

ABSTRACT

The development of non-contact respiratory rate measurement methods has been steadily increasing. The reasons for this increase include the fact that methods involving physical contact often cause discomfort and are relatively expensive. Non-contact respiratory rate measurement solutions can address these issues, one example being the use of an RGB camera. The objective of this study is to design a respiratory rate measurement system utilizing Principal Component Analysis (PCA) on RGB camera images and to analyze the accuracy of the RGB camera method in measurement compared to manual methods. The required subjects are a group of individuals with healthy respiratory conditions.

The methods used include manual processing of video data obtained from subjects with ROI to determine the chest area. Next, there is pre-processing which includes signal extraction from Region of Interest (ROI), signal normalization using Min-Max Normalization, and noise removal or reduction using a Bandpass Filter. PCA is used to reduce the dimensions of the RGB signal to one main component that represents respiration. Subsequently, signal processing, calculation and analysis are performed, and system performance evaluation is conducted using MAE, RMSE, MAPE.

The accuracy results show that before running, the MAPE value was 34.68% with an accuracy of 65.31%. Meanwhile, after running, the MAPE values was 12.97% with an accuracy increase to 87.02%. The combined MAPE value was 23.83% with an accuracy of 76.17%, indicating the overall system performance. The findings of this study indicate that the camera method using PCA can be used as a non-contact measurement of respiratory rate. However, there are still some limitations that need to be optimized.

Kata Kunci: *RGB Camera, Respiratory Rate, Non-Contact Measurement, Principal Component Analysis (PCA), Linear Regression, Mean Absolute Percentage Error (MAPE).*