

Quality Improvement Method	Method Description	Accuracy	CNN Model
Basic 1D-CNN	The Basic 1D CNN model	0.7153	Basic 1D-CNN
Basic 1D-CNN + Standardization	Standardization the Basic 1D-CNN	0.7248	Basic 1D-CNN
Basic 1D-CNN + SMOTE	SMOTE Data in Basic 1D-CNN	0.6922	Basic 1D-CNN
Basic 1D-CNN + Time Window Averaging	Time Window Averaging in Basic 1D-CNN	0.842	Basic 1D-CNN
Basic 1D-CNN + Time Window	The data is segmented into fixed-length sequences through a time window	0.9235	Basic 1D-CNN
Standardization	Data after Standardization	0.8940	1D CNN
Time Window Averaging	Averaging Data in Time Window	0.8989	1D CNN
Noisy Data	Data after Adding Noise	0.9076	1D CNN
Standardization (with noise data)	Noise Data after Standardization	0.8877	1D CNN
Time Window Averaging (with noise)	Averaging Data in Time Window	0.8652	1D CNN
standardization and time window averaging (with noise)	Time Window Averaging Data after Using Standardization	0.8988	1D CNN
Downsample in sum method (with noise)	Time windows are accumulated to get a sum value.	0.6292	1D CNN
Downsampling in mini method (with noise)	Time windows are accumulated to get a minimum value.	0.6629	1D CNN
Downsampling in max method (with noise)	Time windows are accumulated to get a maximum value.	0.7865	1D CNN
Sliding Average (with noise)	Average Calculated using Sliding Window	0.9158	1D CNN
FFT (with noise)	Data Preprocessing using Fast Fourier Transform	0.9162	1D CNN
2D Original Model	Training and Evaluation using Original Dataset	0.9769	2D CNN
2D Standardization	Data after Standardization (for training and evaluation)	0.9738	2D CNN
2D Time Window Averaging	Averaging Data in Time Window (for training and evaluation)	0.9778	2D CNN
2D Original Model (with noise)	Data after Adding Noise	0.9053	2D CNN
2D Standardization (with noise)	Data after Standardization with Noise	0.9465	2D CNN
2D Time Window Averaging (with noise)	Averaging Data in Time Window with Noise	0.9066	2D CNN
2D Standardization and Time Window Averaging (with noise)	Data after Standardization and Time Window Averaging with Noise	0.9653	2D CNN
2D Data Smoothing - Sliding Average (with noise)	Average Calculated using Sliding Window with Noise	0.9085	2D CNN
2D Using Fast Fourier Transform (with noise)	Data Preprocessing using Fast Fourier Transform with Noise	0.9508	2D CNN
2D Time Jitter Application - Original Model	Original Data with Time Jitter Application	0.9751	2D CNN
2D Time Jitter Application (with noise)	Data with Time Jitter Application and Noise	0.9065	2D CNN
2D Time Scaling - Original Model	Original Data with Time Scaling Application	0.9750	2D CNN
2D Time Scaling (with noise)	Data with Time Scaling Application and Noise	0.8998	2D CNN