

# Discriminability

writeL<sup>A</sup>T<sub>E</sub>X

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## 1 Discriminability

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

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**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  $\frac{tot}{S \times T \times (T-1)}$ 
```

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

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**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  $\frac{rdf}{(S-1) \times T \times (T-1)}$ 
```

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