Supplementary

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Algorithm 1 Proposed model calibration strategy based on the RS EEG signals

Input: Model parameters Θ, Prototypes P_y, Training set $\{X^{tr}, Y^{tr}\}$, RS EEG signals $\{Z^{tr}, Z^{te}\}$, the number of epochs for training E, the number of epochs for calibration N, learning rate for training η_1, learning rate for calibration η_2, learning rate for adaptation η_3, hyperparameter for prototype ϵ, Distance function D

for $k = 1$ `to` E **do** ▷ Feature disentanglement training
  for all $\{x^{tr}, y^{tr}, z^{tr}\} \subset \{X^{tr}, Y^{tr}, Z^{tr}\}$ **do**
    $\Theta \leftarrow \Theta - \eta_1 \nabla \mathcal{L}(x^{tr}, y^{tr}, z^{tr}; \Theta)$ `by Eq.3`
    $P_y \leftarrow P_y - \epsilon D(x^{tr}, P_y)$ `by Eq.4`
  end for
end for
$Signals = \{\}$
for all $z \subset Z^{te}$ **do** ▷ RS EEG signals calibration
  $z^* \leftarrow z^* - \eta_2 \nabla \mathcal{L}(z; \Theta)$ `by Eq.5`
  $Signals \leftarrow Signals \cup z^*$
end for
for $k = 1$ `to` N **do** ▷ Model adaptation
  $\Theta \leftarrow \Theta - \eta_3 \nabla \mathcal{L}(Signals; \Theta)$ `by Eq.6`
end for

Table 1. Classification accuracy on BCI competition IV-2a. Each column shows the accuracy of an individual subject or the average accuracy across all subjects. The methods in the first sub-row do not use RS EEG signals, while those in the second sub-row use RS EEG signals. Bold indicates the best accuracy achieved for each subject. ResTL achieved improved accuracy in all subjects compared to baselines.

Method	Sub1	Sub2	Sub3	Sub4	Sub5	Sub6	Sub7	Sub8	Sub9	Avg
DeepConvNet	33.85	28.65	39.06	30.38	26.39	31.08	31.25	35.07	38.54	32.70
EEGNet	53.76	39.54	54.88	43.02	51.80	48.96	60.70	61.38	47.82	51.32
HS-CNN	43.32	29.95	50.00	35.64	30.94	39.85	36.88	42.33	44.55	39.27
CRAM	61.02	42.35	73.11	50.43	50.74	51.48	67.26	69.72	66.85	59.22
Jeon *et al.*	63.46	44.95	73.08	46.39	50.72	56.01	65.87	66.35	58.41	58.36
GCRAM	61.43	42.70	71.72	51.80	55.83	52.48	68.07	69.95	67.04	60.11
Conformer	58.89	43.75	74.04	45.43	52.88	52.64	64.18	70.91	61.30	58.23
EEGNet-BCM	54.79	47.13	69.37	47.92	61.32	53.24	62.28	61.88	64.11	58.00
CRAM-BCM	64.73	44.41	77.21	**52.85**	56.83	53.41	67.65	73.60	65.65	61.82
Conformer-BCM	65.38	45.91	79.81	50.72	55.53	52.16	66.59	75.72	68.27	62.23
EEGNet-ResTL	**72.17**	**54.63**	69.29	52.22	54.57	56.55	65.92	70.25	63.04	62.07
Conformer-ResTL	63.94	46.63	**81.25**	51.44	**65.87**	**57.45**	**69.47**	**79.33**	**70.43**	**65.09**

Table 2. Classification accuracy on BCI competition IV-2b. Each column shows the accuracy of an individual subject or the average accuracy across all subjects. The methods in the first sub-row do not use RS EEG signals, while those in the second sub-row use RS EEG signals. Bold indicates the best accuracy achieved for each subject. ResTL achieved improved accuracy in all subjects except subject#3 compared to baselines.

Method	Sub1	Sub2	Sub3	Sub4	Sub5	Sub6	Sub7	Sub8	Sub9	Avg
DeepConvNet	72.45	60.54	56.70	75.70	75.10	64.96	72.94	66.35	70.39	68.35
EEGNet	67.25	54.75	**67.42**	69.97	73.78	61.25	74.83	73.83	67.25	67.81
HS-CNN	67.64	60.66	54.90	74.47	73.76	69.65	69.35	68.19	78.06	68.52
CRAM	66.58	52.50	53.58	78.72	70.80	61.42	74.33	70.58	70.67	66.58
Jeon *et al.*	71.42	58.42	65.83	68.33	77.10	70.17	77.08	75.17	74.00	70.84
MIN2Net	68.25	**67.00**	56.17	77.07	78.88	70.42	76.33	72.92	59.17	69.58
GCRAM	69.25	59.67	59.42	86.32	73.55	66.75	68.33	76.25	70.25	69.98
Conformer	70.25	57.25	54.58	80.77	71.97	63.25	68.58	71.67	75.75	68.23
EEGNet-BCM	69.42	55.00	66.67	78.72	72.78	67.17	72.50	75.50	66.75	69.39
CRAM-BCM	64.92	56.42	62.83	85.35	75.15	66.08	74.25	75.00	74.75	70.53
Conformer-BCM	70.75	60.75	60.58	86.60	73.87	69.33	71.42	72.55	76.33	71.38
EEGNet-ResTL	72.33	59.42	61.58	89.60	**79.12**	72.08	**78.25**	74.92	70.83	73.13
Conformer-ResTL	**74.00**	58.00	62.50	**90.33**	76.43	**73.75**	71.67	**78.67**	**78.50**	**73.76**