

# MSVTNet: Multi-Scale Vision Transformer Neural Network for EEG-Based Motor Imagery Decoding

Ke Liu, Tao Yang, Zhuliang Yu, *Member, IEEE*, Weibo Yi, Hong Yu, Guoyin Wang, Wei Wu\*, *Senior Member, IEEE*

## I. EVALUATION METRICS

The effectiveness of our proposed model is assessed using accuracy, standard deviation and kappa as evaluation metrics:

1) *Accuracy*:

$$Acc = \frac{1}{S} \sum_{s=1}^S SubAcc_s, \quad SubAcc = \frac{n_{true}}{n_{target}} \times 100\% \quad (1)$$

where  $Acc$  and  $SubAcc$  is the decoding accuracy for each subject and the overall model, respectively.  $n_{target}$  represents the total number of trials in the test set,  $n_{true}$  represents the number of correctly classified trials, and  $S$  represents the total number of subjects in the dataset.

2) *Standard deviation*:

$$Std = \sqrt{\frac{1}{S} \sum_{s=1}^S (SubAcc_s - Acc)^2} \quad (2)$$

3) *Kappa*:

$$Kappa = \frac{Acc - p_e}{1 - p_e} \quad (3)$$

where  $p_e$  is the hypothetical probability of chance agreement.

## II. EXPERIMENT ANALYSIS

TABLE I  
TRAINABLE PARAMETERS OF DIFFERENT DEEP LEARNING METHODS

Dataset	Shallow ConvNet	EEGNet	FBCNet	EEG Conformer	Light ConvNet	IFNet	MSVTNet	
							Subject-dependent	Subject-independent
BCICIV2A	23,444	1,884	11,812	789,572	13,156	11,396	75,494	43,670
BCICIV2B	11,722	1,354	4,034	759,106	2,082	7,938	71,524	39,700
OpenBMI	12,402	1,626	8,930	786,306	11,874	10,114	72,748	40,924

TABLE II  
DATA VOLUMES FOR DIFFERENT EXPERIMENTS. THE NUMBERS INDICATE THE NUMBER OF TRIALS IN THE TRAINING AND TEST SETS FOR EACH SUBJECT

Dataset	Subject-dependent		Subject-independent
	Session-dependent	Session-independent	
BCICIV2A	432 / 72	576 / 288	2304 / 288
BCICIV2B	180 / 30	800 / 320	5800 / 720
OpenBMI	300 / 50	400 / 200	21200 / 400

To clearly present the number of trainable parameters for all deep learning algorithms in the experimental settings, as well as the number of trials under different datasets and analyses, we provide statistics in Table I and Table II, respectively.

It is noteworthy that on the OpenBMI dataset, most deep learning-based algorithms exhibit better decoding performance in the subject-dependent analysis compared to the subject-independent analysis. This is consistent with [1], indicating that deep learning models benefit from more training data. To investigate the underlying reasons for the accuracy improvement, we categorize subjects based on a 70% decoding accuracy threshold [2] in session-dependent and session-independent analyses, and then calculate the average decoding accuracy of these subjects in the subject-independent analysis. As shown in Fig. 1, those subjects who originally have decoding accuracies greater than 70% in the session-dependent and session-independent

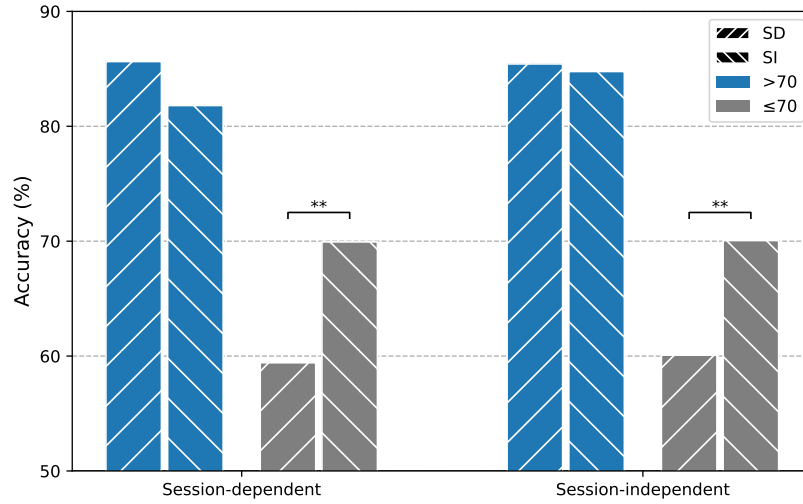


Fig. 1. Comparison of subject-independent decoding performance. SD and SI represent the performance of baseline subjects in the subject-dependent analysis and the corresponding subjects in the subject-independent analysis, respectively. \*\* indicates statistical significance with  $p < 0.01$ .

analyses show a slight performance decline in the subject-independent analysis. Conversely, the average accuracy of those subjects with original accuracies less than or equal to 70% increases by around 10% in the subject-independent analysis, with a statistically significant difference ( $p < 0.01$ ). This suggests that the large amount of training data from multiple subjects can significantly enhance the decoding performance of deep learning models for BCI illiterate users [3].

### III. SINGLE SUBJECT CLASSIFICATION ACCURACIES

For reproducibility and future comparisons, the single subject MI classification accuracies achieved by FBCSP-SVM [4], Shallow ConvNet [5], EEGNet [6], FBCNet [7], EEG Conformer [8], Ligth ConvNet [9], IFNet [10] and MSVTNet for subject-dependent (session-dependent and session-independent) and subject-independent analyses on BCI Competition IV 2a (BCIC-IV-2a) [11], BCI Competition IV 2b (BCIC-IV-2b) [12] and OpenBMI [13] datasets are presented in Table III, IV, V, VI and VII, respectively.

TABLE III  
CLASSIFICATION ACCURACIES IN % FOR EACH SUBJECT ON THE BCIC-IV-2A DATASET

Experiment	Method	S01	S02	S03	S04	S05	S06	S07	S08	S09	Avg	Std
Session-dependent	FBCSP-SVM	79.17	65.28	88.89	62.50	70.83	43.06	93.06	84.72	63.89	72.38	14.84
	Shallow ConvNet	74.17	63.33	90.56	60.56	65.56	66.94	80.56	80.00	78.33	73.33	9.33
	EEGNet	75.28	52.50	88.33	69.72	69.72	67.50	79.44	85.00	88.61	75.12	11.06
	FBCNet	78.06	56.94	95.28	68.33	79.17	50.28	84.44	87.50	78.89	75.43	13.66
	EEG Conformer	72.50	61.39	87.22	64.72	62.22	58.61	79.17	87.22	57.78	70.09	11.18
	Light ConvNet	84.17	62.78	91.11	73.61	80.28	61.94	92.50	89.72	79.17	79.48	10.82
	IFNet	85.56	59.44	95.28	61.11	69.17	56.67	86.39	88.61	78.61	75.65	13.55
	MSVTNet	81.67	64.17	93.61	77.78	80.56	78.61	90.56	87.50	88.61	82.56	8.36
Subject-dependent	FBCSP-SVM	81.60	50.00	80.90	60.07	46.53	46.53	85.07	78.13	70.14	66.56	15.06
	Shallow ConvNet	74.38	56.46	84.38	68.75	54.24	55.83	74.38	81.32	71.88	69.07	10.56
	EEGNet	81.74	52.92	85.42	63.19	70.62	56.81	84.24	78.12	80.62	72.63	11.58
	FBCNet	81.88	54.44	89.31	76.94	65.42	55.90	84.72	79.24	81.94	74.42	11.99
	EEG Conformer	78.89	52.22	84.31	68.40	55.97	57.22	79.24	75.21	76.67	69.79	11.15
	Light ConvNet	86.46	54.31	90.49	78.47	64.10	60.35	86.25	84.65	84.31	76.60	12.60
	IFNet	83.68	51.74	90.83	76.25	67.85	57.50	88.75	82.15	84.17	75.88	13.09
	MSVTNet	85.76	54.38	91.74	75.90	77.22	68.26	88.26	80.14	84.79	78.50	10.86
Subject-independent	FBCSP-SVM	41.15	25.00	53.30	31.25	27.43	28.65	22.74	56.25	43.23	36.56	11.70
	Shallow ConvNet	66.67	39.93	81.08	50.87	44.62	49.65	68.58	73.96	67.19	60.28	13.49
	EEGNet	72.57	47.40	75.87	56.08	55.03	44.79	65.97	75.52	66.15	62.15	11.12
	FBCNet	67.01	37.50	65.97	50.87	27.43	32.47	43.75	63.54	58.68	49.69	14.20
	EEG Conformer	56.94	42.19	70.49	48.61	52.43	50.52	72.92	70.83	51.91	57.43	10.56
	Light ConvNet	64.58	34.72	68.23	46.53	37.33	35.76	44.97	61.28	57.99	50.15	12.34
	IFNet	60.76	30.73	77.95	45.83	29.51	34.72	40.10	62.85	65.45	49.77	16.47
	MSVTNet	67.71	45.31	85.76	53.30	50.35	47.40	75.17	81.42	70.49	64.10	14.47

TABLE IV  
CLASSIFICATION ACCURACIES IN % FOR EACH SUBJECT ON THE BCIC-IV-2B DATASET

Experiment	Method	S01	S02	S03	S04	S05	S06	S07	S08	S09	Avg	Std
Subject-dependent	FBCSP-SVM	56.67	50.00	66.67	80.00	88.57	70.00	60.00	63.33	36.67	63.54	14.58
	Shallow ConvNet	56.00	57.33	43.33	86.29	83.43	78.67	65.33	74.00	44.00	65.38	15.31
	EEGNet	65.33	62.67	50.67	87.43	69.71	91.33	78.67	62.67	54.00	69.16	13.28
	FBCNet	58.00	55.33	55.33	93.14	90.86	85.33	52.67	64.00	46.00	66.74	16.99
	EEG Conformer	74.67	56.67	56.67	85.14	93.14	68.00	66.00	65.33	49.33	68.33	13.27
	Light ConvNet	64.00	62.00	51.33	92.57	88.00	76.67	66.00	65.33	46.67	68.06	14.43
	IFNet	76.00	52.00	58.00	89.71	90.86	84.00	60.00	72.67	47.33	70.06	15.44
	MSVTNet	60.67	67.33	58.00	90.86	81.14	82.00	78.67	62.67	51.33	70.30	12.55
	FBCSP-SVM	62.19	56.43	52.19	95.31	86.25	79.69	77.19	87.19	77.81	74.92	13.95
	Shallow ConvNet	71.38	65.21	79.00	81.81	81.31	79.81	83.37	90.56	82.69	79.46	6.88
	EEGNet	74.56	67.36	84.50	97.25	91.31	78.94	93.06	93.56	88.38	85.44	9.40
	FBCNet	71.94	51.36	64.19	96.50	91.50	82.94	81.44	91.75	86.56	79.80	13.87
	EEG Conformer	70.00	63.93	81.75	95.94	90.38	76.19	84.56	92.94	84.25	82.21	10.00
	Light ConvNet	74.38	54.21	69.12	97.31	91.81	86.19	83.00	91.44	84.50	81.33	12.63
	IFNet	73.25	54.71	59.06	97.50	86.19	84.62	83.19	92.81	90.19	80.17	14.01
	MSVTNet	75.56	70.36	85.00	96.06	94.69	85.06	91.50	94.06	88.00	86.70	8.35
Subject-independent	FBCSP-SVM	70.97	54.56	52.50	74.86	67.30	75.56	73.75	66.18	73.61	67.80	8.17
	Shallow ConvNet	73.47	66.76	60.56	80.81	82.16	79.44	78.19	75.00	72.22	74.29	6.64
	EEGNet	76.53	70.44	64.72	75.68	83.65	76.81	83.75	79.47	73.61	76.07	5.73
	FBCNet	74.03	59.12	61.67	80.54	78.78	73.33	70.97	74.34	76.94	72.19	6.90
	EEG Conformer	70.28	70.29	60.42	81.49	80.27	76.11	77.50	72.76	73.33	73.61	6.01
	Light ConvNet	71.25	59.41	61.94	83.78	81.89	74.03	72.36	72.63	75.42	72.52	7.53
	IFNet	72.78	60.29	56.11	80.81	75.14	80.83	73.47	72.50	80.00	72.44	8.30
	MSVTNet	74.86	71.47	61.94	82.03	83.24	85.00	81.67	71.45	76.39	76.45	7.00

#### IV. CONFUSION MATRIX FOR ALL EXPERIMENTS

To more comprehensively compare the performance of different decoding algorithms on the BCIC-IV-2a, 2b and OpenBMI datasets, the confusion matrices of all analysis experiments are displayed in Fig. 2, 3 and 4, respectively. Compared with the contrastive algorithms, MSVTNet achieved higher decoding accuracy for each MI class with smaller variance in all analysis experiments, demonstrating the reliability and generalization of the model decoding performance.

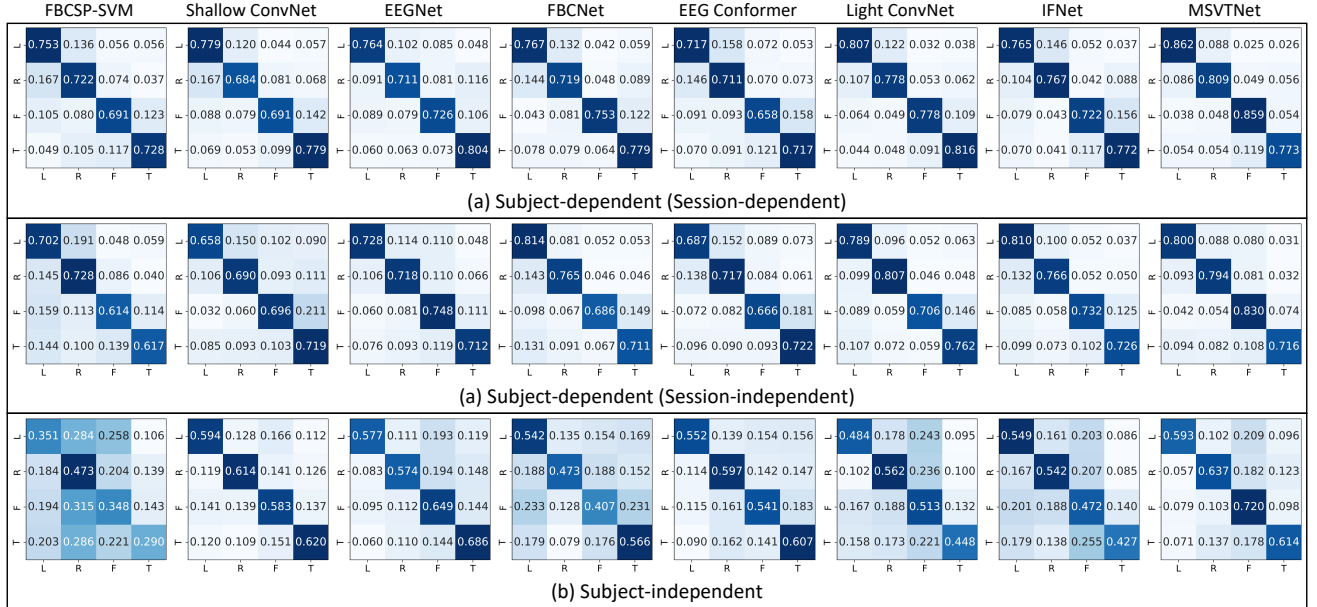


Fig. 2. Confusion matrices for different models on the BCIC-IV-2a dataset. Each column represents the true label and each row depicts the predicted label. L, R, F, and T refer to MI of left hand, right hand, feet and tongue, respectively.

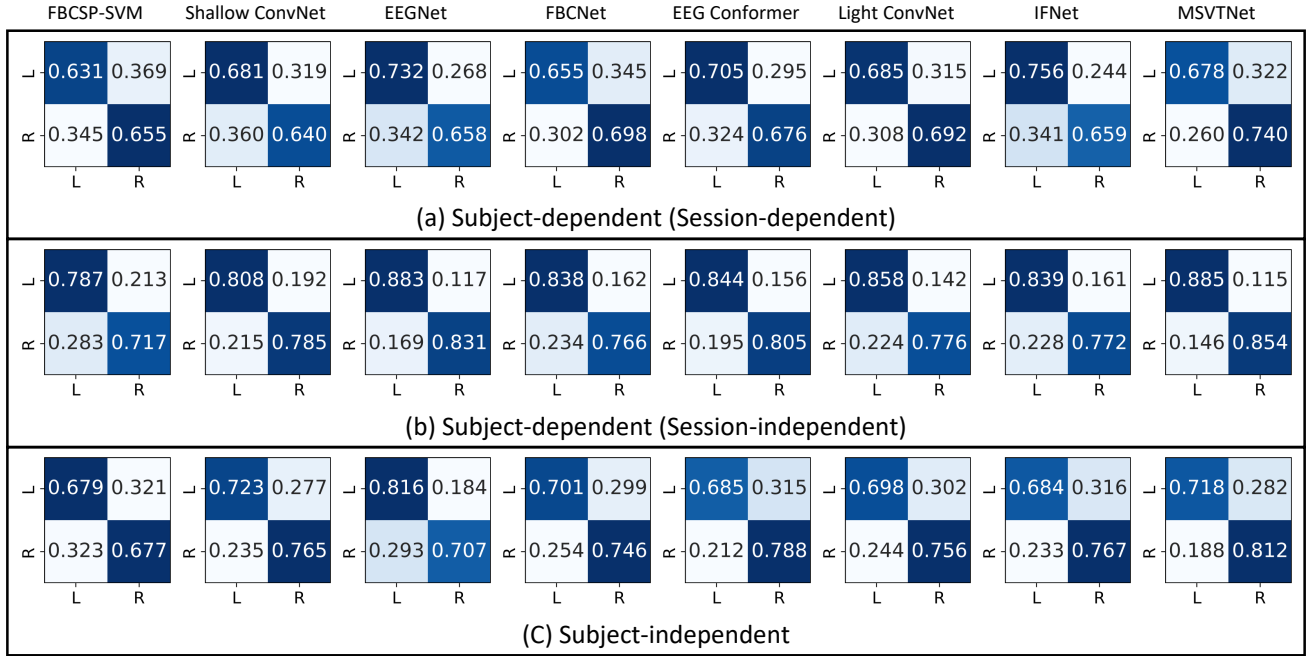


Fig. 3. Confusion matrices for different models on the BCIC-IV-2b dataset. Each column represents the true label and each row depicts the predicted label. L and R refer to MI of left hand and right hand, respectively.

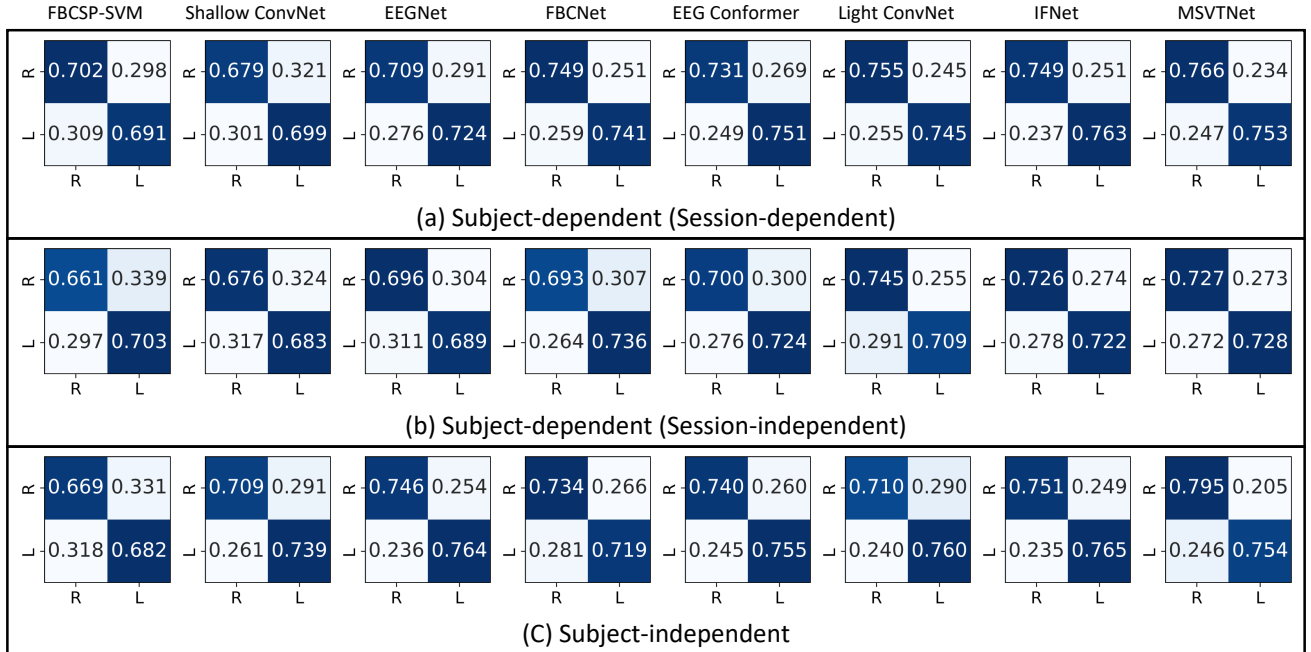


Fig. 4. Confusion matrices for different models on the OpenBMI dataset. Each column represents the true label and each row depicts the predicted label. L and R refer to MI of left hand and right hand, respectively.

TABLE V  
CLASSIFICATION ACCURACIES IN % USING SUBJECT-DEPENDENT (SESSION-DEPENDENT) ANALYSIS FOR EACH SUBJECT ONT THE OPENBMI DATASET

Subject No.	FBCSP-SVM	Shallow ConvNet	EEGNet	FBCNet	EEG Conformer	Light ConvNet	IFNet	MSVTNet
1	78.00	74.80	80.80	81.20	74.80	74.00	85.60	82.40
2	100.00	98.40	100.00	100.00	98.80	98.80	100.00	100.00
3	90.00	93.20	97.20	94.40	89.20	87.20	96.80	97.60
4	58.00	62.80	65.20	66.40	60.80	60.40	73.20	63.60
5	98.00	85.60	98.00	91.20	91.60	96.80	97.60	98.80
6	78.00	70.00	79.60	76.80	82.80	80.00	77.20	81.20
7	60.00	53.60	49.60	56.80	72.00	57.60	68.00	66.80
8	40.00	55.20	69.20	78.40	65.60	69.60	70.00	67.20
9	78.00	76.80	85.20	79.60	78.00	83.20	81.20	80.00
10	64.00	69.20	71.20	76.00	69.20	70.40	72.40	74.40
11	42.00	50.00	46.00	52.80	64.00	60.40	48.00	58.80
12	56.00	63.60	73.20	66.00	69.60	73.60	66.00	75.20
13	54.00	44.80	52.40	56.80	62.80	61.60	56.80	70.80
14	68.00	58.80	57.60	74.40	64.40	70.00	63.60	70.40
15	50.00	63.20	72.40	76.80	66.40	71.20	66.00	76.80
16	42.00	61.20	58.80	58.40	56.80	53.20	57.20	54.40
17	78.00	75.60	79.60	82.40	86.00	83.20	80.80	88.40
18	90.00	84.00	94.00	86.00	89.20	91.20	90.80	90.80
19	76.00	84.40	83.60	88.00	82.80	80.80	89.60	83.60
20	52.00	52.80	56.40	60.40	65.20	70.40	66.00	57.60
21	98.00	96.00	98.40	98.40	99.60	99.60	100.00	100.00
22	90.00	76.40	90.40	90.80	84.40	89.60	92.00	89.60
23	68.00	64.80	69.20	67.20	62.00	65.20	70.80	73.20
24	52.00	56.80	47.20	47.60	58.80	66.00	55.20	63.60
25	52.00	60.80	55.60	68.80	57.20	64.40	61.60	62.40
26	52.00	58.00	49.20	55.60	56.00	52.40	56.00	53.20
27	52.00	57.60	50.40	66.80	63.60	63.20	62.40	57.20
28	98.00	89.60	92.80	94.00	96.40	94.40	95.60	94.40
29	94.00	84.00	86.80	90.80	88.00	92.00	89.60	86.80
30	82.00	63.60	69.20	74.80	73.60	74.80	82.40	75.60
31	76.00	70.00	76.40	74.40	80.80	76.40	95.60	85.60
32	78.00	84.80	79.20	88.40	82.40	83.20	82.00	85.20
33	100.00	94.00	99.60	100.00	100.00	98.40	100.00	100.00
34	42.00	55.20	59.20	67.20	60.40	59.60	68.80	60.40
35	64.00	83.60	86.80	85.20	78.40	88.80	84.00	89.60
36	96.00	92.00	96.00	92.40	95.20	94.40	98.00	96.40
37	98.00	90.80	95.60	96.00	95.20	94.80	96.80	98.00
38	46.00	60.80	49.20	61.60	63.60	56.40	55.20	57.20
39	92.00	84.00	88.00	84.80	87.60	89.20	94.40	95.20
40	58.00	50.00	60.40	54.00	54.80	54.00	53.60	60.80
41	66.00	59.60	55.20	66.00	62.00	65.60	68.80	71.60
42	46.00	50.00	50.00	57.20	56.00	58.40	56.00	54.00
43	86.00	71.20	77.20	77.20	82.80	82.80	91.60	82.00
44	98.00	88.80	97.20	94.00	90.40	97.20	96.80	98.80
45	92.00	87.60	88.80	90.00	89.60	92.40	97.20	92.00
46	56.00	58.40	48.80	58.00	61.20	70.00	51.20	60.80
47	48.00	52.40	46.00	51.20	56.40	59.60	55.20	50.40
48	56.00	70.00	64.00	75.20	70.40	83.20	74.40	74.40
49	70.00	63.60	73.20	75.60	77.20	74.40	73.20	76.00
50	50.00	51.20	57.20	55.60	61.20	62.80	58.40	59.20
51	58.00	52.40	64.00	69.20	72.00	66.80	67.60	68.80
52	78.00	63.20	72.80	72.40	78.40	73.20	79.60	76.80
53	52.00	51.60	55.20	63.20	60.00	62.80	64.00	58.00
54	66.00	50.80	50.40	55.60	57.20	51.60	47.60	54.00
Avg	69.67	68.92	71.66	74.48	74.13	75.02	75.60	75.93
Std	18.82	14.90	17.31	14.52	13.66	14.16	16.14	15.14

TABLE VI  
CLASSIFICATION ACCURACIES IN % USING SUBJECT-DEPENDENT (SESSION-INDEPENDENT) ANALYSIS FOR EACH SUBJECT ON THE OPENBMI DATASET

Subject No.	FBCSP-SVM	Shallow ConvNet	EEGNet	FBCNet	EEG Conformer	Light ConvNet	IFNet	MSVTNet
1	81.00	80.50	88.50	87.70	81.10	87.40	88.90	86.40
2	63.00	72.50	72.40	64.90	60.20	61.00	70.40	68.30
3	96.00	94.40	96.30	96.20	91.60	95.50	97.90	96.80
4	68.00	61.50	63.90	76.70	68.10	78.40	67.70	74.50
5	89.50	83.80	84.60	87.60	93.70	89.60	86.20	91.00
6	84.50	75.00	84.30	82.20	80.40	83.10	86.60	84.80
7	71.50	54.30	57.70	65.90	68.40	73.00	67.20	75.10
8	57.50	61.40	65.80	65.20	61.60	62.60	64.40	63.20
9	71.00	72.80	81.60	79.90	80.90	81.90	81.00	81.90
10	53.00	58.90	60.30	62.70	67.20	66.20	63.00	61.10
11	50.00	53.60	51.60	52.10	59.00	54.50	54.10	58.30
12	61.00	65.60	62.30	69.90	65.80	67.50	71.30	71.20
13	59.50	56.70	56.80	54.70	55.10	57.30	60.10	58.50
14	54.00	56.40	54.40	59.00	61.10	59.80	61.60	62.90
15	47.50	60.60	59.40	59.60	50.70	57.40	55.00	55.00
16	55.50	50.10	50.30	57.40	63.30	60.10	56.20	57.90
17	49.50	66.10	52.70	58.00	60.60	52.60	56.70	62.10
18	72.50	82.50	88.70	87.00	87.70	91.00	91.80	87.90
19	73.00	75.70	75.80	69.30	79.20	77.10	78.90	71.20
20	64.50	60.40	59.40	71.90	73.60	74.20	70.90	78.40
21	99.50	96.60	99.70	99.20	98.30	99.60	100.00	98.60
22	52.00	66.50	74.90	67.70	77.70	73.40	76.00	77.20
23	66.00	66.30	60.30	66.10	68.70	68.90	68.60	67.90
24	49.00	50.70	51.10	52.00	54.70	53.90	51.00	57.30
25	59.00	68.30	62.50	66.70	63.90	65.70	70.00	64.50
26	61.00	53.30	49.60	54.50	55.50	53.60	50.30	55.20
27	57.50	54.30	54.10	55.90	61.70	58.90	51.80	54.40
28	95.00	88.10	91.50	95.70	95.30	97.90	97.70	95.00
29	97.00	93.30	94.60	93.50	89.90	95.00	94.40	90.40
30	65.00	61.90	65.00	68.80	71.60	71.20	75.20	72.90
31	71.00	59.20	59.80	67.20	62.10	71.00	77.30	68.70
32	92.50	87.00	87.50	90.10	80.10	85.70	92.20	92.70
33	93.00	95.30	96.00	97.20	94.00	97.40	98.40	96.30
34	52.50	52.40	51.20	55.30	57.00	58.00	56.20	54.60
35	58.00	70.80	68.80	73.60	73.10	70.20	76.70	79.60
36	98.50	96.60	97.50	97.00	98.50	98.40	97.60	97.70
37	93.50	92.50	96.60	95.20	95.50	94.10	96.20	95.40
38	61.00	49.50	53.00	57.40	59.80	61.90	54.60	58.30
39	77.00	79.20	84.00	83.00	80.30	84.20	88.20	85.20
40	58.50	56.90	57.00	58.00	56.30	58.20	60.40	63.60
41	60.50	49.40	54.20	57.90	58.40	59.50	58.20	58.90
42	64.00	54.70	55.30	65.30	60.90	66.00	61.60	64.40
43	62.00	69.00	77.40	76.40	83.60	81.60	83.70	85.90
44	98.00	96.10	98.80	97.90	97.60	97.50	98.10	97.20
45	94.50	90.10	93.70	91.80	90.10	93.80	95.80	95.60
46	62.00	61.20	61.10	74.60	63.50	70.00	65.50	64.70
47	49.00	56.70	53.70	60.50	56.90	64.20	53.80	56.80
48	51.50	57.90	60.00	62.40	58.10	63.30	60.20	64.90
49	58.50	67.20	69.10	63.60	68.60	70.50	68.20	71.50
50	49.00	51.70	52.30	55.60	51.90	55.70	55.80	53.40
51	58.50	58.50	53.40	58.80	54.30	59.80	57.90	54.70
52	80.00	67.10	79.90	76.70	76.60	78.50	79.60	76.20
53	60.00	53.70	55.50	54.90	60.20	58.20	50.40	56.10
54	57.00	53.20	54.80	58.60	61.60	57.60	56.20	56.40
Avg	68.20	67.93	69.27	71.43	71.21	72.66	72.36	72.75
Std	15.95	14.68	16.21	14.58	14.13	14.48	15.82	14.66

TABLE VII  
CLASSIFICATION ACCURACIES IN % USING SUBJECT-INDEPENDENT ANALYSIS FOR EACH SUBJECT ON THE OPENBMI DATASET

Subject No.	FBCSP-SVM	Shallow ConvNet	EEGNet	FBCNet	EEG Conformer	Light ConvNet	IFNet	MSVTNet
1	79.50	66.17	84.00	82.25	83.00	79.75	82.75	85.25
2	55.00	86.50	81.00	74.75	87.00	80.25	85.00	86.50
3	87.75	97.67	95.50	93.00	92.25	94.50	96.00	97.75
4	61.25	73.67	55.75	51.50	73.00	71.25	69.00	74.75
5	74.50	90.17	95.75	89.00	94.25	92.25	95.00	92.50
6	80.25	83.00	89.00	81.00	85.25	84.00	87.25	88.75
7	52.75	60.17	66.50	63.00	63.25	65.75	70.00	73.50
8	67.25	68.17	76.00	71.75	72.75	69.00	73.50	76.50
9	80.25	82.50	85.25	81.75	82.75	83.50	83.75	82.50
10	53.25	66.00	60.75	59.75	63.25	62.25	60.75	60.50
11	50.25	60.00	62.00	56.00	63.75	59.25	61.00	65.75
12	58.50	69.00	73.75	72.00	75.25	72.25	72.75	78.00
13	56.75	57.83	67.25	61.50	59.75	54.00	62.50	65.25
14	58.50	75.00	81.25	73.75	77.75	75.25	78.75	80.25
15	54.50	54.00	62.25	56.25	60.50	56.75	62.25	62.50
16	65.00	70.50	71.25	70.75	71.75	70.25	70.75	68.00
17	64.25	68.50	78.25	75.00	80.25	74.25	79.50	83.25
18	75.50	84.67	91.75	83.75	85.25	83.50	89.25	89.75
19	69.50	83.67	83.25	77.75	81.25	77.50	80.75	82.00
20	72.00	74.17	80.25	75.50	78.50	76.75	80.75	81.25
21	83.75	79.00	92.00	87.00	90.25	86.50	95.50	92.50
22	78.00	74.67	84.50	77.50	81.00	84.00	87.25	85.50
23	67.00	79.67	70.50	71.00	72.25	69.75	65.00	73.50
24	49.75	55.00	54.00	55.25	52.75	54.75	58.25	58.00
25	59.75	68.67	68.75	73.25	67.50	63.75	76.75	79.00
26	56.25	61.33	67.25	64.75	64.25	64.00	63.50	68.00
27	59.25	58.67	66.25	61.75	66.75	62.00	68.50	70.75
28	91.50	94.17	98.75	96.00	97.25	97.25	99.00	97.00
29	85.25	49.50	66.50	57.50	46.00	57.75	54.50	56.25
30	72.50	71.00	75.75	74.75	71.00	70.75	72.25	80.75
31	73.00	60.83	75.25	76.00	75.75	76.25	78.75	78.50
32	84.50	86.50	85.25	81.75	86.75	86.00	87.00	87.75
33	93.75	98.33	98.00	96.00	98.25	97.75	98.25	97.00
34	50.00	49.50	54.25	54.00	52.50	53.50	51.75	57.50
35	48.00	69.67	58.50	60.75	62.00	65.00	66.25	68.75
36	84.50	99.00	95.25	94.50	98.75	90.00	97.00	96.50
37	94.75	96.83	97.00	95.25	94.75	96.50	96.00	95.50
38	59.25	61.50	64.50	56.50	65.50	64.25	67.25	66.50
39	85.00	86.83	90.25	87.50	89.75	86.00	88.50	88.25
40	60.00	70.83	68.25	64.00	72.75	64.75	74.75	74.50
41	51.50	59.00	56.25	55.00	58.50	66.50	59.25	67.75
42	65.50	73.33	77.50	72.00	71.25	69.75	72.75	75.75
43	68.50	88.17	86.25	86.25	87.25	85.50	88.50	85.25
44	89.25	93.33	94.25	91.75	93.25	92.75	93.50	95.25
45	80.00	84.50	88.75	86.50	89.75	91.00	90.00	85.75
46	69.50	64.50	77.75	75.50	70.75	70.00	73.50	77.25
47	65.00	64.67	73.75	73.00	68.50	72.00	73.00	73.50
48	52.25	62.17	53.50	61.50	54.75	59.50	65.00	64.25
49	61.50	55.17	67.50	69.50	67.00	69.75	64.00	70.50
50	52.00	53.67	53.50	55.00	53.25	52.25	54.50	58.75
51	60.25	64.17	67.50	64.75	69.00	68.00	67.00	67.50
52	69.00	81.17	82.75	77.00	82.75	76.00	82.50	80.25
53	57.75	60.50	65.25	58.00	67.75	60.25	63.00	70.75
54	53.25	62.33	62.75	60.50	66.50	64.00	58.75	61.25
Avg	67.55	72.40	75.53	72.62	74.75	73.52	75.79	77.41
Std	13.03	13.48	13.19	12.62	13.12	12.39	12.98	11.53

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