# **Multi-Dimensional Attention for Cross-Age Remote Photoplethysmography**

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Camera-based remote photoplethysmography (rPPG) enables contactless monitoring of important physiological signals such as heart rate (HR), with transformative potential for clinical applications. Despite the unprecedented advancements achieved by deep learning-based approaches, they predominantly overlook age-specific physiological differences, limiting their clinical generalizability.

To address this challenge, this project propose a novel method named MAC-rPPG, which synergizes multi-dimensional spatiotemporal attention with age-specific physiological priors. Specifically, we first design a chromatic reference propagation module (CRPM) that enriches the rPPG channel features to counteract motion artifacts. Furthermore, we propose textual age prompts for hyper-convolutional (HC-P) layers and a multi-dimensional attention mechanism (MDA) that adaptively adjusts the convolution kernel and decouples multidimensional features to capture the physiological characteristics of different age groups, thereby improving the model's generalizability across ages.

Cross-age joint training on muti-age datasets enables our model to achieve 35-45% mean absolute error reduction over state-of-the-art methods in unseen scenarios, including controlled adult environments and motion-intensive neonatal intensive care unit settings, validating its clinical potential for demographic-inclusive monitoring.

