A new R package for graphical approaches

Name: graphicalMCP

Key differences to gMCP

* For Bonferroni-based tests, no change
* A general testing strategy is needed to allow a mixture of Bonferroni, parametric, Simes tests
  + E.g., parametric for H1-3, Simes for H4-5, Simes for H6-7, Bonferroni for H8 and for connecting blocks.
* It will be based on a closed test which enables user assign test types to blocks of hypotheses. Both rejection decisions and adjusted p-values can be outputted.
* Optimal graphs

Key functions for version 1

* Testing
  + Object class
    - graphMCP-class from gMCP
    - matrix2graph from gMCP
    - Checking regularity conditions
      * Similar to graphAnalysis.Rd from gMCP
  + Weighting scheme
    - generateWeights from gMCP
  + Testing for each intersection hypothesis
    - bonferroni.test.Rd, gMCP from gMCP (Bretz et al., 2009)
    - Parametric test (Bretz et al., 2011; Xi et al., 2017)
    - Simes test (Bretz et al., 2011; Lu 2016)
    - A high-level function (similar to gMCP.extended in gMCP) to allow a mixture of the above three types of tests
  + Output
    - Similar to gMCP from gMCP
* Power
  + Bonferroni test
    - calcPower from gMCP
  + Other cases
    - calcPower from gMCP
    - An efficient function for closed test with above testing for intersection hypothesis
  + Optimal graphs
  + Output
    - Similar to calcPower from gMCP

Future extensions

* Group sequential test
* Entangled graphs

Existing interfaces to gMCP

From Keaven Anderson (Merck)

[Multiplicity graphs • gsDesign (keaven.github.io)](https://keaven.github.io/gsDesign/articles/hGraph.html)

From David Robertson (MRC Cambridge)

[shiny.mrc-bsu.cam.ac.uk/apps/GraphApp/](http://shiny.mrc-bsu.cam.ac.uk/apps/GraphApp/)

Reference

Bretz, F., Maurer, W., Brannath, W., & Posch, M. (2009). A graphical approach to sequentially rejective multiple test procedures. *Statistics in medicine*, *28*(4), 586-604.

Bretz, F., Posch, M., Glimm, E., Klinglmueller, F., Maurer, W., & Rohmeyer, K. (2011). Graphical approaches for multiple comparison procedures using weighted Bonferroni, Simes, or parametric tests. *Biometrical Journal*, *53*(6), 894-913.

Lu, K. (2016). Graphical approaches using a Bonferroni mixture of weighted Simes tests. *Statistics in Medicine*, *35*(22), 4041-4055.

Xi, D., Glimm, E., Maurer, W., & Bretz, F. (2017). A unified framework for weighted parametric multiple test procedures. *Biometrical Journal*, *59*(5), 918-931.