Transfer Learning of Teal Packages

Kai Zhou

Initial Thought

R becomes a trend and open-source packages thrive in pharmaceutical industry.

Improve efficient. under outsource studies, we do not have enough time and resource to oversee vendor's deliverables, especially TLFs.

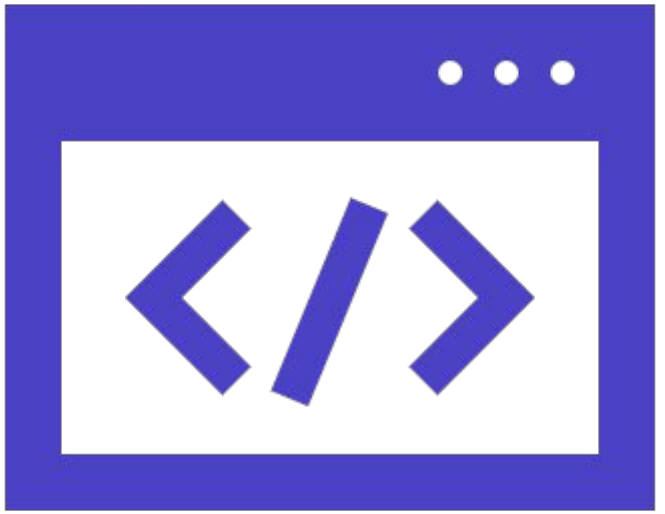
Support stats and physician to do exploratory. exploratory analysis is usually requested during the whole life cycle of study. Usually, subgroup analysis is the common one. It requires programmer to generate a bunch of outputs in a very short time either for submission or internal decision-making.

Why we choose Teal packages?

- Teal is the most mature one of packages for interactive solution in industry.
- It has conducted one successful pilot submission to FDA.
- It has the most complete and detail introduction and development instruction.
- The most important one is that teal is open-source and we could easily check the source code and get help from the Github platform.

Target

- We want to develop a RShiny APP to include most of the common outputs from company standard output library.
- Programmers can easily set up for studies.
- It can support stats/physician for exploratory analysis.



Build the Development Team and Working Style

1

We built a team with 4 team members with passionate about R programming and new technology.

2

Using web-based RStudio + bitbucket for collaboration.

3

Use the synthetic cdisc data from scda package as test data.

4

Package install,

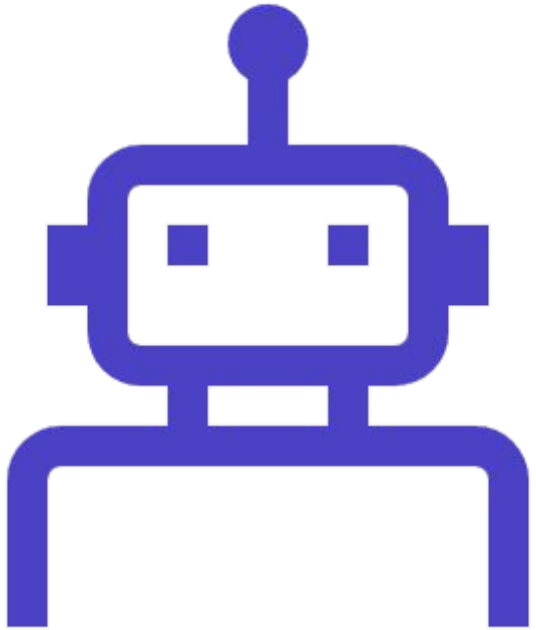
- Pharmaverser-universe repository.
- Install from Github directly.

Challenges

- Our programmers don't have sufficient knowledge about R.
  - To understand the design principal of Teal, it needs advanced R knowledge.
  - Most of the programmers doesn’t have that level of R knowledge.
- Teal packages is very complex, but document is not sufficient since it is still under development.
- Create a new module is very hard for newcomers and we don't have a development guidance.
- The structure of outputs in the modules of teal.modules.clinical package is not consistent with company standard. We need to adjust the structure to fit company standard.

Solutions

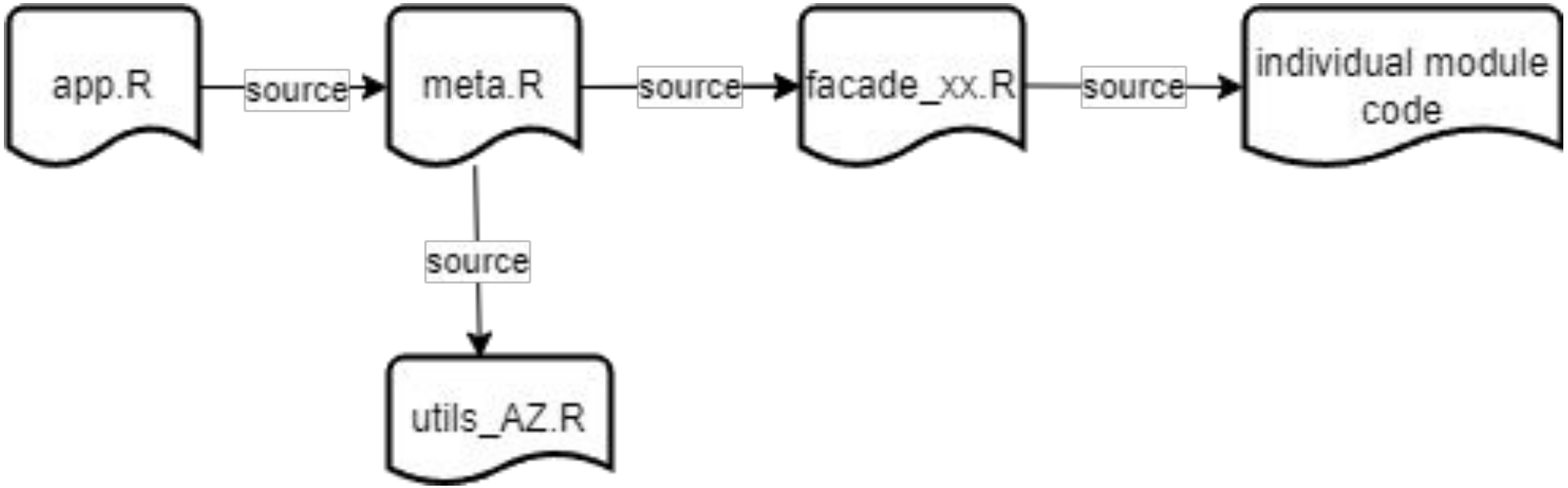
- Company delivered R training for team members. We are also encouraged to learn R by ourselves since R becomes more popular and important in our daily work.
  - Influence through leadership, e.g., Setting learning R/R project as goals.
- Self-learning
  - Let team member adopted one of the downstream packages(teal.data, teal.widgets..) and share with members in the team meeting after exploration, especially on the design pattern, code principle and key functions of package.
  - We also tried to read and learn source code from individual code(starts with 'tm_').
- Development
  - teal.modules.clinical has already integrated a lot of common TLFs.
  - Some outputs in the teal.modules.clinical doesn't fit company standard.
    - Extract the code teal.modules.clinical and update accordingly.
    - Develop a brand-new module and try to imitate the code style of template code.



Struct
Progra

```
### Initialize APP

# interface for lab box plot

az_tm_g_lab_boxplot <- function(label,
                                dataname = 'ADLB',
                                parentname = 'ADSL',
                                arm_var = teal.transform::choices_selected(
                                  choices = teal.transform::variable_choices(adsl, subset = c('TRT01A', 'TRT01P')),
                                  selected = c('TRT01A')
                                ),

                                val_var = teal.transform::choices_selected(
                                  teal.transform::variable_choices(adlb, c('AVAL', 'CHG')),
                                  selected = c('AVAL'),
                                  fixed = FALSE
                                ),

                                prm_val = teal.transform::choices_selected(
                                  teal.transform::value_choices(adlb, 'PARAMCD', 'PARAM'),
                                  selected = c('ALT'),
                                  fixed = FALSE
                                ),

                                time_var = teal.transform::choices_selected(
                                  teal.transform::variable_choices(adlb, c('AVISIT')),
                                  selected = c('AVISIT'),
                                  fixed = TRUE
                                )
```

Structure of Programs…continued…



Pilot

Presentation title

Title	Module
Progression-free survival - based on blinded independent central review (Full analysis set)	Time to event table
Progression-free survival - based on investigator assessment (Full analysis set)	Time to event table
Progression-free survival - sensitivity analysis for evaluation-time bias, attrition bias and ascertainment bias (Full analysis set)	Time to event table
Progression-free survival - based on blinded independent central review - Kaplan-Meier plot (Full analysis set)	KM plot
Progression-free survival, time to censoring - based on blinded independent central review - sensitivity analysis for attrition bias - Kaplan-Meier plot (Full analysis set)	KM plot
Progression-free survival - based on blinded independent central review - complementary log-log plot (Full analysis set)	
Treatment status at progression - based on blinded independent central review (Full analysis set)	
Summary of RECIST assessments - based on blinded independent central review (Full analysis set)	
Disagreements between investigator and central reviews of RECIST progression (Full analysis set)	
Progression-free survival - based on blinded independent central review - subgroup analysis (Full analysis set)	Time to event table
Progression-free survival - based on blinded independent central review - forest plot by subgroup (Full analysis set)	Forest Survival Plot
Overall survival - primary analysis (Full analysis set)	Time to event table
Overall survival - primary analysis - Kaplan-Meier plot (Full analysis set)	KM Plot
Overall survival, time to censoring - sensitivity analysis for attrition bias - Kaplan-Meier plot (Full analysis set)	KM Plot
Overall survival - subgroup analysis (Full analysis set)	KM Plot
Overall survival - forest plot by subgroup (Full analysis set)	Forest Survival Plot
Objective response rate - based on blinded independent central review (Full analysis set)	Objective Response
Objective response rate - based on investigator assessment (Full analysis set)	Objective Response
Objective response rate with confirmed response - based on blinded independent central review (Full analysis set)	Objective Response
Best objective response - based on blinded independent central review (Full analysis set - patients with measurable disease at baseline)	
Best objective response - based on investigator assessment (Full analysis set - patients with measurable disease at baseline)	
Best objective response with confirmed response - based on blinded independent central review (Full analysis set - patients with measurable disease at baseline)	
Duration of objective response - based on blinded independent central review (Full analysis set)	
Duration of objective response - based on investigator assessment (Full analysis set)	
Duration of objective response - based on blinded independent central review - Kaplan-Meier plot (Full analysis set)	KM plot
Disease control rate at 28 weeks - based on blinded independent central review (Full analysis set)	Objective Response
Disease control rate at 28 weeks - based on investigator assessment (Full analysis set)	Objective Response
Time to progression - based on blinded independent central review (Full analysis set)	Time to event table
Time to progression - based on investigator assessment (Full analysis set)	Time to event table
Time to progression - based on blinded independent central review - Kaplan-Meier plot (Full analysis set)	KM plot
Time to progression - based on investigator assessment - Kaplan-Meier plot (Full analysis set)	KM plot
Time from randomisation to second progression or death - based on investigator assessment (Full analysis set)	Time to event table

Problems

- Package install/programming environment setting
- Problem solving
- Usage
- Package validation