

# Heart Rate Plus

by PVDApps

- a) App measures Heart rate and keeps the past history.
- b) App by PVDapps startup.
- c) Instantaneous and continuous measurement.
- d)
  - High accuracy
  - Low error
- e)
  - High latency
  - Fails sometimes.

# Health Watcher

- a) App measures Heart rate, Blood pressure, Respiration Rate, Oxygen Saturation Level.
- b)
  - A. . K. Kanva, C. J. Sharma and S. Deb, "Determination of SpO2 and Heart-rate using Smartphones, International Conference on Control, Instrumentation, Energy & Communication, New Delhi, India, 2014.
  - [extracting heart rate and respiration rate using a cell phone camera](#)
  - [measuring vital signs using smart phones by b. vikram chandrasekaran.](#)
- c) Requires less computation power and by using image processing algorithms by [intel](#).
- d)
  - Uses the same data for measuring HR, BP, SpO2.
  - Can be run on low end device

e)

- Fails to multiple times before giving results
- Has a high latency
- Error Prone to ambient light
- High error variance.

## Instant Heart Rate

a) App measures Heart rate very precisely and further uses data to give more insights about stress levels.

b) **Azumio** is a mobile health company that specializes in biometric mobile technology. Azumio released Instant Heart Rate in October 2010

c) This app has been used for research at Heart Research at UCSF(University of California San Francisco) for cardiology research training.

d)

- High accuracy
- Can be run on low end device
- Low latency
- Low run time
- Low error

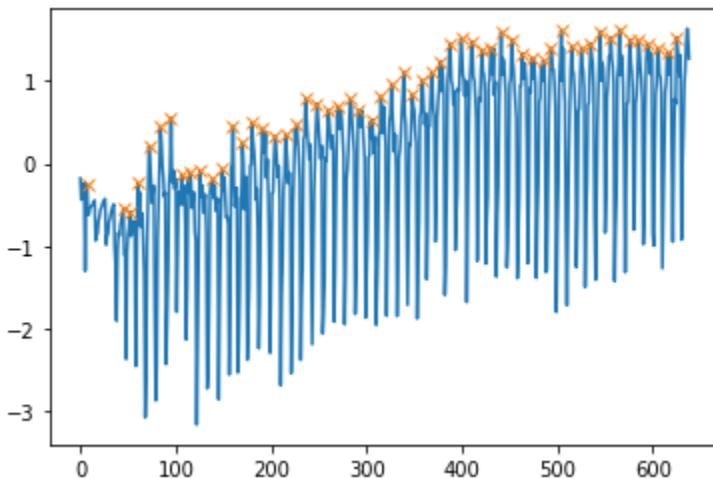
e)

- Error is mostly because of instability of hand.

# Plots:

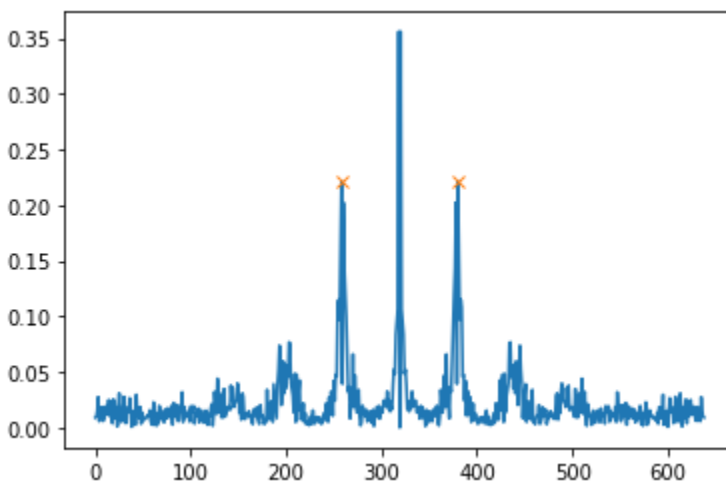
## Time series Data Approach with 3 seconds

- a) As we increase the sliding window the accuracy of the estimator increases.
- b) For small sliding windows error increases.



## FFT

- a) Also depends upon sliding window
- b) As we increase the sliding window accuracy of the estimator increases.



## **TASK 4:**

1. FPS can not less than  $f_s = 2 \cdot f_{\text{high}}$  of the signal.  $f_{\text{high}} = 1.5$ . In our case i.e  $f_s = 2 \cdot 1.5 = 3$  fps. As per Nyquist sampling theorem i.e.  $\text{FPS} > 3$
2. The parts directly under the flash light don't change much also at the edges there are very small changes. We can choose a window at the center.
3. If we lower resolution we have to sample at high fps. And we sample at low fps we have to have high resolution to have meaningful results.