Achieving High-performance Cross-day Neural Decoding by Learning Channel-level Invariant Representations

Anonymous Authors[1]

[1]Anonymous Institution, Anonymous City, Anonymous Region, Anonymous Country. Correspondence to: Anonymous Author <anon.email@domain.com>.

Table 1. The performance of regression and classification prediction which compares with different cross-day decoding methods.

R^2/acc	Model	Task	Number of days since day 0					
			0	[5, 10)	[10, 20)	[20, 40)	[40, 65)	[65, +∞)
Center-Out (C)	Stabilizedbci	Direction	86.5± 0.011	56.6± 0.027	50.7± 0.157	44.8± 0.110	-/-	-/-
	SD-Net			69.3± 0.152	62.5± 0.005	63.3± 0.232	-/-	-/-
	NoMAD			48.4± 0.023	50.6± 0.157	37.9± 0.226	-/-	-/-
	CRRL (Ours)			**77.1± 0.117**	**70.5± 0.198**	**66.8± 0.117**	-/-	-/-
Center-Out (M)	Stabilizedbci	Direction	73.1± 0.208	-	51.6± 0.181	43.7± 0.052	-	-
	SD-Net			-	62.0± 0.151	52.0± 0.149	-	-
	NoMAD			-	39.5± 0.233	29.7± 0.140	-	-
	CRRL (Ours)			-	**63.5± 0.126**	**57.4± 0.048**	-	-
ISO (J)	Stabilizedbci	Direction	92.5± 0.240	57.4± 0.089	53.1± 0.205	35.0± 0.120	36.5± 0.105	29.1± 0.015
	SD-Net			65.2± 0.228	58.6± 0.159	44.2± 0.061	43.8± 0.181	34.5± 0.032
	NoMAD			65.2	**62.4± 0.023**	40.8± 0.111	37.5± 0.203	39.7± 0.119
	CRRL (Ours)			**66.3± 0.160**	61.5± 0.204	**62.2± 0.107**	**48.6± 0.180**	**51.1± 0.008**
ISO (S)	Stabilizedbci	Direction	94.4± 0.072	43.3± 0.023	47.2± 0.229	40.9± 0.172	25.0± 0.247	14.8± 0.176
	SD-Net			56.5± 0.024	53.7± 0.009	53.7	45.6± 0.048	35.9± 0.214
	NoMAD			53.3± 0.065	51.2± 0.188	45.0± 0.127	44.1± 0.187	31.3± 0.135
	CRRL (Ours)			**57.2± 0.160**	**56.6± 0.077**	**54.5± 0.237**	**54.1± 0.199**	**45.2± 0.210**
ISO (J)	ADAN	EMG	0.71± 0.060	0.66	0.60	0.56	0.54± 0.106	0.48± 0.057
	Cycle-GAN			0.68± 0.212	0.65	0.63± 0.114	0.59± 0.183	0.50± 0.036
	CRRL (Ours)			**0.70± 0.234**	**0.66± 0.123**	**0.69± 0.223**	**0.65± 0.239**	**± 0.070**
Key (G)	ADAN	EMG	0.46	0.26	0.21	0.18	<0	-
	Cycle-GAN			0.27	0.25	0.20	0.09	-
	CRRL (Ours)			**0.41**	**0.37**	**0.35**	**0.32**	-
Center-Out (C)	Stabilizedbci	Trajectory	0.84	0.59	0.52	0.45	-	-
	SD-Net			0.73	0.65	0.62	-	-
	NoMAD			0.55	0.58	0.41	-	-
	CRRL (Ours)			**0.75**	**0.68**	**0.65**	-	-
Center-Out (M)	Stabilizedbci	Trajectory	0.68± 0.077	-	0.38	0.34	-	-
	SD-Net			-	0.45	0.39	-	-
	NoMAD			-	0.33	0.26	-	-
	CRRL (Ours)			-	**0.51**	**0.45**	-	-
ISO (J)	Stabilizedbci	Trajectory	0.73± 0.070	0.38± 0.239	0.32± 0.223	0.23± 0.204	0.20	0.17
	SD-Net			0.42± 0.228	0.35± 0.032	0.28± 0.159	0.25± 0.157	0.20± 0.117
	NoMAD			0.44± 0.163	0.45± 0.176	0.37± 0.160	0.28± 0.127	0.31± 0.187
	CRRL (Ours)			**0.51± 0.246**	**0.48± 0.186**	**0.43± 0.205**	**0.46± 0.043**	**0.47± 0.101**
ISO (S)	Stabilizedbci	Trajectory	0.75± 0.193	0.33± 0.146	0.35± 0.152	0.24± 0.112	0.18	<0
	SD-Net			0.40± 0.145	0.37± 0.019	0.36± 0.091	0.32± 0.117	0.24± 0.234
	NoMAD			0.34± 0.069	**0.40± 0.061**	**0.38± 0.136**	0.37± 0.095	0.29± 0.242
	CRRL (Ours)			**0.43± 0.134**	0.39± 0.221	0.35± 0.187	**0.37± 0.108**	**0.30± 0.186**