

Discriminability

writeL^AT_EX

January 18, 2017

1 Discriminability

Algorithm 1 Discriminability: A measure of intra-subject consistency and inter-subject differentiation. We want to see that after an implementation

Input: $X \in \mathbb{R}^{C \times N \times T \times S}$ EEG Data (format *electrode* \times *time* \times *trial* \times *subject*)

Input: $\delta : \mathbb{R}^{C \times N}, \mathbb{R}^{C \times N} \rightarrow \mathbb{R}$ a distance function

Output: $D \in \mathbb{R}$ value between 0 and 1, discriminability

```
1: procedure DISCRIMINABILITY( $\mathcal{X}, \delta$ )
2:    $tot = 0$  ▷ set total of rdfs to 0
3:   for  $s \in S$  do
4:      $tot += rdf(X, \delta, s)$ 
5:   return  $\frac{tot}{S \times T \times (T-1)}$ 
```

Algorithm 2 Reliability Density Function: Comparison of difference for given subject of 2 given trials vs the difference between other subjects and their trials

Input: $X \in \mathbb{R}^{C \times N \times T \times S}$ EEG Data (format *electrode* \times *time* \times *trial* \times *subject*)

Input: $\delta : \mathbb{R}^{C \times N}, \mathbb{R}^{C \times N} \rightarrow \mathbb{R}$ a distance function

Input: $s : \mathbb{R}$ subject

Output: $\hat{D} \in \mathbb{R}$ value between 0 and 1, "reliability density" for given conditions

```
1: procedure RDF( $X, \delta, s$ )
2:    $rdf = 0$  ▷ set rdfs to 0
3:   for  $s' \in S$  do
4:     for  $t \in T$  do
5:       for  $t' \in T$  do
6:         if  $t \neq t'$  and  $s \neq s'$  then
7:            $rdf += \mathbb{I}(\delta(X_{t,s}, X_{t',s}) < \delta(X_{t,s}, X_{t',s}))$ 
8:   return  $\frac{rdf}{(S-1) \times T \times (T-1)}$ 
```
