

**PharmaSUG China 2022 - Paper 122**  
**Beautify User Interfaces in Shiny APP**  
Wanrong Wang, Fosun Pharma

## ABSTRACT

Shiny app has been widely used in clinical trials in recent years. Beautifying the user interface is increasingly essential for developers. Including colors, general layout, sidebar and theme and so on. There are 2 packages fresh and bslib in R to customize UI. The fresh package developed by the dreamRs team, also authors of shinyWidgetd and the bslib package developed by RStudio. Both are excellent tools for customizing app's interface. In addition to fresh and bslib, there are packages that are easier to customize, like dashboardthemes and shinythemes.

This paper will introduce how to use the these packages to customize appearance of shiny UI.

## INTRODUCTION

When building a shiny app, its appearance is the default theme if you don't customize it. However, in some cases, you may prefer to customize the appearance of your shiny app instead of using the default one. In this case, the packages you can use include but are not limited to: dashboardthemes , shinythemes , fresh and bslib etc. They allow you to customize the appearance of your app to varying degrees and give your app a new skin without much CSS knowledge.

Dashboardthemes or shinythemes is good choice if you like pre-packaged themes:

- dashboardthemes package provides 7 themes for shinydashboard applications.
- shinythemes package provides 16 bootstrap themes from bootwatch.

Fresh or blisb is better option if you tend to customize in depth:

- with fresh package, you can create new themes to use in shiny and shinydashboard and bs4dash applications.
- with bslib package, you can create new themes to use in relevant page layout function, such as navbarPage() or fluidPage().

## DASHBOARDTHEMES

You can use theme argument in shinyDashboardThemes() and insert it into the dashboardBody part. Your code would look like this:

```
dashboardBody(  
  shinyDashboardThemes(  
    theme = "onenote"  
  ),  
  tabItems(  
    tabItem(tabName = "sch", sch_ui("sch")),  
    tabItem(tabName = "role", role_ui("role"))  
  ...
```

There are 7 themes to choose from are: Blue gradient, Flat Red, Grey light, Grey dark, OneNote, Poor man's Flatly, and Purple gradient. Their corresponding codes are: blue\_gradient, flat\_red, grey\_light, grey\_dark, onenote, poor\_mans\_flatly, purple\_gradient.

The output without any theme applied is like Display 1:

MM Tool 管理平台

项目进度

角色信息

The screenshot shows a project management interface. At the top, there are navigation links for '项目进度' (Project Progress) and '角色信息' (Role Information). Below this is a timeline for two studies, Study I and Study II. The timeline shows various milestones and tasks. Below the timeline is a table titled 'Show 10 entries' containing five rows of data. The columns include: 提交人 (Submitter), 提交时间 (Submission Time), 项目名称 (Project Name), SP.Lead (SP Lead), 项目持续时间 (Project Duration), 本项目中将在什么节点第一次使用本工具 (This project will use this tool for the first time at what node), 本项目中需要以什么频率更新 (This project needs to be updated at what frequency), 工具首次上线时间 (Tool first goes live time), 数据cutoff.date (Data cutoff date), and 工具链接 (Tool link). The data rows correspond to the entries in the table.

提交人	提交时间	项目名称	SP.Lead	项目持续时间	本项目中将在什么节点第一次使用本工具	本项目中需要以什么频率更新	工具首次上线时间	数据cutoff.date	工具链接
1 AAA	2021-09-26 09:40:07	Study I	Lead 1	24个月	FPI后三个月	每月一次	2021.12.30	2021.12.28	<a href="http://10.197.17.78:3838/STUDY_I/">http://10.197.17.78:3838/STUDY_I/</a>
2 AAA	2021-09-26 09:50:23	Study I	Lead 1	24个月	FPI后三个月	每月一次	2022.1.30	2022.1.28	<a href="http://10.197.17.78:3839/STUDY_I/">http://10.197.17.78:3839/STUDY_I/</a>
3 AAA	2021-09-26 09:51:05	Study I	Lead 1	24个月	FPI后三个月	每两周一次	2022.2.28	2022.2.26	<a href="http://10.197.17.78:3840/STUDY_I/">http://10.197.17.78:3840/STUDY_I/</a>
4 BB	2021-09-26 12:31:26	Study II	Lead 4	24个月	FPI后一个月	每季度一次	2021.12.30	2021.12.28	<a href="http://10.197.17.78:3841/STUDY_II/">http://10.197.17.78:3841/STUDY_II/</a>
5 BB	2021-10-26 12:23:53	Study II	Lead 4	24个月	FPI后一个月	每季度一次	2022.1.30	2022.1.28	<a href="http://10.197.17.78:3842/STUDY_II/">http://10.197.17.78:3842/STUDY_II/</a>

Showing 1 to 5 of 5 entries

Search:

Previous 1 Next

## Display 1. Primary

The output of different theme are applied like: Display 2, Display 3, Display 4, Display 5, Display 6, Display 7, Display 8.

MM Tool 管理平台

项目进度

角色信息

This screenshot is identical to the one above, showing the same project management interface with a timeline and a table of entries. The only difference is the visual theme, which features a vertical blue gradient bar on the left side of the header.

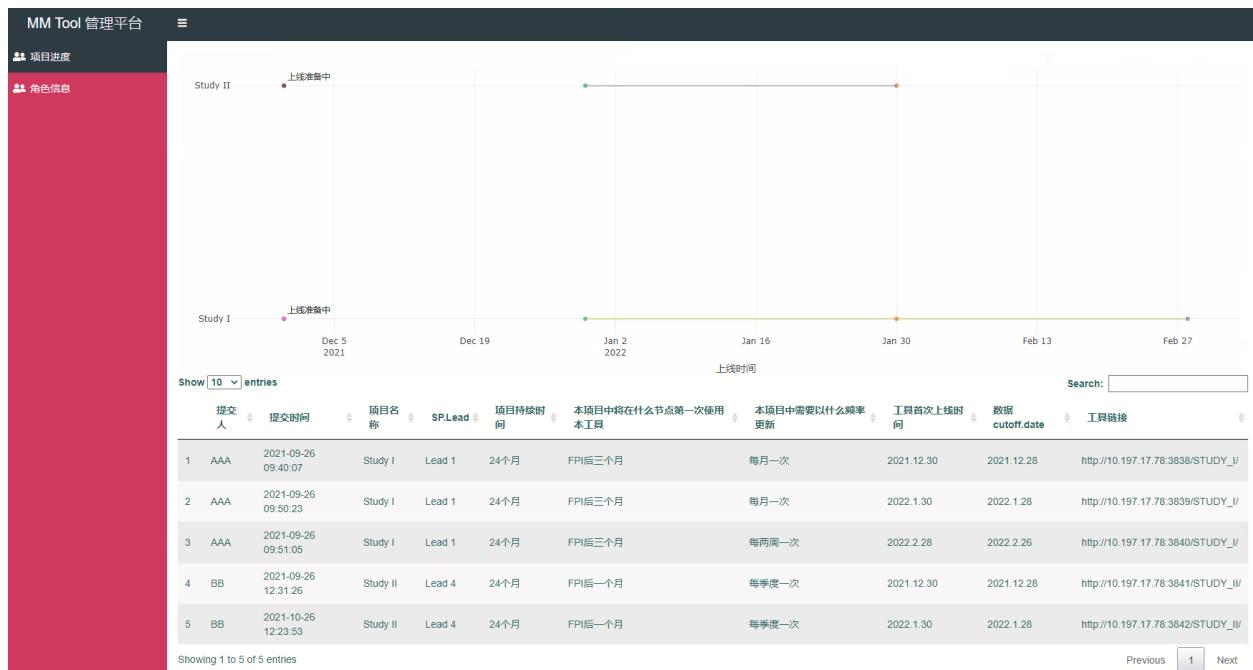
提交人	提交时间	项目名称	SP.Lead	项目持续时间	本项目中将在什么节点第一次使用本工具	本项目中需要以什么频率更新	工具首次上线时间	数据cutoff.date	工具链接
1 AAA	2021-09-26 09:40:07	Study I	Lead 1	24个月	FPI后三个月	每月一次	2021.12.30	2021.12.28	<a href="http://10.197.17.78:3838/STUDY_I/">http://10.197.17.78:3838/STUDY_I/</a>
2 AAA	2021-09-26 09:50:23	Study I	Lead 1	24个月	FPI后三个月	每月一次	2022.1.30	2022.1.28	<a href="http://10.197.17.78:3839/STUDY_I/">http://10.197.17.78:3839/STUDY_I/</a>
3 AAA	2021-09-26 09:51:05	Study I	Lead 1	24个月	FPI后三个月	每两周一次	2022.2.28	2022.2.26	<a href="http://10.197.17.78:3840/STUDY_I/">http://10.197.17.78:3840/STUDY_I/</a>
4 BB	2021-09-26 12:31:26	Study II	Lead 4	24个月	FPI后一个月	每季度一次	2021.12.30	2021.12.28	<a href="http://10.197.17.78:3841/STUDY_II/">http://10.197.17.78:3841/STUDY_II/</a>
5 BB	2021-10-26 12:23:53	Study II	Lead 4	24个月	FPI后一个月	每季度一次	2022.1.30	2022.1.28	<a href="http://10.197.17.78:3842/STUDY_II/">http://10.197.17.78:3842/STUDY_II/</a>

Showing 1 to 5 of 5 entries

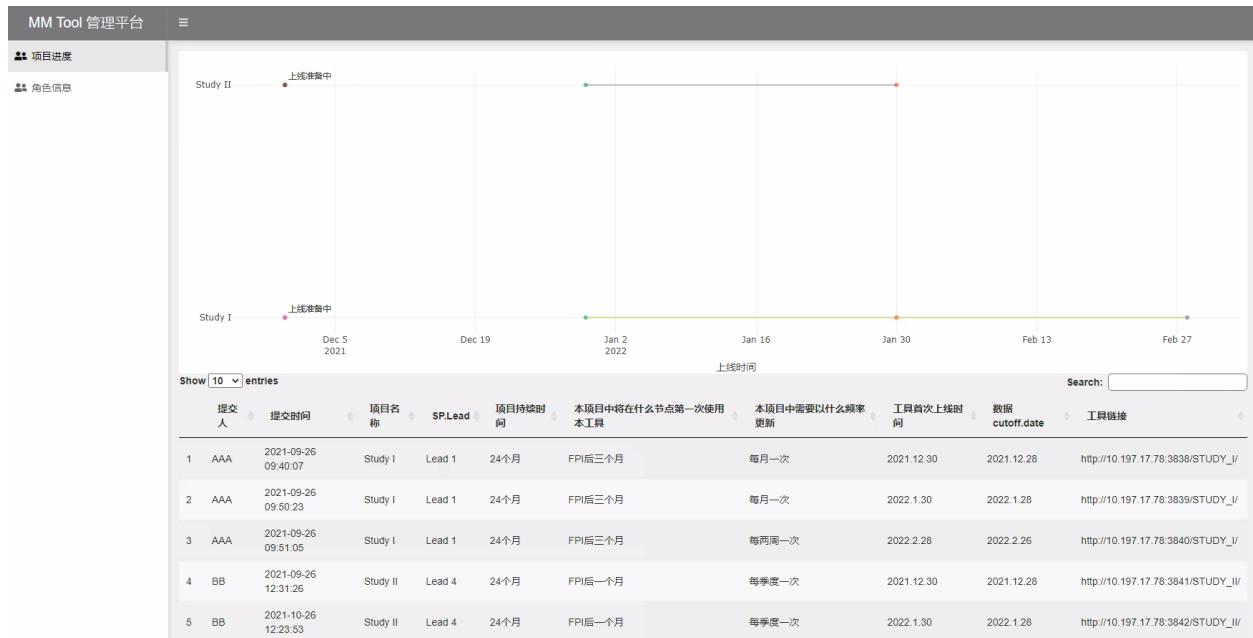
Search:

Previous 1 Next

## Display 2. Blue gradient



Display 3. Flat Red



Display 4. Grey light

MM Tool 管理平台

项目进度 角色信息

The screenshot shows a Gantt chart with two projects: Study I and Study II. Study I has tasks from Dec 5, 2021, to Feb 27, 2022. Study II has tasks from Jan 2, 2022, to Jan 30, 2022. Below the chart is a table with the following data:

	提交人	提交时间	项目名称	SP Lead	项目持续时间	本项目中将在什么节点第一次使用本工具	本项目中需要以什么频率更新	工具首次上线时间	数据cutoff.date	工具链接
1	AAA	2021-09-26 09:40:07	Study I	Lead 1	24个月	FPI后三个月	每月一次	2021.12.30	2021.12.28	<a href="http://10.197.17.78:3838/STUDY_I/">http://10.197.17.78:3838/STUDY_I/</a>
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3	AAA	2021-09-26 09:51:05	Study I	Lead 1	24个月	FPI后三个月	每两周一次	2022.2.28	2022.2.26	<a href="http://10.197.17.78:3840/STUDY_I/">http://10.197.17.78:3840/STUDY_I/</a>
4	BB	2021-09-26 12:31:26	Study II	Lead 4	24个月	FPI后一个月	每季度一次	2021.12.30	2021.12.28	<a href="http://10.197.17.78:3841/STUDY_II/">http://10.197.17.78:3841/STUDY_II/</a>
5	BB	2021-10-26 12:23:53	Study II	Lead 4	24个月	FPI后一个月	每季度一次	2022.1.30	2022.1.28	<a href="http://10.197.17.78:3842/STUDY_II/">http://10.197.17.78:3842/STUDY_II/</a>

Showing 1 to 5 of 5 entries

Display 5. Grey dark

MM Tool 管理平台

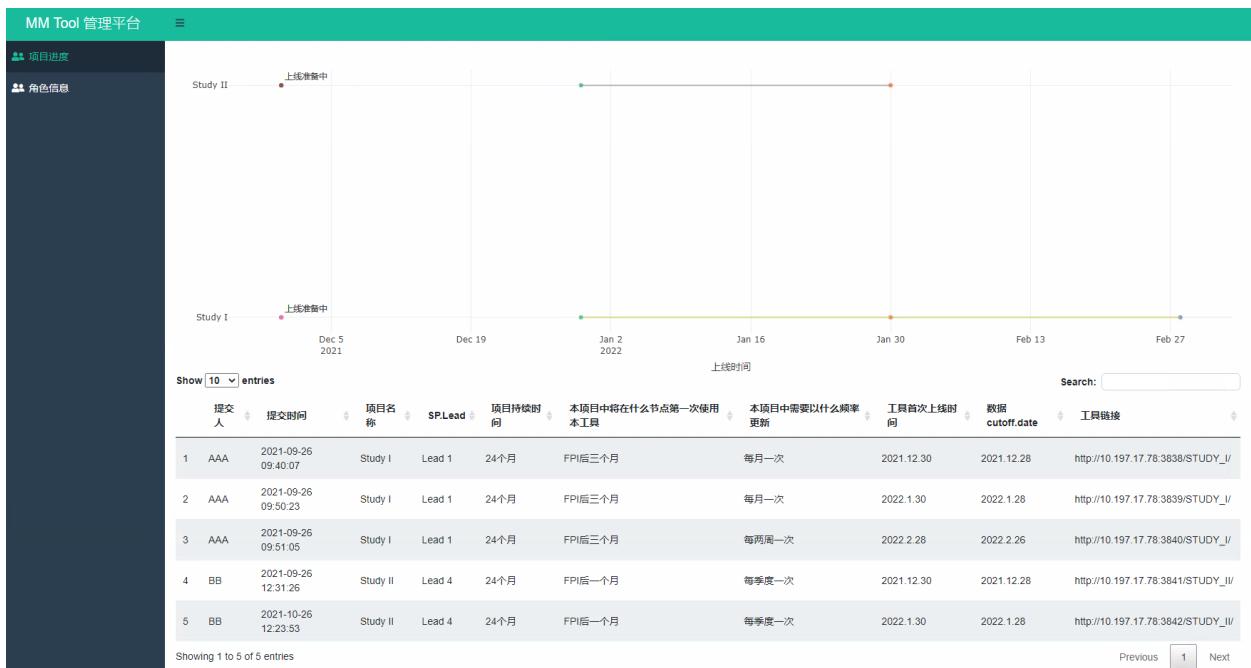
项目进度 角色信息

The screenshot shows a Gantt chart with two projects: Study I and Study II. Study I has tasks from Dec 5, 2021, to Feb 27, 2022. Study II has tasks from Jan 2, 2022, to Jan 30, 2022. Below the chart is a table with the following data:

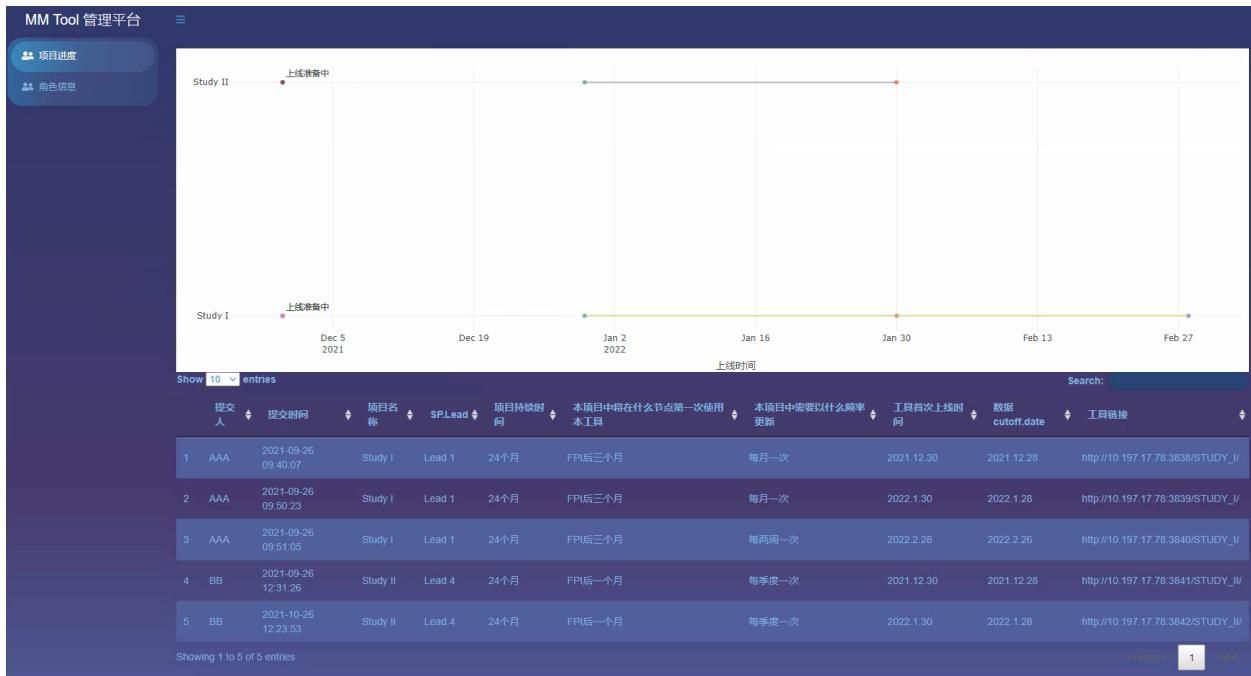
	提交人	提交时间	项目名称	SP Lead	项目持续时间	本项目中将在什么节点第一次使用本工具	本项目中需要以什么频率更新	工具首次上线时间	数据cutoff.date	工具链接
1	AAA	2021-09-26 09:40:07	Study I	Lead 1	24个月	FPI后三个月	每月一次	2021.12.30	2021.12.28	<a href="http://10.197.17.78:3838/STUDY_I/">http://10.197.17.78:3838/STUDY_I/</a>
2	AAA	2021-09-26 09:50:23	Study I	Lead 1	24个月	FPI后三个月	每月一次	2022.1.30	2022.1.28	<a href="http://10.197.17.78:3839/STUDY_I/">http://10.197.17.78:3839/STUDY_I/</a>
3	AAA	2021-09-26 09:51:05	Study I	Lead 1	24个月	FPI后三个月	每两周一次	2022.2.28	2022.2.26	<a href="http://10.197.17.78:3840/STUDY_I/">http://10.197.17.78:3840/STUDY_I/</a>
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5	BB	2021-10-26 12:23:53	Study II	Lead 4	24个月	FPI后一个月	每季度一次	2022.1.30	2022.1.28	<a href="http://10.197.17.78:3842/STUDY_II/">http://10.197.17.78:3842/STUDY_II/</a>

Showing 1 to 5 of 5 entries

Display 6. OneNote



Display 7. Poor man's Flatly

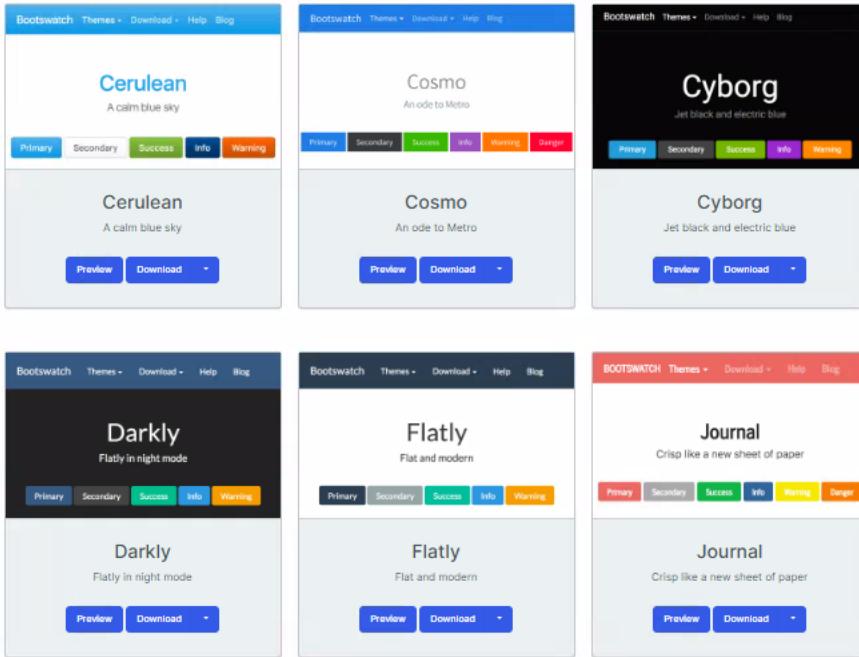


Display 8. Purple gradient

## SHINYTHEMES

Bootstrap is a collection of open source themes for Bootstrap (Bootstrap is a free and open-source web development framework). You can simply download a CSS file and replace the one in Bootstrap.

Display 9 is a screenshot of the bootswatch website home page showing some free theme styles:



## Display 9 Bootswatch themes

You can use the theme argument in shinytheme() and insert it to bootstrapPage, fluidPage, navbarPage, or fixedPage. Your code would look like this:

```
ui = tagList(
  navbarPage(
    theme =shinytheme("standstone"),
    ...
  )
)
```

Bootswatch provides 16 themes available for shinytheme, including: Cerulean, Cosmo, Cyborg, Darkly, Flatly, Journal, Lumen, Paper, Readable, Standstone, Simplex, Slate, Spacelab, Superhero, United, and Yeti.

The output without any theme applied is like Display 10:

shinythemes Navbar 1 Navbar 2 Navbar 3

**File input:**

No file selected

**Text input:**

general

**Slider input:**

Default actionButton:

Search

actionButton with CSS class:

Action button

Tab 1 Tab 2 Tab 3

**Table**

speed	dist
4.00	2.00
4.00	10.00
7.00	4.00
7.00	22.00

Verbatim text output

general, 30, NULL

## Header 1

### Header 2

Header 3

Header 4

Header 5

## Display 10 Default

The output of theme “Standstone” is applied looks like Display 11:

shinythemes NAVBAR 1 NAVBAR 2 NAVBAR 3

**File input:**

BROWSE...

No file selected

**Text input:**

general

**Slider input:**

Default actionButton:

SEARCH

actionButton with CSS class:

ACTION BUTTON

TAB 1 TAB 2 TAB 3

**Table**

speed	dist
4.00	2.00
4.00	10.00
7.00	4.00
7.00	22.00

Verbatim text output

general, 30, NULL

## Header 1

### Header 2

Header 3

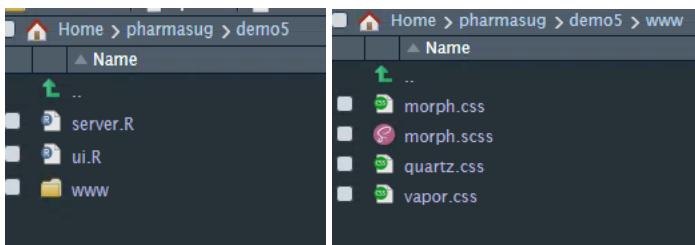
Header 4

Header 5

## Display 11 Standstone

Some Bootstrap themes are not included in shinythemes, such as Morph, Quartz, and Vapor and so on. If you want to use them, you can download its css code from <https://bootswatch.com>, then you can create a subdirectory named www and include css file in www.

The directory structure would be like Display 12:



## Display 12 www subdirectory

Your code would look like this:

```
ui = tagList(
  navbarPage(
    theme = "morp.css",
    ...
  )
)
```

The output of theme “Morph” is applied looks like Display 13:

speed	dist
4.00	2.00
4.00	10.00
7.00	4.00
7.00	22.00

## Display 13 Morph

### FRESH

#### CREATE A THEME

To design a new theme, the main function is `create_theme()`. You can create a new theme and export to a CSS output\_file to the specified location. If not provided output\_file, it will returns a string value containing the compiles CSS. You can also import a bootswatch CSS theme and make modifications based on it;

3 type of functions are used to customize themes: `bs_vars_*`(for shiny), `adminlte_*`(for shinydashboard) and `bs4dash_*`( for bs4dash). Here are several examples:

1. `bs_vars_*`
- `bs_vars_button`: used to customize buttons;
- `bs_vars_navbar`: used to customize navigation bar component;
- `bs_vars_font`: used to customize fonts;

- ...  
2. adminlte\_\*
  - adminlte\_color: used to customize defaults colors;
  - adminlte\_sidebar: used to customize the sidebar;
  - adminlte\_global: used to customize global settings;
- ...  
3. bs4dash\_\*
  - bs4dash\_layout: used to customize layout;
  - bs4dash\_status: used to customize default statuses;
  - bs4dash\_yiq: used to customize color if contrast between a color and its background is under threshold;
- ...

## USE A THEME

To use a newly created theme, you can inline `create_theme()` in the UI code. And also can using output CSS file that in the www folder, then call `use_theme()` inside UI code.

For 3 different application frameworks, you can use `use_theme()` with different paths:

- shiny: `fluidPage` or `navbarPage`.
- shinydashboard: `dashboardBody`.
- bs4Dash: `bs4DashBody`.

## A EXAMPLE

Create a theme and use it in shinydashboard:

```
create_theme(
  adminlte_color(
    light_blue = "#FFE4B5"
  ),
  adminlte_sidebar(
    dark_bg = "#ffc0cb",
    dark_hover_bg = "#ffc0cb",
    dark_color = "#ffc0cb"
  ),
  adminlte_global(
    content_bg = "#B0E0E6",
    box_bg = "#B0E0E6",
    info_box_bg = "#B0E0E6"
  ),
  output_file = "~/Test/t3/www/mytheme1.css"
)

dashboardBody(
  use_theme("mytheme1.css"),
  tabItems(
    ...
  )
)
```

Colors are set via HTML color codes and You can refer to <https://html-color.codes>. output as Display 14:



Display 14 Example 1

## BLSIB

### CREATE A THEME

You can use `bs_theme()` to create a new theme, such as custom background color, foreground color, default theme colors, font. Of course, you can also choose a pre-packaged bootswatch theme and customize various theming defaults.

### USE A THEME

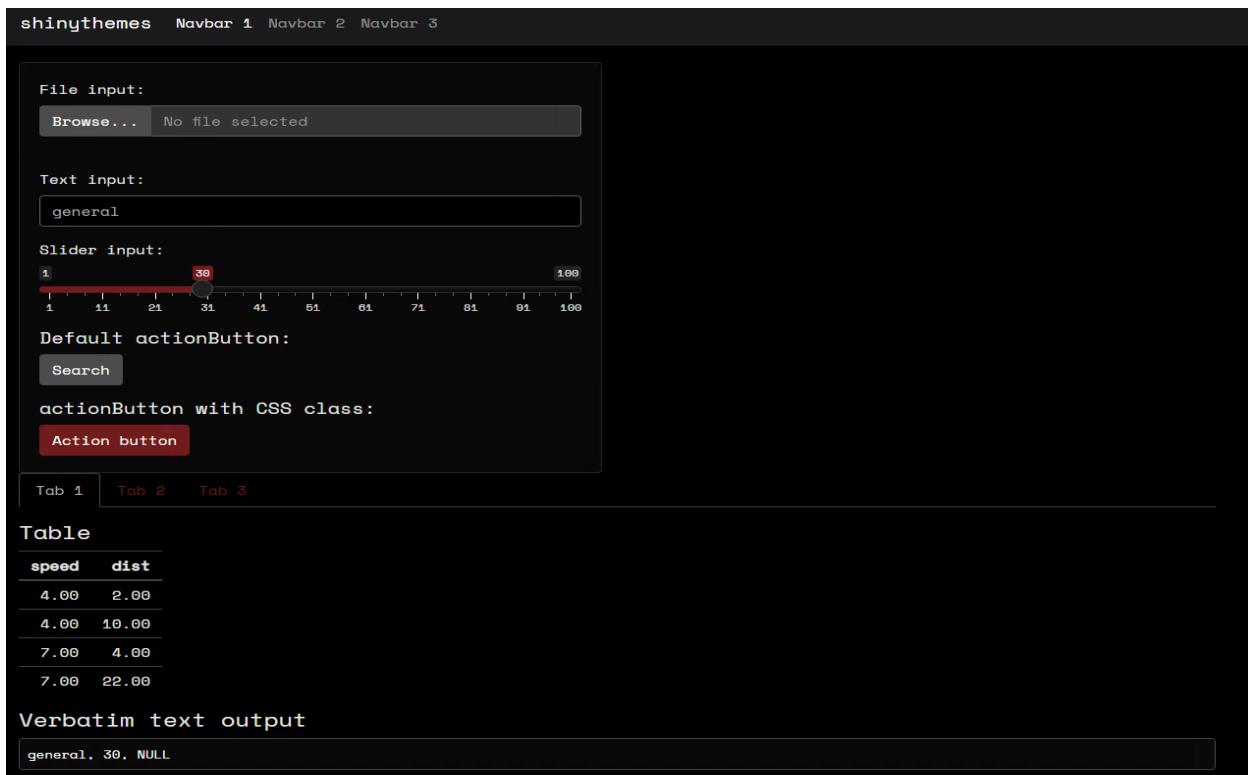
You can use the new theme in relevant page layout function, such as `navbarPage()`, `fluidPage()`.

### A EXAMPLE

Create a theme and use it in `navbarPage`:

```
ui = tagList(
  navbarPage(
    theme = bs_theme( bg = "#000000", fg = "white", primary = "#701c1c",
                      base_font = font_google("Space Mono"),
                      code_font = font_google("Space Mono")),
    ...
  )
)
```

Output as Display 15:



## Display 15 Example 2

The font set comes from Google Fonts, you can refer to <https://www.googlefonts.cn/>, which provides many fonts, like Hanalei Fill, Kirang Haerang, Sunflower.

## CONCLUSION

When you develop your own shiny app, you may want its UI to be different rather than default, so design it yourself and make it unique!

## REFERENCES

Kenton Russel aka. "Outstanding User Interfaces with Shiny." Accessed June, 2022. <https://unleash-shiny.rinterface.com/>.

Victor Perrier, Fanny Meyer. "Fresh themes." Accessed June, 2022. <https://dreamrs.github.io/fresh/articles/fresh.html>

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## **CONTACT INFORMATION**

Your comments and questions are valued and encouraged. Contact the author at:

Wanrong Wang  
Fosun Pharma  
+86-183 9451 1002  
[wangwanrong@fosunpharma.com](mailto:wangwanrong@fosunpharma.com)