

## NEUR 603 Multivariate Models Assignment

Note: MATLAB code included with report (*multivariate\_model.m*) can be run to reproduce results (running will take time, since data is shuffled 5000 times to get permutation-based p-values).

1. The permutation-based  $p$ -value of the first latent variable was obtained by permuting our data matrix  $X$  and computing the first singular value associated with the permuted data 10000 times (Figure 1). The proportion of  $p$ -values with permuted first singular value  $s$  greater than the original first singular value  $s$  (computed with unpermuted data) was found to be 0.009 (this will change if we use more permutation trials and better approximate the true null distribution). Therefore, **the permutation-based  $p$ -value of the first latent variable is approximately 0.009.**

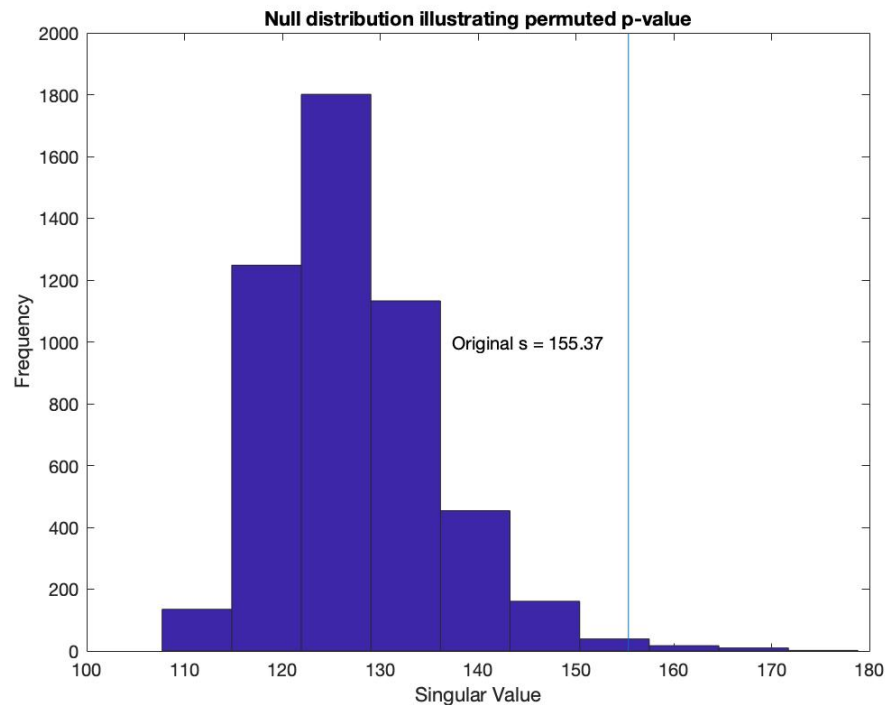


Figure 1 - Null distribution of singular values generated by randomly permuting data and computing 5000 singular values for the first latent variable. The original first singular value is denoted by a blue vertical line

2. **The out-of-sample correlation of connectivity- and mood-based scores is 0.50** (thus, there is a moderate correlation between connectivity- and mood-based scores). A 75% training and 25% test split was used. Note the in-sample correlation was found to be 0.75. Our model doesn't generalize very well to new data.