DAR		14344		827019	B	3	5	1	FALSE			412884		1	Mnazi mmoja				2022/9/15															9	1
2022/9/15	DAR		14344		826912	B	4	5	4	FALSE			412804		1	Mwananyamala				2022/9/15															1	1
2022/9/15	DAR		14344		827004	B	5	5	0	FALSE			412875		2	Kiwilani				2022/9/15															28	1
2022/9/15	DAR		14344		827002	B	6	5	0	FALSE			412874		2	Kiwilani				2022/9/15															28	1
2022/9/15	DAR		14344		827014	B	7	5	0	FALSE			412881		1	Mnazi mmoja				2022/9/15															9	1
2022/9/15	DAR		14344		826884	B	8	5	0	FALSE			412781		1	Buguruni				2022/9/15															10	1
2022/9/15	DAR		14344		827025	B	9	5	1	FALSE			412887		2	Mnazi mmoja				2022/9/15															9	1
2022/9/15	DAR		14344		827011	B	10	5	0	FALSE			412879		1	Mnazi mmoja				2022/9/15															9	1
2022/9/15	MORO		21599		651652	A	1	9	4	FALSE			300341		1	Sakasaba 2				2022/9/14															16	1
2022/9/15	MORO		21599		651436	A	2	9	1	FALSE			300158		1	Mwananyamala				2022/9/8															1	1
2022/9/15	MORO		21599		651322	A	3	9	4	FALSE			300063		1	Kigamboni				2022/9/8															1067	1
2022/9/15	MORO		21599		651622	A	4	9	5	FALSE			300321		1	Morogoro				2022/9/14															6	1
2022/9/15	MORO		21599		651632	A	5	9	1	FALSE			300330		1	Mtenga				2022/9/14															23	1
2022/9/15	MORO		21599		651616	A	6	9	1	FALSE			300315		1	Morogoro				2022/9/14															6	1
2022/9/15	MORO		21599		651320	A	7	9	2	FALSE			300061		1	Kigamboni				2022/9/8															1067	1
2022/9/15	MORO		21599		651623	A	8	9	0	FALSE			300322		1	Morogoro				2022/9/14															6	1
2022/9/15	MORO		21599		651324	A	9	9	3	FALSE			300065		1	Kimara				2022/9/8															1066	1
2022/9/15	MORO		21599		651316	A	10	9	3	FALSE			300057		1	Kigamboni				2022/9/8															1067	1
2022/9/15	MORO		21599		651615	B	1	9	0	FALSE			300314		1	Morogoro				2022/9/14															6	1

(excel format)

By following this format, we ensure that the app can effectively read and analyze data. Our approach is straightforward: we acknowledge that data may expand, and new data may be added. By using the same format, we ensure that as long as the format remains consistent, you can analyze data for similarities without any additional setup.

Analysis for Rat Data

Logout

Upload the Excel File

Choose a xlsx file

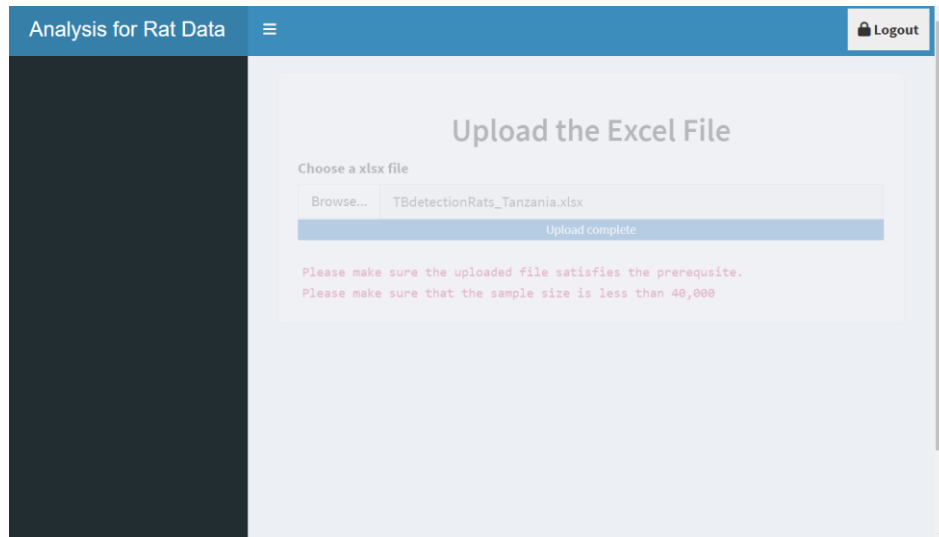
Browse...

No file selected

Please make sure the uploaded file satisfies the prerequisite.
Please make sure that the sample size is less than 40,000

(Upload UI interface)

With the correct format for the uploaded file, the app will initiate the data analysis process. It may temporarily appear as grey for a brief period, primarily because of our extensive dataset.



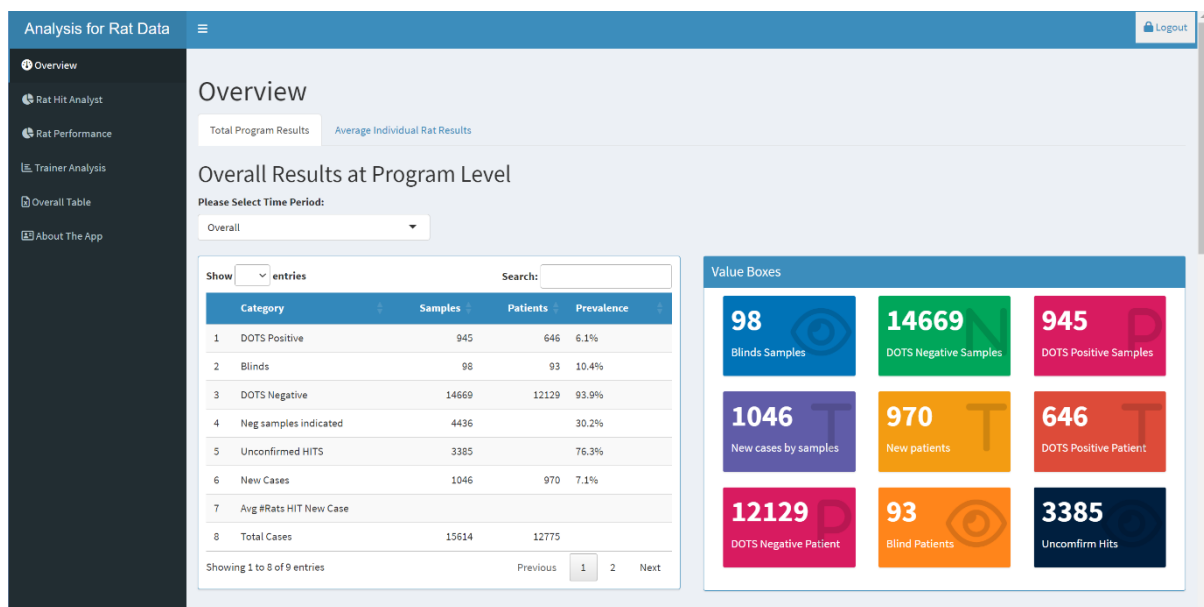
3. Main Features

We summarize our findings on given Apopo datasets into different features for demonstration. Users can easily track their interest aspects through titles and we will go through their functionalities on this guide.

3.1. Overview

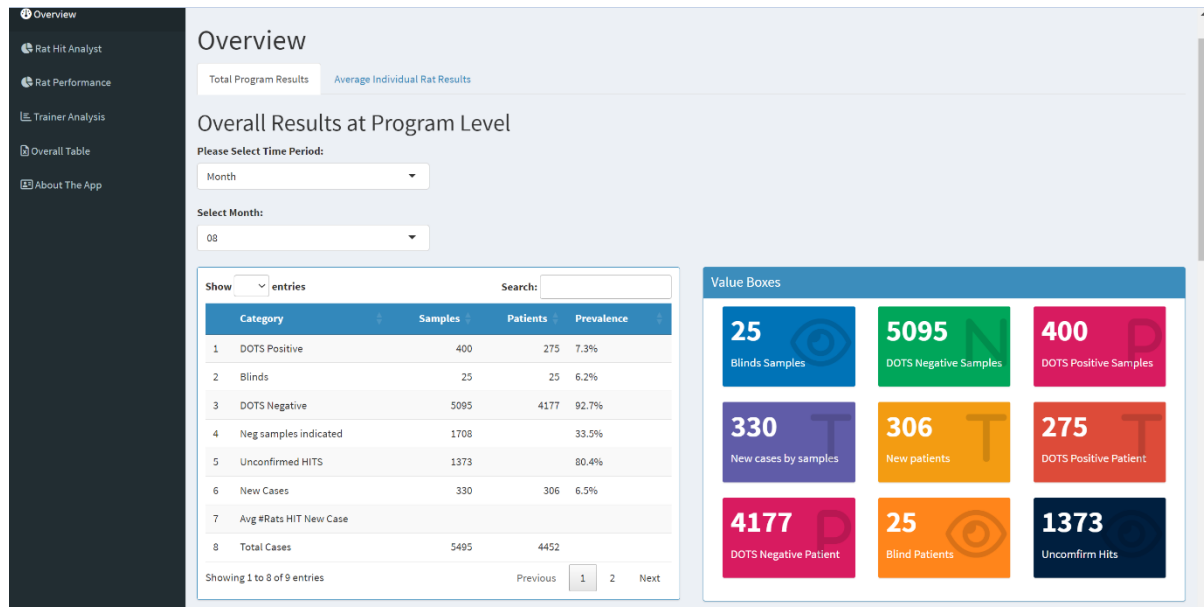
3.1.1. Tab: Total Program Results

Once the data is loaded and the analysis is complete, you will be directed to the Overview page. This interface offers straightforward functionality and provides detailed insights into essential initial data for our

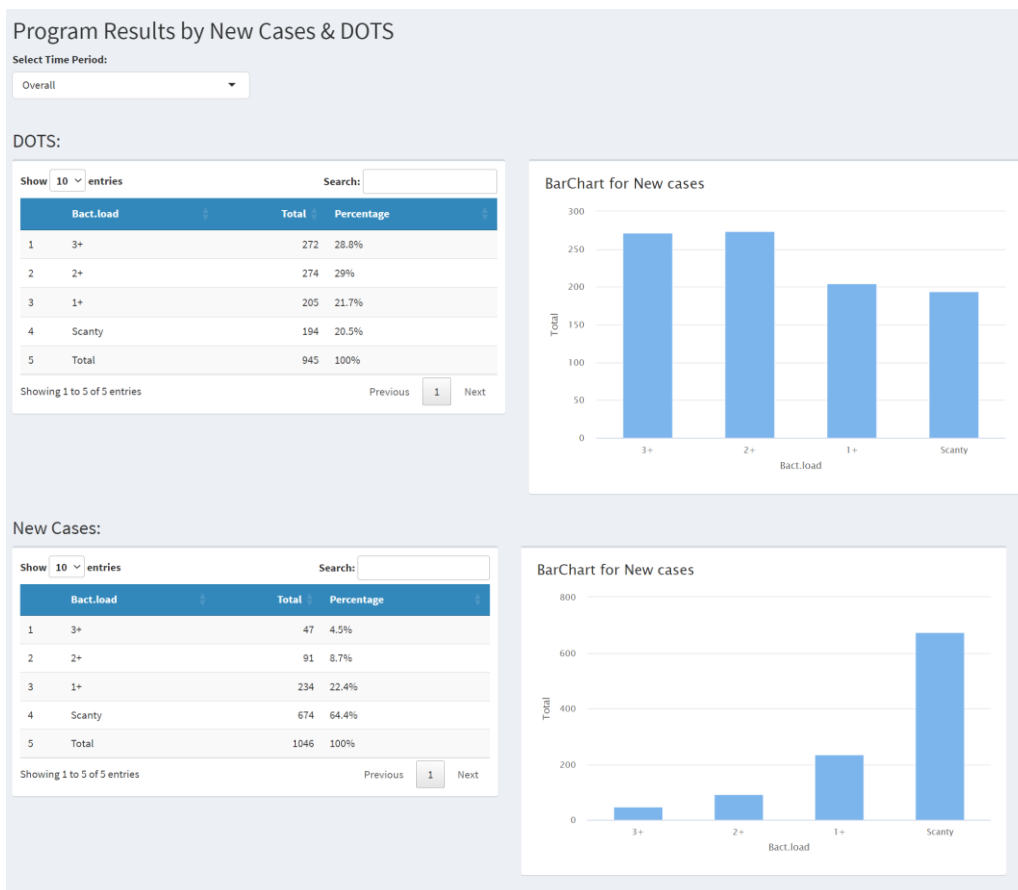


study. Additionally, we've incorporated brightly colored squares to draw the your attention and highlight the specific data we want to emphasize.

What's more, for further specification of the study, we separate our dataset into different time periods. We cut them into days, weeks and months and you can choose the specific time periods for comparison.

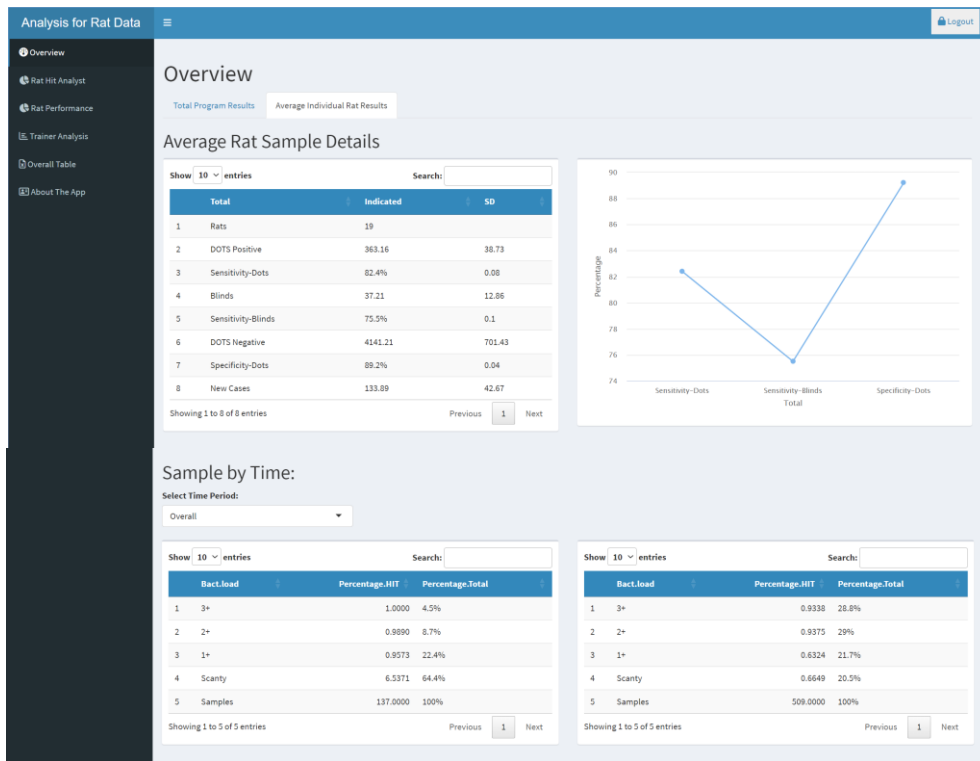


As you scroll down the page, you will come across two tables and a corresponding bar chart, each related to the accounting of DOTS and New Cases. These factors are of utmost importance in influencing our research and require further in-depth analysis. Therefore, we have singled out these two factors for detailed examination. Additionally, we have incorporated a time period selection functionality to enhance your analytical capabilities.



3.1.2. Tab: Average Individual Rat Results

If you are looking for an average data, then please click the tab “Average Individual Rat Results” and check the data. Please note that we also provide a line chart for data visualization and search function for rapid targeting wanted data.



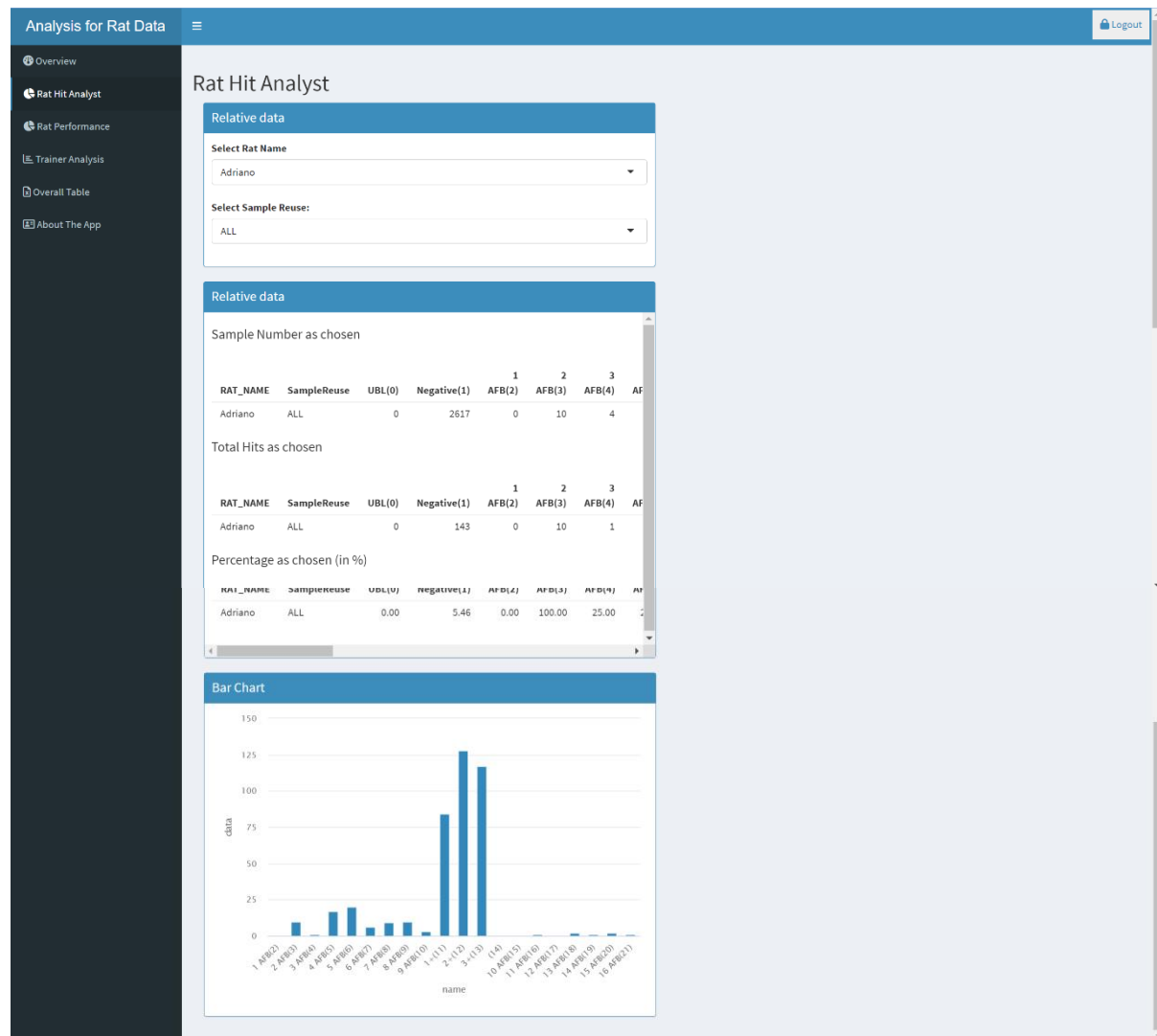
3.2. Rat Hit Analyst & Overall Table

If you are interested in if rats hit(identify) the TB samples or not, you can check Rat Hit Analyst & Overall Table where Overall Table contains quantities of all samples of different bacterial loads encountered by each rat. Moreover, Sample Reuse refers to if this sample is the first time use or not, it will affect rat to cheat on this sample so we need to list clarify them out.

Then, “By Hit” tab is amount of times rat hit the sample, and “Pct.(%)” refers to the percentage hit amount divided by total amount.

Analysis for Rat Data															
Overview															
Rat Hit Analyst															
Rat Performance															
Trainer Analysis															
Overall Table															
About The App															
Overall Table															
By Bacterial Level															
By Hit															
Pct.(%)															
Show 20 entries															
Search:															
RAT_NAME	SampleReuse	UBL(0)	Negative(1)	1 AFB(2)	2 AFB(3)	3 AFB(4)	4 AFB(5)	5 AFB(6)	6 AFB(7)	7 AFB(8)	8 AFB(9)	9 AFB(10)	1+ (11)	2+ (12)	
1 Adriano	ALL	0	2617	0	10	4	58	69	33	30	39	12	184	158	
2 Adriano	FRESH	0	2449	0	2	4	51	64	29	27	39	12	139	72	
3 Adriano	RE-USED	0	168	0	8	0	7	5	4	3	0	0	45	86	
4 Campbell	ALL	0	3644	0	13	6	74	85	41	38	51	18	236	188	
5 Campbell	FRESH	0	3355	0	2	4	58	78	32	35	49	15	164	81	
6 Campbell	RE-USED	0	289	0	11	2	16	7	9	3	2	3	72	107	
7 Carolina	ALL	0	5238	1	82	90	38	23	14	18	13	13	138	154	
8 Carolina	FRESH	0	5083	1	76	76	30	15	8	18	9	10	82	85	
9 Carolina	RE-USED	0	155	0	6	14	8	8	6	0	4	3	56	69	
10 Charlotte	ALL	0	5122	1	92	87	40	23	21	10	17	8	144	133	
11 Charlotte	FRESH	0	4951	1	77	71	27	15	16	9	9	7	88	64	
12 Charlotte	RE-USED	0	171	0	15	16	13	8	5	1	8	1	56	69	
13 Curtis	ALL	0	3644	0	13	6	74	85	41	38	51	18	236	188	
14 Curtis	FRESH	0	3355	0	2	4	58	78	32	35	49	15	164	81	

Then for “Rat Hit Analyst”, it provided select box that you can choose the specific rat and sample reuse condition. After selection, the Relative Data box will list the chosen rat’s data and visualized the data as bar chart for clear understanding.



3.3. Rat Performance

If you want to figure out how each rat performance as sensitivity and specificity, you can directly go to tab “Rat Performance”.

In this tab, it contains each rat’s sensitivity and specificity for research purpose.

Analysis for Rat Data

Overview

Rat Hit Analyst

Rat Performance

Trainer Analysis

Overall Table

About The App

Logout

Rat Performance Tab Content

Sensitivity & Specificity

Visualization

Sensitivity

Show 10 entries

Search:

	Rat_Name	HIT_True	Total_Amount	Sensitivity
1	Freddy	392	520	0.7538
2	Carolina	487	722	0.6745
3	Serena	454	722	0.6288
4	Princess Leia	482	722	0.6676
5	Violet	420	722	0.5817
6	Charlotte	592	718	0.8245
7	Eunice	482	718	0.6713
8	Magufuli	474	718	0.6602
9	Oprah	516	718	0.7187
10	Dian	427	718	0.5947

Showing 1 to 10 of 19 entries

Previous

1

2

Next

Specificity

Show 10 entries

Search:

	Rat_Name	HIT_FALSE	Total_Amount	Specificity
1	Freddy	3057	3680	0.8307
2	Carolina	4701	5238	0.8975
3	Serena	4873	5238	0.9303
4	Princess Leia	4754	5238	0.9076
5	Violet	4902	5238	0.9359
6	Charlotte	4162	5122	0.8126
7	Eunice	4651	5122	0.9080
8	Magufuli	4632	5122	0.9043
9	Oprah	4523	5122	0.8831
10	Dian	4697	5122	0.9170

Showing 1 to 10 of 19 entries

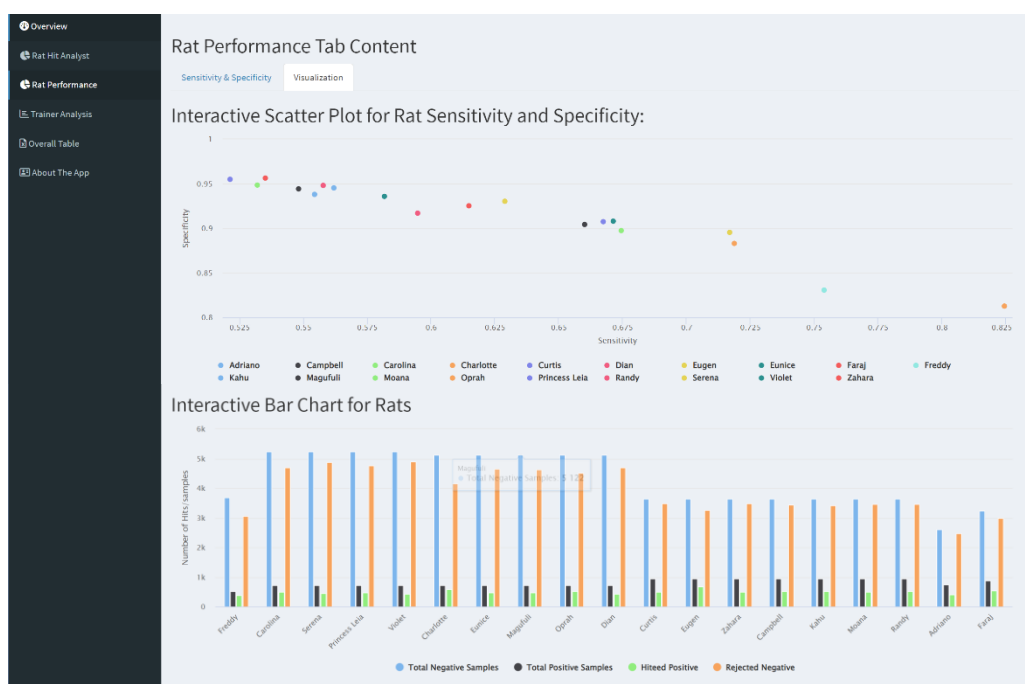
Previous

1

2

Next

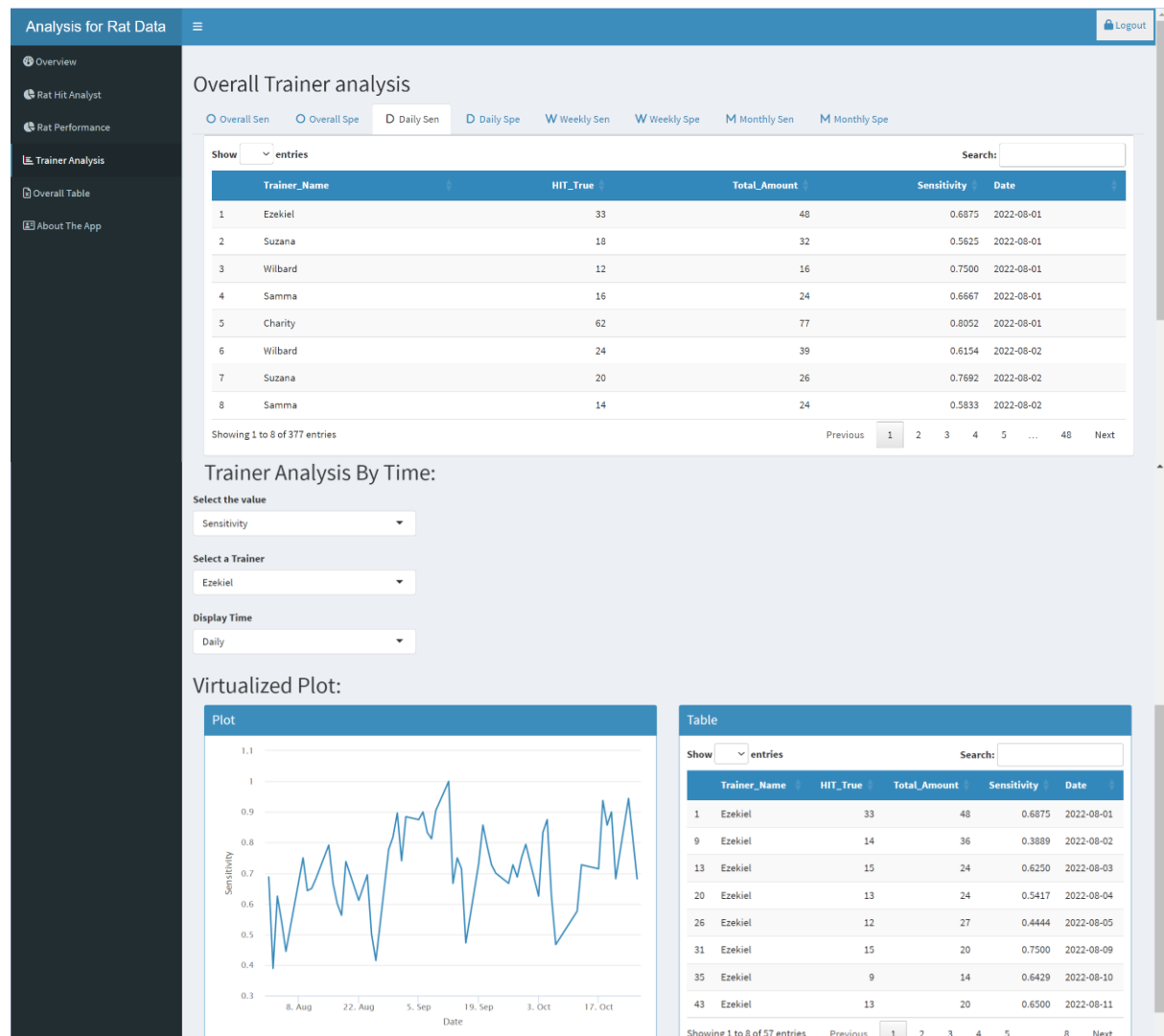
In “Visualization”, we provided visualized data. What’s important, they are interactive graph that if you don’t like any of the variables (e.g., Adriano, Cambell, etc.) in two graphs, you can delete them from graph by simply click on the variable’s name, and add them back by one more click.



3.4. Trainer Analysis

“Trainer Analysis” refers to the analysis for rat’s data that controlling Trainer as an independent variable. For data display, we provided another category other than choose Time UI and Trainer UI. Users can have more direct feeling when looking at table data.

Also, for easier reading the data, we created line plots after choose Trainer’s name and Time slots.



3.5. About the App

The final part it about the development of the R shiny App. We have documented websites that were helpful to us on this platform, and we'd like to express our gratitude to them for their assistance. Users interested in this can visit these websites to access specific information.

Login Page (<https://www.listendata.com/2019/06/how-to-add-login-page-in-shiny-r.html#comment-form>)

Dashboard structure(<https://rstudio.github.io/shinydashboard/>)

Highchart Output (<https://www.highcharts.com/blog/tutorials/highcharts-for-r-users/>)

Datatable Output(<https://rstudio.github.io/DT/shiny.html>)

Value Box(<https://rstudio.github.io/shinydashboard/structure.html>)

Additionally, we have provided our email addresses and the supervising professor's. If you have any questions or suggestions, please feel free to email us for further discussion.

Analysis for Rat Data

Logout

Overview
Rat Hit Analyst
Rat Performance
Trainer Analysis
Overall Table
About The App

Something about this App:

Reference

Main Structure
The main structure of this App(mainly the login page) is from: <https://www.listendata.com/2019/06/how-to-add-login-page-in-shiny-r.html#comment-form> ,and we then implant our own code for the Shiny Dashboard and the corresponding data analysis.

For the structure of the shiny dashboard, see: <https://rstudio.github.io/shinydashboard/> .

Highchart Output
The interactive charts/plots in this App are generated from the package called 'highcharter',see: <https://www.highcharts.com/blog/tutorials/highcharts-for-r-users/> .

Datatable Output
The data tables in the app are generated from the package 'DT', for more information see: <https://rstudio.github.io/DT/shiny.html> .

ValueBox Output
For information about valuebox and other boxes, see: <https://rstudio.github.io/shinydashboard/structure.html> .

Feedback

If you have any comments or concerns, please contact Professor Sohee Kang at:sohee.kang@utoronto.ca, or any member of our team:

Kuteluke Ainiwaer: ainiwaer.kuteluke@mail.utoronto.ca
Huairu Chen: huairu.chen@mail.utoronto.ca
Junjie Ma: junjie.ma@mail.utoronto.ca
Any suggestion will be greatly appreciated.

