flowDashboard: An Interactive Dashboard for Comparative Flow Analysis

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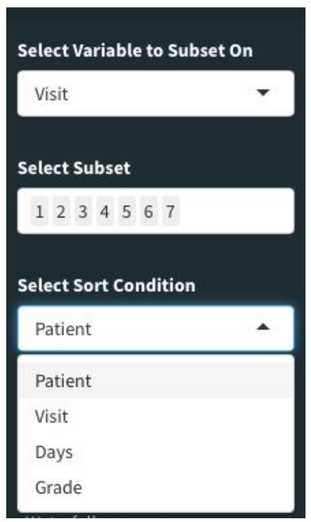
Motivation

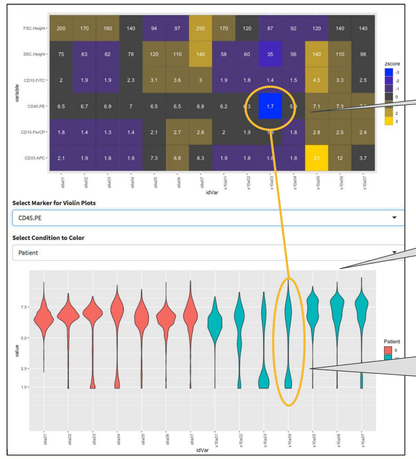
- Most gating from flow cytometry is manual and not reproducible
- Need for transparency within flow data analysis
- Visualize impact of each step of analysis:
  - preprocessing/normalization
  - Gating
    - Autogating or manual
  - Population Expression
- Enable exploration of data by researchers
  - Understand what is reproducible

Subsetting Module

- Annotation and Condition driven
- Integrates with all other visualization modules
- Allows for dynamic subsetting and sorting by condition for visualizations
- Enables exploring data for technical and biological variability



Assessing Quality Control across Samples



Heatmap gives an overview of variability of marker expression across samples

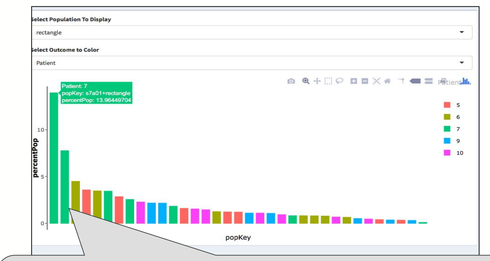
Individual Markers can be compared and colored by condition

Violin plots for each marker/sample can be visualized for technical variablity. Samples can be flagged for poor quality and removed from downstream analysis.

Assessing Gating

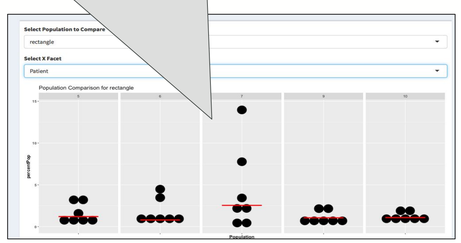
Full gating hierarchy for each population/sample can be assessed for reliability. Bad gating results can be flagged and removed

Gating Heatmap: sortable heatmap that shows Gating Hierarchy for each sample/population

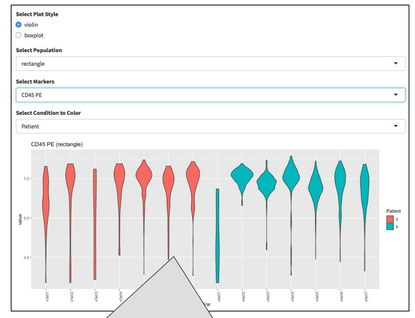


Waterfall plots: allow user to assess correlations between populations and conditions

Dotplots: allow user to assess association of population percentages within categories



Population Expression



Violin plots allow to assess reproducibility of expression within a population and aggregate data within conditions and populations

Implementation

- Implemented in R/Shiny/plotly as modules
  - Modules can be mixed and matched for a customized dashboard
  - `data.table` used for fast subsetting of data structures
- Data and display options encapsulated in R6 objects
  - Automates building of dashboard from objects
  - Objects are derived from either `flowSet` or `gatingSet` objects from `flowWorkspace` (Bioconductor)

Check it out!

http://github.com/laderast/flowDashboard
Shiny example: http://bit.ly/sampleFlow

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