Single Item Decoding Toolbox (9/10/2019)

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**Introduction**

The single item decoding (SID) toolbox is divided into two core scripts: (1) **SI\_MVPA\_v3** (2) **SI\_analysis\_MVPA\_v3** – both of which utilize their own collection of subscripts. The script **SI\_Classify** defines requisite inputs for **SI\_MVPA\_v3** whereas **SI\_Analysis** defines requisite inputs for **SI\_analysis\_MVPA\_v3**. All scripts have extensive comments with respect to their function, and this document serves as a higher level review *what* functions the scripts implement. As such, for detailed description of variable names, algorithms, etc., please refer directly to the code.

Also note, that the current code is designed to operate on sorted data. Notably, all subjects data should be identically sorted by category and then stimulus number.

The folder **Data** contains example confusion matrices from the LR-LOPO analysis [lambda=100, normalize training data, normalize testing data] when training on pictures and testing on pictures. The data dimensions are [Subject X Trial X Trial] with the values representing posterior probabilities. Additional results are available upon request.

**Code Description**

***SI\_MVPA\_v3():*** This script does all the heavy lifting. At its core, it merely serves as a wrapper for the inbuilt Matlab function **fitcecoc** which performs the actual classification analysis. The main function of this script is to create confusion matrices for each subject, which are then analyzed via **SI\_analysis\_MVPA\_v3**.

***-> Dependent on SI\_debias***

***SI\_analysis\_MVPA\_v3():*** This script analyzes the resulting confusion matrices generated by SI\_MVPA\_v3. Many of the results in the manuscript are based upon data generated from this analysis script.

***-> Dependent on SI\_Rank***