Paper PP23

SanityCheckR: data quality control with R Shiny

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ABSTRACT

Data exploration and validation is a critical step in any life sciences project workflow and performing it usually implies programming skills and writing many lines of code which can be time consuming. With the aim of empowering all team members, with and without programming skills, to interact in a quick and easy fashion with datasets, we developed SanityCheckR an interactive application to explore, visualize and summarize SAS dataset files, using R language and the Shiny framework. The dashboard was customized to allow the user to interact with the dataset (for example, dynamically filtering variables) and provide easy access to the most common quality control tools, such as descriptive and pivot tables, plots to visualize variables and reveal missing data patterns, accelerating and simplifying the exploration/validation processes. In addition, this tool can be used in a live and interactive manner enabling more informative discussions in, for instances, data review meetings.

INTRODUCTION

SanityCheckR is a web-based tool written in the open-source R programming language and powered by the Shiny framework, a package developed by RStudio for web applications.

The application's back-end structure uses fifteen R packages (amongst which, ggplot2, tidyverse, markdown, haven) and the front-end is based on the Shiny Dashboard R package, providing an intuitive and user-friendly dashboard design that makes the web interface very attractive for users. The dashboard was customized to provide easy access to the most common quality control checks, including (1) domain name, number of observations, subjects and variables; (2) summary statistics of numeric and character variables; (3) percentage and distribution (by variable and observations) of missing data and (4) data visualization (Figure 1). SanityCheckR is a no-code tool that allows data exploration and validation, in an interactive manner, by all team members, regardless of their programming experience.

SANITYCHECKR LAYOUT AND FUNCTIONALITY

The application's main menu, located on the left side, has three expandable main panels (*Data*, *Descriptive Statistics (subpanels: Numeric, Character, Pivot Tables)* and *Data Visualization (subpanels: Exploratory Analysis, Missing Data)*) with respective sub-panels, there is also a *Browse* button to upload files and a *Report* button to download a word document with a summary of the main features of the dataset.

The main display screen is in the center right of the page and at the top six information boxes display the dataset CDISC domain (if existent), number of observations, subjects, variables, percentage of missing data and type of special characters found in the file (Figure 1). SanityCheckR uses SAS datasets (.sas7bdat files) as an input, once the file is uploaded, the dataset is available to interact with, on the *Data* panel (for example, dynamically filtering variables) and all summary statistics and missing data overview will be immediately available in the *Descriptive Statistics* (*Numeric* and *Character* sub-panels) and *Data Visualization* (*Missing Data* sub-panel), respectively. In the *Descriptive Statistics-Numeric* and *Character* sub-panels, the users can also plot variables by clicking in the plot icon located on the right side of the descriptive tables (Figure 2). Pivot tables are easily accessible, in the *Descriptive Statistics-Pivot Tables* panel, by dragging and dropping variables as columns or rows (Figure 3). In *Data Visualization-Exploratory Analysis* panel, users can select x and y variables to plot as well as choose a stratifying variable and respective strata to visualize (Figure 4). In addition, the *Data Visualization-Missing Data* panel, uses a series of stem plots and heat maps to reveal missing data patterns (Figure 5 and 6). Finally, the cheery on top of the cake, all descriptive statistics and plots can be downloaded and therefore high-quality documents can be quickly shared with team members and clients.

Figure 1: Overview of SanityCheckR dashboard.

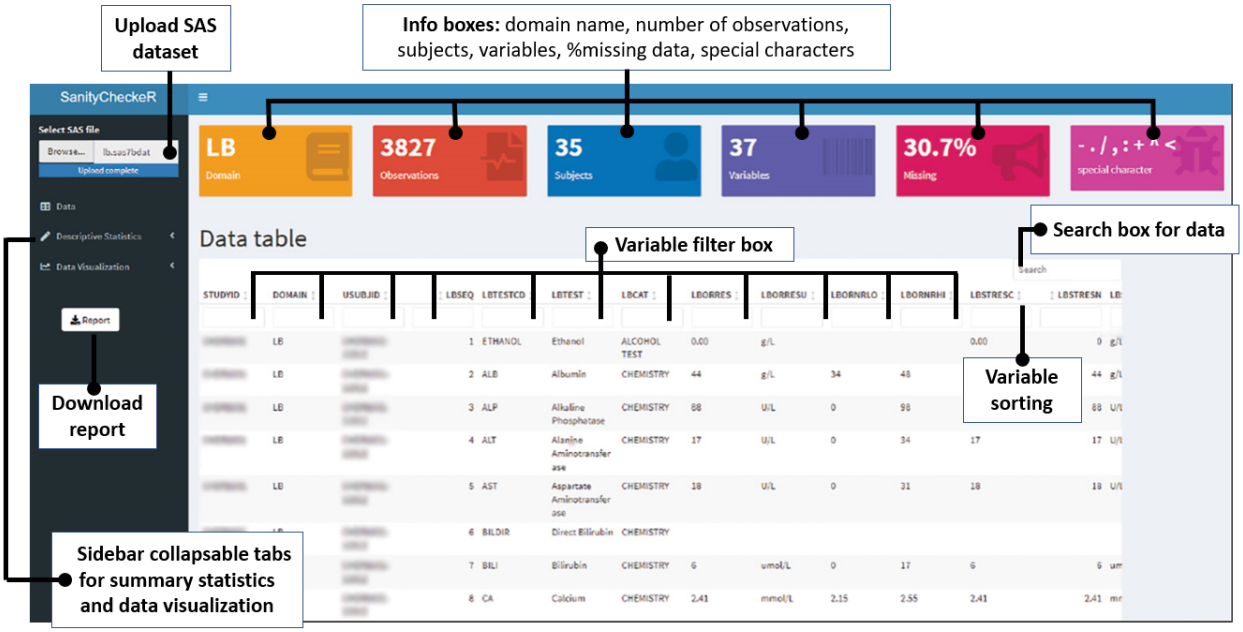


Figure 2: Descriptive Statistic panel: numeric and character tabs.

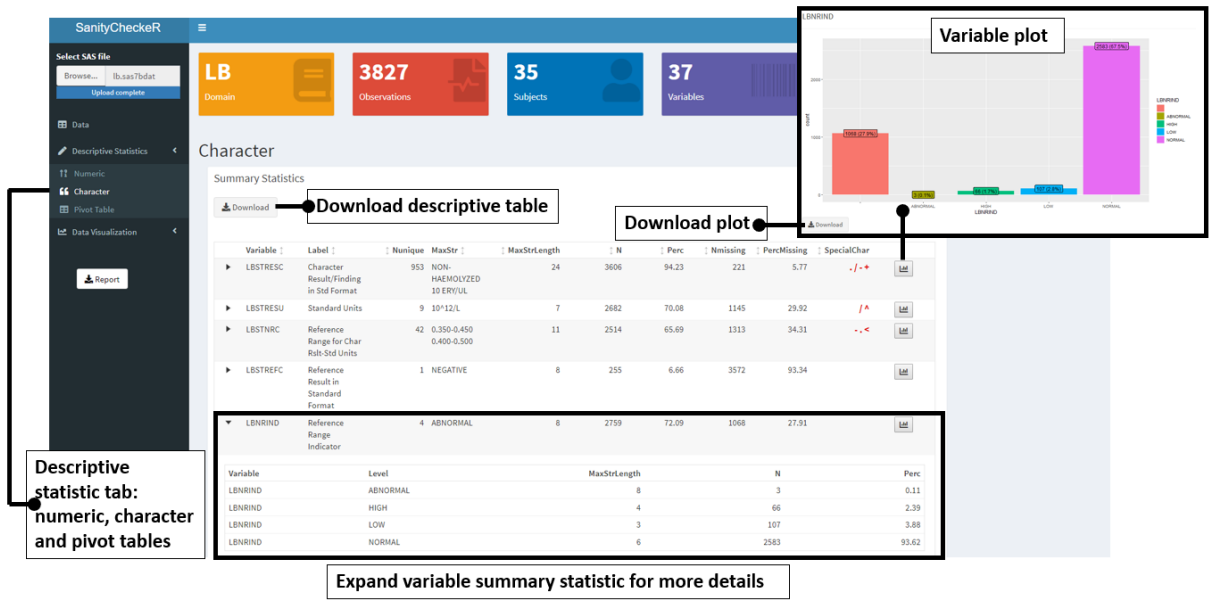


Figure 3: Descriptive Statistic panel: pivot table tab.

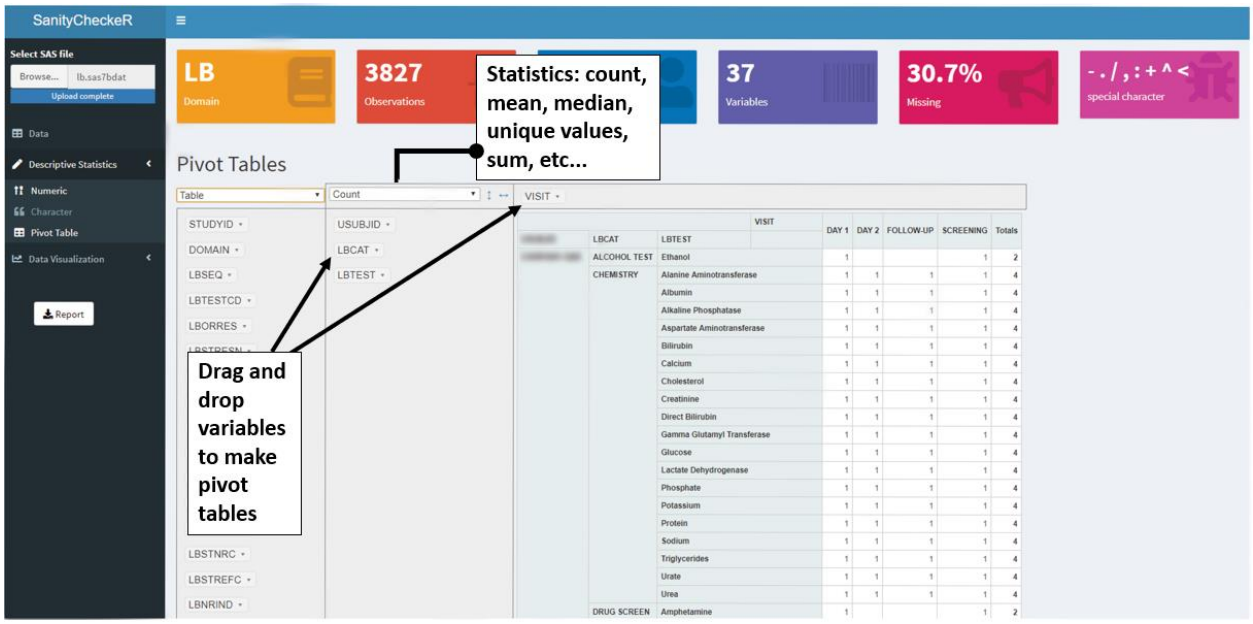


Figure 4: Data Visualization panel: exploratory analysis.

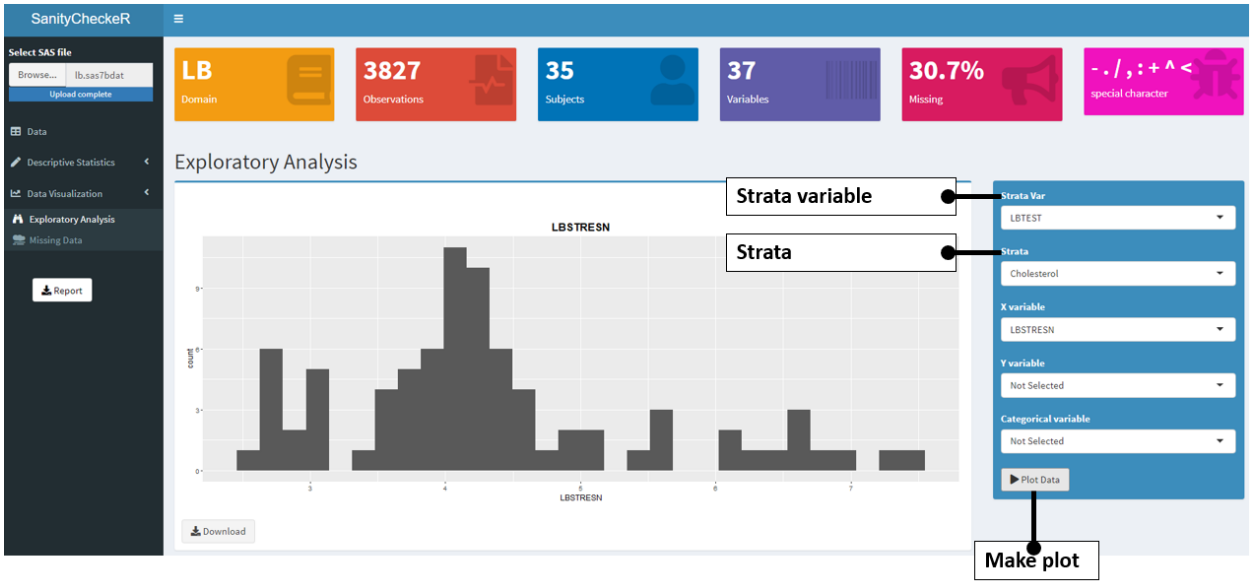


Figure 5: Data Visualization panel: missing data tab, stem plot.

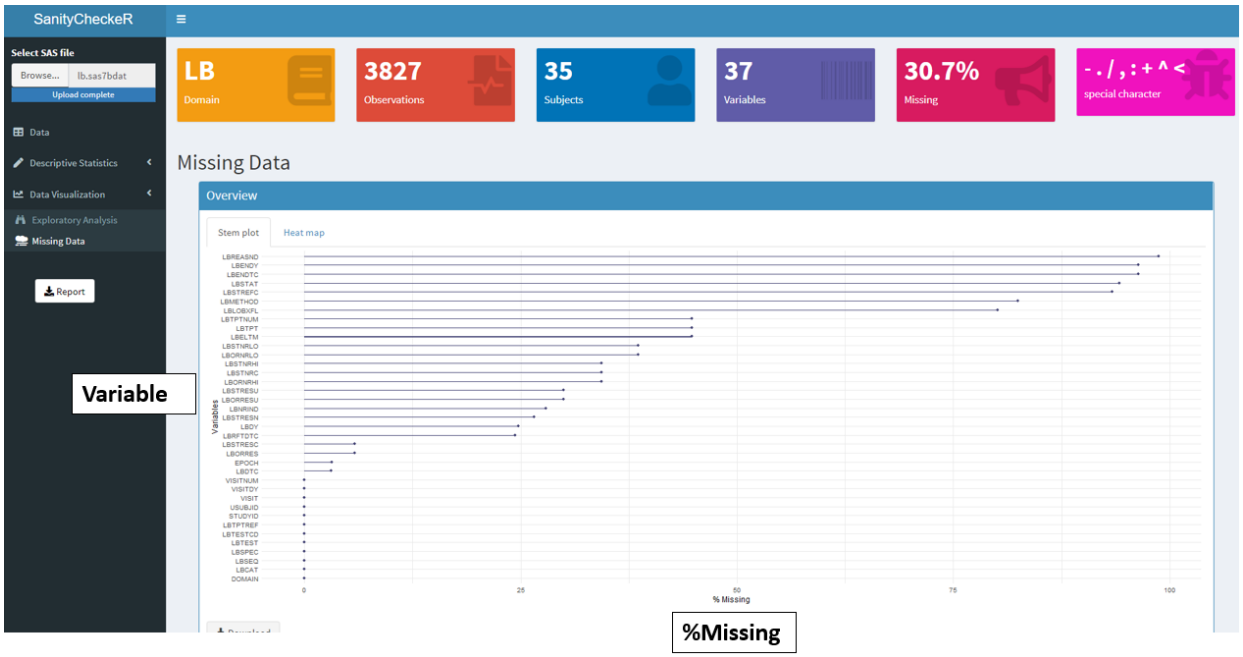
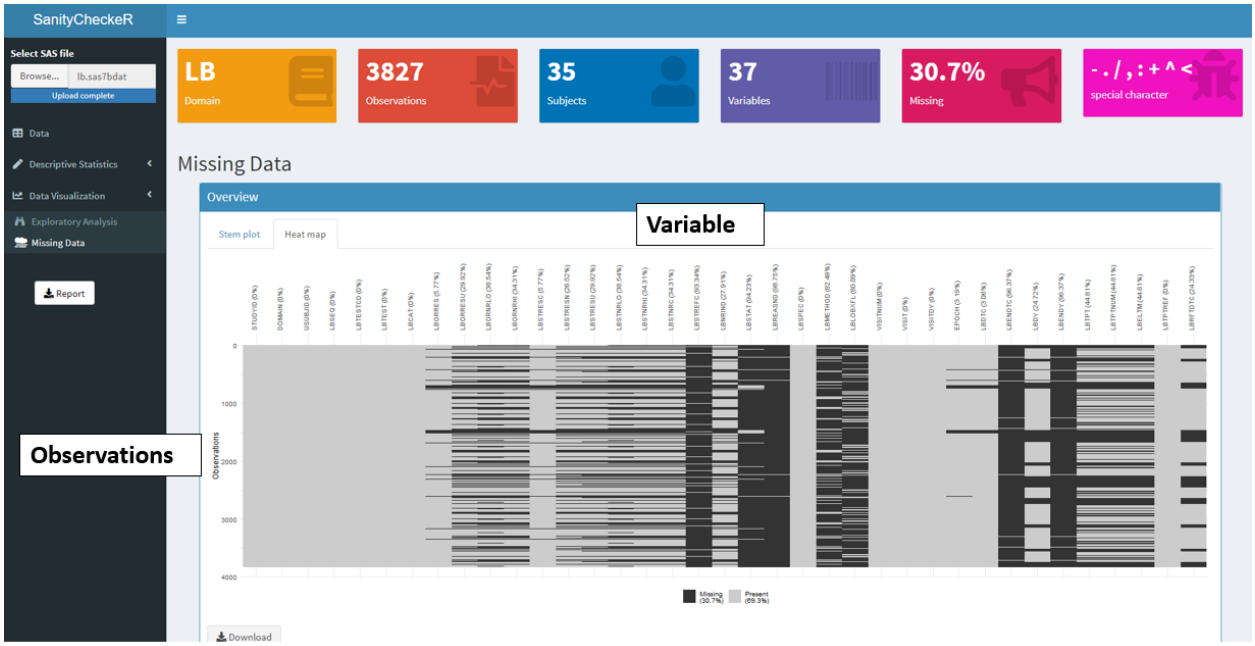


Figure 6: Data Visualization panel: missing data tab, heat map.



CONCLUSION

In conclusion, SanityCheckR is a no-code tool that has the potential to accelerate and simplify the data exploration and validation processes, in an interactive manner, by all team members, regardless of their programming skills.

REFERENCES

Mastering Shiny. by Hadley Wickham. Released May 2021

ACKNOWLEDGMENTS

I am extremely grateful to OCS Life Sciences staff for useful comments and feedback.

CONTACT INFORMATION

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