

# ECG SQI Validation (Quantitative)

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## I. OBJECTIVE

- 1) To quantitatively validate the proposed signal quality index (SQI) method using acceptable and unacceptable signals of ECG provided by the Physionet Challenge 2011.
- 2) To update the status of Machine Learning in Healthcare conference.

## II. COMPLETED TASKS

### A. Validation on SQI

In report no. 7 (ProgReport7.pdf), 10 sec window SQI which move every 1 sec has been added to the code and randomly taken 40 MIMICII 7-min data have been qualitatively validated. In this report, quantitative validation using Physionet Challenge 2011's 1) acceptable and 2) unacceptable 10 second records which can be found at <http://physionet.org/physiobank/database/challenge/2011/set-a/> was carried out. To obtain the QRS annotations, since it is the Physionet wfdb format data, the two (2) peak detectors that have been used are *wqrs* [1] and *gqrs* [2]. The two sets of annotations (i.e. from the two QRS detectors) are used as an input to the *Bbx\_compare.m* function. If the two peak detectors agree on the annotated values, the SQI value is 1, otherwise, it will be lesser than 1. For the BAD signal, the SQI is lesser than 0.8. For this report 6 10-second ECG records for each GOOD and BAD class have been randomly chosen. In this validation, 1.5 sec-window, step every 1 sec has been used. The results are shown in Fig. 1 and Fig. 2.

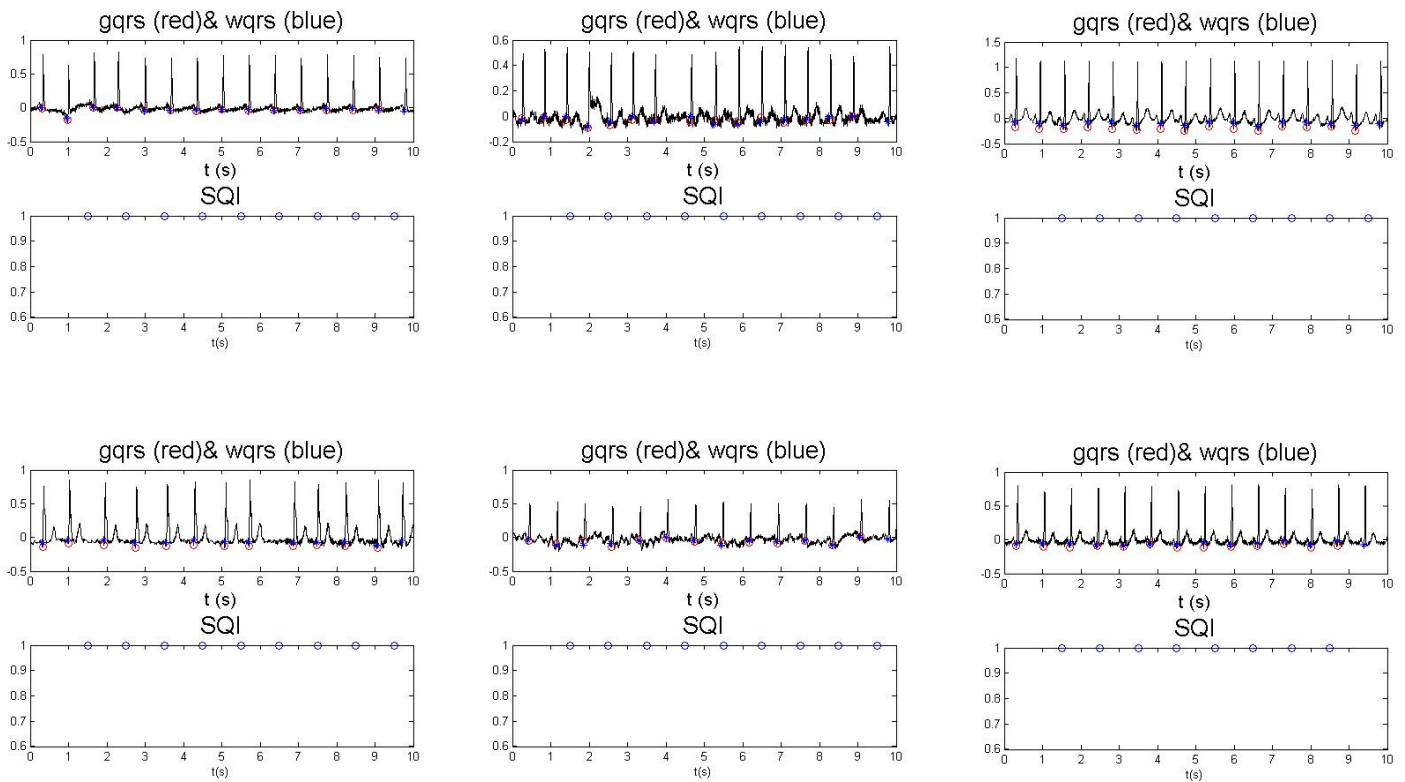


Fig. 1. Good signals detected using the proposed peak detectors from the good class (acceptable) ECG data

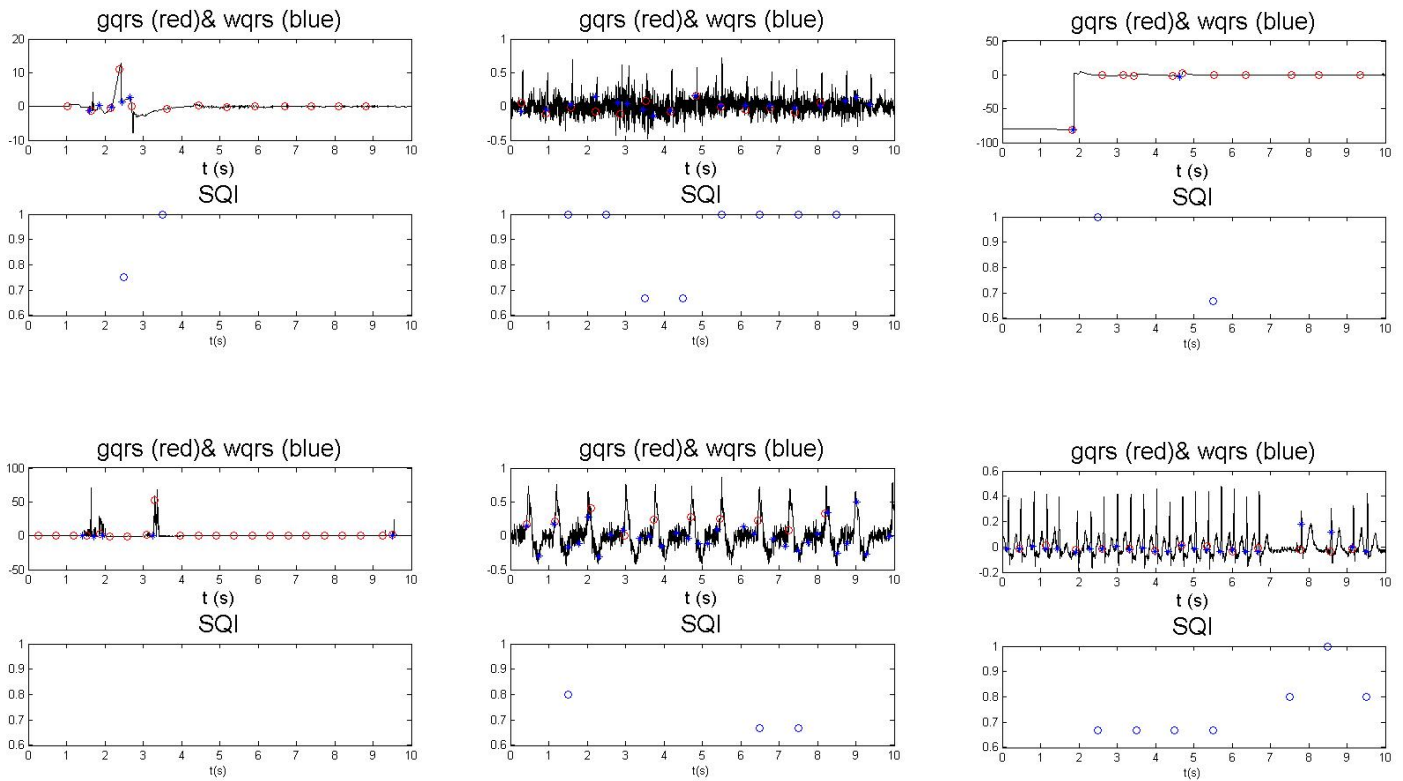


Fig. 2. BAD signals detected using the proposed peak detectors from the bad class (unacceptable) ECG data

### B. Machine Learning in Healthcare Conference

The invited speakers (except Prof. Donnelly and Prof. Saria) have been requested to submit their titles, abstracts and biographies by 6 June 2015. Prof Vanrumste has also been informed that each speaker is given 35 minutes for the presentation.

### III. CONCLUSION

The quantitative validation procedure of the proposed method by using different peak detectors, to determine SQI for ECG data of wfdb has been carried out. The results show that the proposed procedure but using different peak detectors since this is wfdb data, worked when testing on the randomly taken good and bad dataset.

### REFERENCES

- [1] Zong, W., G. B. Moody, and D. Jiang. A robust open-source algorithm to detect onset and duration of QRS complexes. *Computers in Cardiology*, 2003. IEEE, 2003.
- [2] Silva, I, Moody, G. An Open-source Toolbox for Analysing and Processing PhysioNet Databases in MATLAB and Octave. *Journal of Open Research Software* 2(1):e27, 2014

### IV. PREVIOUS REPORTS

All the progress reports are stored in <http://goo.gl/5yASrs>

- 20 Feb 2015 - Datasets for respiratory estimation
- 06 Mar 2015 - Format of the Datasets for Respiratory Rate Estimation
- 20 Mar 2015 - Dialysis 1, 2 and 3 data sets
- 01 Apr 2015 - Completion of Dialysis 1 and 2
- 17 Apr 2015 - Data Screening
- 01 May 2015 - ECG QRS Detection and SQI
- 13 May 2015 - ECG SQI Validation
- 29 May 2015 - ECG SQI Validation (Quantitative)