Weekly Report

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1 Progress

- Revise bachelor thesis, especially examine the noise contained in the signal.
- After the BPF was applied, the wavelet reconstruction was carried out.

1.1 Noise contained in the signal

To see if the frequencies attributed to the heartbeat were extracted, I used the Welch method to examine the frequency response.

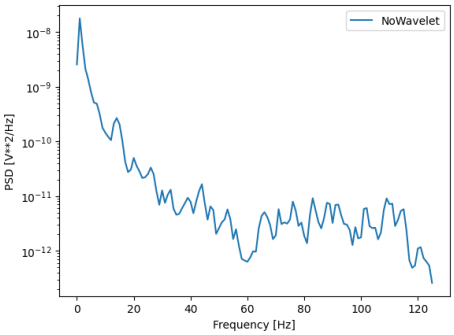

Figure 1: Frequency-power spectral characteristics before wavelet reconstruction

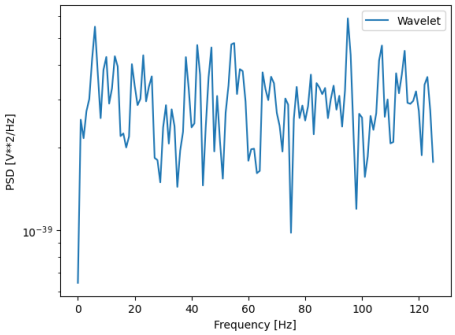

Figure 2: Frequency-power spectral characteristics after wavelet reconstruction

After wavelet reconstruction, the overall power was lower, and the power in the 0.6-2 Hz frequency band, which is the frequency of a heartbeat, and the power in the higher frequency band were similar.

1.2 Try BPF + Wavelet Reconstruction

Since the frequency response after wavelet reconstruction did not extract well the 0.6-2 Hz frequency band corresponding to the heartbeat frequency band, the BPF was applied before wavelet reconstruction.

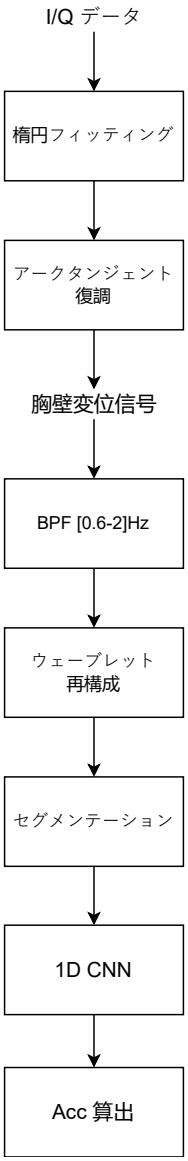

Figure 3: The algorithm of proposed method

On the Keio Hospital dataset, which consists of 12 subjects, we achieved 93.82% accuracy under the close-set condition(Cross-validation is not performed). The confusion matrix is shown below.

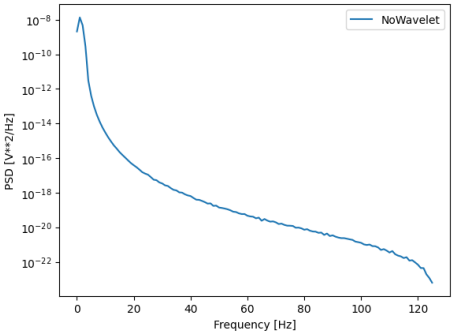

Figure 4: Frequency response of chest wall displacement signal with BPF applied

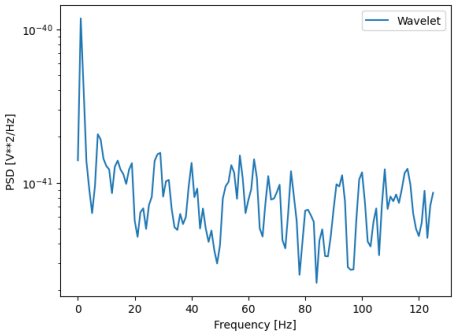

Figure 5: Frequency response of chest wall displacement signal using BPF and wavelet reconstruction

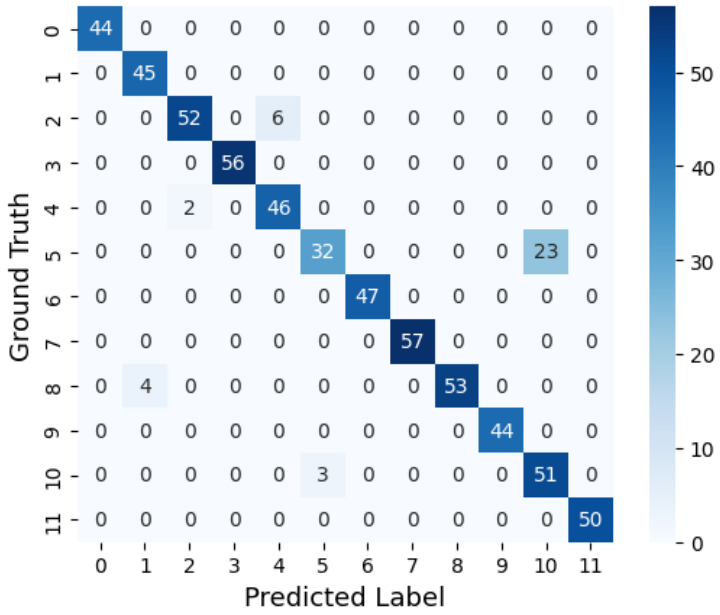

Figure 6: Confusion Matrix when applying BPF + Wavelet Reconstruction

2 Next Plan

- Pass BPF after applying Wavelet Reconstruction