

# Multiband Decomposition and Spectral Discriminative Analysis for Motor Imagery BCI via Deep Neural Network

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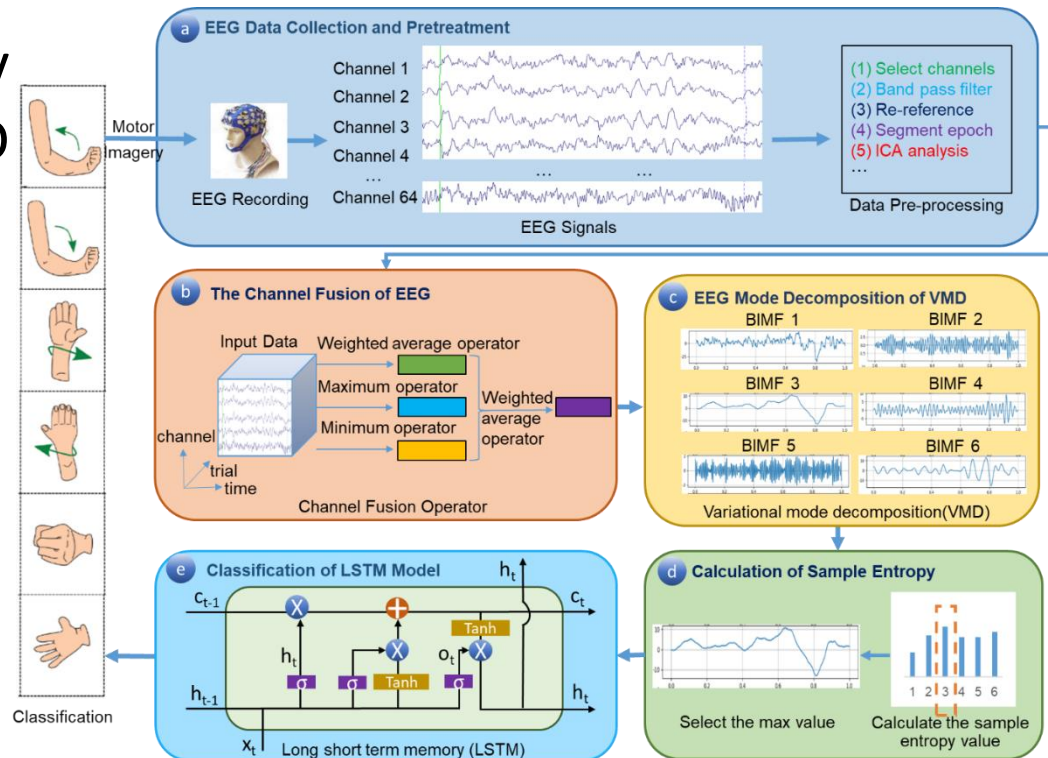
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# Problems & Ideas

- Problems of in Motor Imagery Classification in BCI
  - The motor imagery performance is somewhat limited due to insufficient analysis of key effective frequency bands of EEG signals.
  - Existing methods cannot effectively extract useful frequency bands to analyze EEG signals.

- Ideas: Motor Imagery Classification based on VMD and Sample Entropy

- VMD used to decompose the frequency band of EEG.
- The final frequency band is calculated and selected by the sample entropy and input into LSTM for classification.



# Main Contributions

- We adopt sample entropy to select the best frequency band as the signal representation vector input into LSTM earn the best accuracy.
- VS-LSTM method we proposed has achieved advanced results on seven multi-category.

Subjects	DSP-LDA (%)	LSTM (%)	CNN (%)	VS-LSTM (Ours) (%)
S1	71.4	93.2	90	<b>96.4</b>
S2	72.3	86.9	86.3	<b>96.8</b>
S3	68.7	91.7	88.5	<b>96.8</b>
S4	78.6	88.7	86.9	<b>96.7</b>
S5	77.3	91.9	91.4	<b>96.8</b>
S6	81.3	92.9	92.2	<b>96.4</b>
S7	66.6	97	86.1	<b>96.4</b>
S8	85.1	95	94.3	<b>95.7</b>
S9	68.9	96.2	96.4	<b>96.9</b>
S10	66.7	89.7	92.4	<b>96.1</b>
S11	77.5	92.2	94.1	<b>96.7</b>
S12	66.9	86.8	91.6	<b>97.2</b>
S13	74.4	91.6	88.2	<b>96.8</b>
S14	73.5	95.9	94.8	<b>96.4</b>
S15	76.8	89.8	92.3	<b>97.2</b>
Average	73.7	92.1	91	<b>96.6</b>

