

# Android Implementation of Robust Heart Rate Measurement from Video Using Select Random Patches

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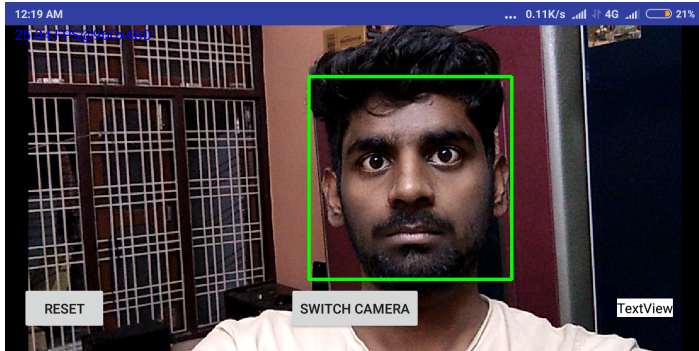


Figure 1: The interface for the app includes a camera preview and two buttons and a textview (a)The 'RESET' button is to reset the app to initial state to enable a new measurement (b)The 'SWITCH CAMERA' button is to enable the user to switch from the device's front camera to back camera and vice versa (c)The textview is to display the final result

Conventional methods for measuring HR such as electrocardiography (ECG) or photoplethysmography using optical sensors require the sensor to make physical contact with the person. It has been shown (under controlled conditions) that it is possible to use a conventional camera to remotely detect small changes in skin color due to a person's cardiac pulse. This project is an attempt to implement code from [1] for mobile phones using an Android app.

The camera preview surface is generated using OpenCV's CameraBridgeViewBase class. The framerate has been set to 25 fps. Pretrained HAAR cascade classifiers have been used for face detection in this version. A green square box is created around the face whenever it is detected. If there are multiple faces detected in a frame then that frame will be skipped and not processed.

The OpenCV library uses Mat data type to store the image data. submat function is used to extract the part of the Mat which is of importance, i.e the face region. Here instead of recording a video, we have stored the data collected into an array of Mat types. This data can be processed as in the original code because the framerate is kept fixed during this process. The required green channel values are extracted from the signal and the average green value is calculated and processed for different random patch pairs.

Since the processing required many matrix functions and operations, Apache Commons Math Library has been included in the project. This library provides us functions to enable operations such as matrix multiplication and inverse,

fft etc. The first part of the process involved the extraction of the signal using ICA(Independent Component Analysis). This was done using fastica.jar from sourceforge.net .

The rest of the functions given in the original code are rewritten in java using the java libraries.

The process is a little slow as it involves many matrix operations. It's accuracy varies according to the illumination conditions. The processing can be made faster in the future if sparsematrix methods can be implemented in Java. The complete computation requires around 3 minutes of processing time on the device Mi Redmi 5. The final output is displayed in the textview.

- [1] Antony Lam and Yoshinori Kuno. Robust heart rate measurement from video using select random patches. In *Proceedings of the IEEE International Conference on Computer Vision*, pages 3640–3648, 2015.