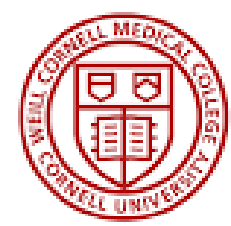




Developing a Shiny Interface for "Maplet" Analysis Pipelines



**Weill Cornell
Medicine**

Introduction

Maplet is an R toolbox for the statistical analysis of **metabolomics** and other **omics** data. The data is stored as a **SummarizedExperiment (SE) object**, which is a matrix-like container with features as rows and samples as columns. The routine analysis work is generally organized into pipelines including **exploratory analysis, statistical analysis, reporting, and visualization**. To **streamline the routine actions** and help the researchers focus on data exploration, this first interface prototype is designed to **support interactive exploration and visualization** of the results produced by maplet pipelines. The interface is developed with **R Shiny**, which builds **interactive web apps** using R.

Workflow and features



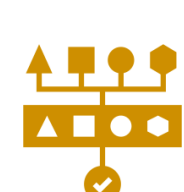
1. Upload Data



Parameter setting



Perform analysis pipelines



Download the resulting SE to the local file



2. Data Exploration

Feature annotations



Series of interactive pie charts



Patients' annotations



Interactive plots (scatter/box/bar plots) & multi-choice of hover text



3. Visualization & Comparison



- Generate an **interactive 2D PCA/UMAP projection** and display a drop-down menu of all sample annotations columns for coloring the plot
- Extract all the result objects from a given SE and display these in **tables** or **plots** choosing from a **drop-down menu**
- Connect a **table** with all statistical results to a **series of interactive plots** that can be triggered in a **fixed order** when given a SE and a statistic name:
 - 1) **Table** → **Volcano plot** → **Box/Scatter plot**
 - 2) **Table** → **StatsBar plot** → **Equalizer/Volcano plot** → **Box/Scatter plot**
- Enable the **download** option to save the interactive plot in the local directory
- Customizable and interactive **hover text** allows users to add more information to graphics automatically

Conclusion

After uploading a maplet-generated SE object, this first prototype of the maplet Shiny interface includes various types of data visualization and useful features, among which are the download option for interactive plots and customizable hover text, which facilitates the inspection and understanding of plots. Despite being a prototype, the developed interface gives the user several tools for the exploration of complex data and results in an interactive and user-friendly setting.

Acknowledgements

We appreciate the assistance and significant contributions from Dr. Elizabeth Sweeney, Dr. Jan Krumsiek, Dr. Elisa Benedetti, Kelsey Chetnik and Mustafa Büyükožkan during developing the first prototype of the Shiny interface for maplet analysis pipelines.

Reference

[1] Maplet paper: <https://arxiv.org/abs/2105.04305>
[2] Shiny: <https://shiny.rstudio.com/articles/upload.html>

Client:

Dr. Jan Krumsiek

Faulty Advisor:

Dr. Elizabeth Sweeney

Team:

Jinfeng Lu,
Xiang Zhu,
Yifan Wu

Biostatistics & Data Science,
Department of Population
Health Science,
Weill Cornell Medicine



Fig 1. Sample page display of the Annotations Explorer module, showing sidebar options for users to visualize plots.