Data analysis exercises

The data can be downloaded directly into R from GitHub at `https://github.com/mdbrown/SISCR-Data-Files`.

Software in R can be found in the following locations. The TreatmentSelection package can be found on GitHub at `https://github.com/mdbrown/TreatmentSelection`. See the tutorial at `http://rpubs.com/mdbrown/TreatmentSelection`. The R package, DynTxRegime, for developing marker-based treatment rules using OWL and related approaches, can also be found on CRAN at `https://cran.r-project.org/web/packages/DynTxRegime/index.html`.

Solutions to these exercises can be found on Dropbox at `https://www.dropbox.com/sh/8aab4ko1doywjq6/AACgbvBGRiRIstqCcnAevrSia?dl=0`.

The first 4 questions pertain to the simulated dataset.

1. Estimate the marginal treatment effect.

2. Identify the subset of markers that predict the magnitude of the treatment effect. Describe how the treatment effect varies as a function of the markers.

3. Develop a rule for assigning treatment based on marker(s). Provide a rationale for the form of the rule. Interpret the rule: what markers are involved, what marker combinations are associated with a 'treat' recommendation?

4. Evaluate the clinical impact of the rule.

The next 3 questions pertain to data from the iPrEx trial, which evaluated the efficacy of PrEP for HIV prevention in men who have sex with men and transgender women. The clinical outcome is HIV infection by 1 year. The "markers" are demographics and self-reported risk behaviors at baseline.

5. Develop a model for predicting risk of HIV infection absent PrEP.

6. Evaluate the clinical impact of a rule that recommends PrEP if risk absent PrEP is above 3%.

7. Evaluate a rule that recommends PrEP if the treatment effect is positive– does it have better performance?

The last 2 questions pertain to data from the depression treatment trial, which evaluated pharmacotherapy vs. pharmacotherapy and cognitive behavioral therapy combined for the treatment of chronic depression. The "markers" are baseline variables and the outcome is the HAMD depression score (lower values are preferable).

8. Develop a rule for recommending CBT over and above pharmacotherapy, given the baseline variables GENDER, MOOD and HAMABase.

9. Evaluate the clinical impact of this treatment rule.