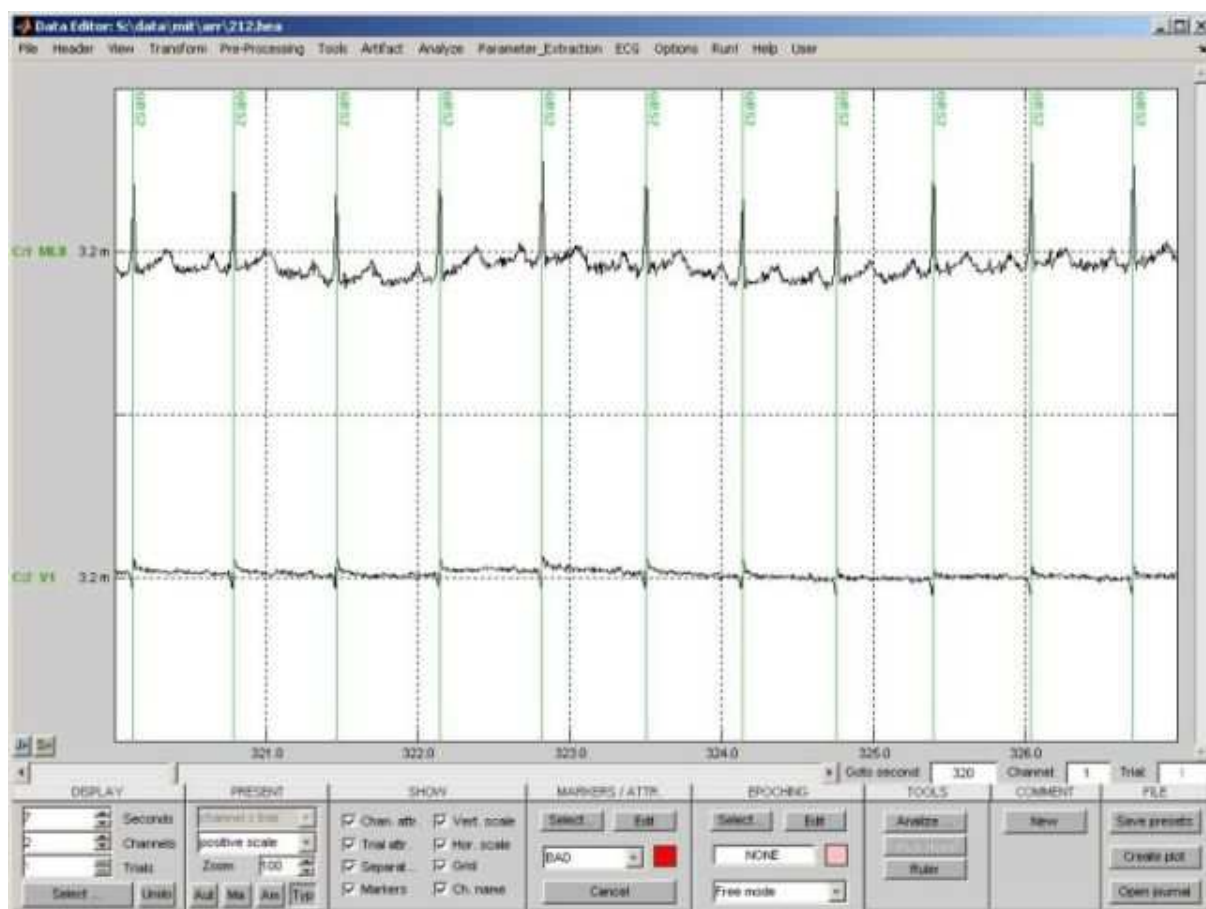


Beat Classification with g.Bsanalyze ECG Toolbox part II User Story

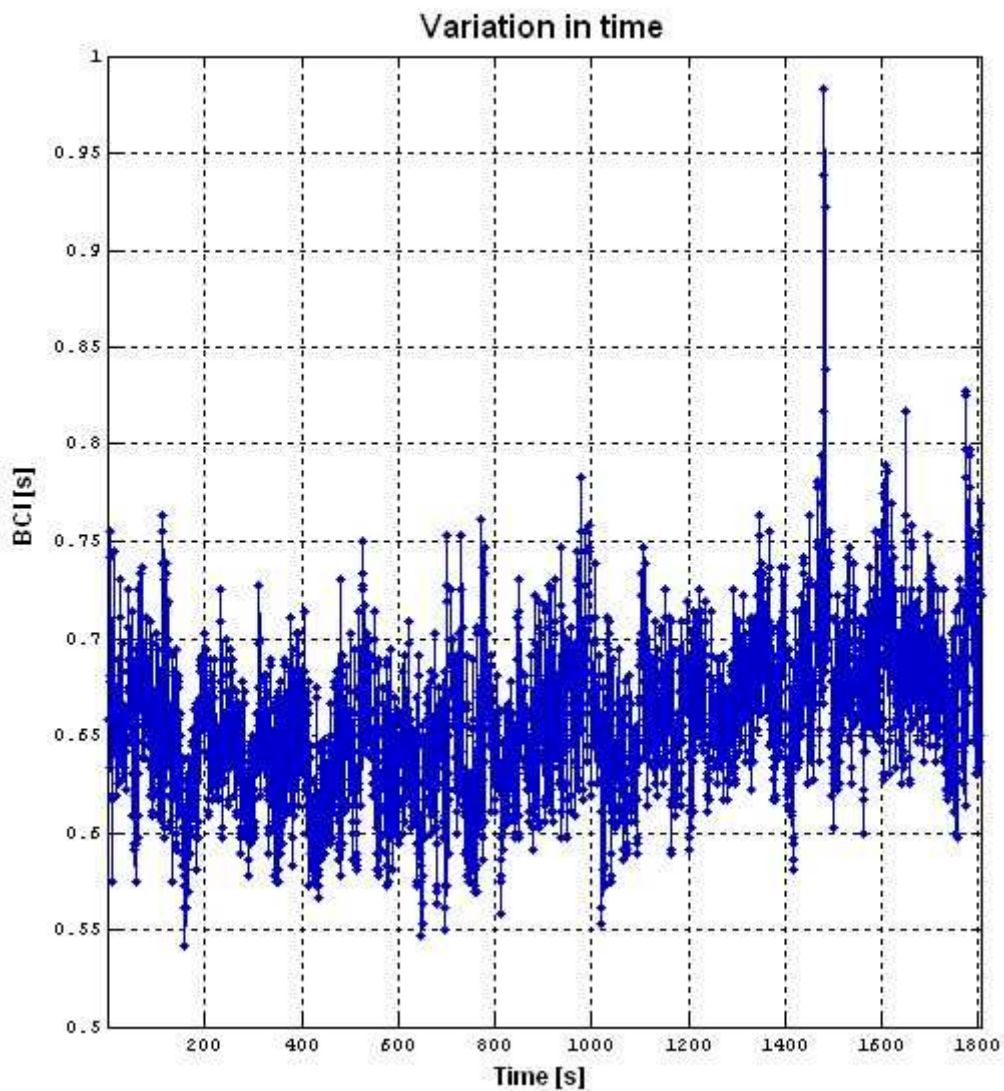
When processing long term ECGs it is often not possible (or at least very time consuming) to scroll through the whole signal in order to find interesting sequences within the ECG. The ECGtoolbox II provides a beat classifier that helps the user to focus on those points of interest.

One way of detecting interesting sequences is to analyze the RR intervals. For this purpose, a QRS detector is needed. Other pathologies may reflect only in changes in the QRS morphologies. Such situations cannot be seen from RR sequences and therefore they cannot be detected using a QRS detector only. On the other hand, manual detection of these changes - especially from long-term ECG recordings - is very time consuming.



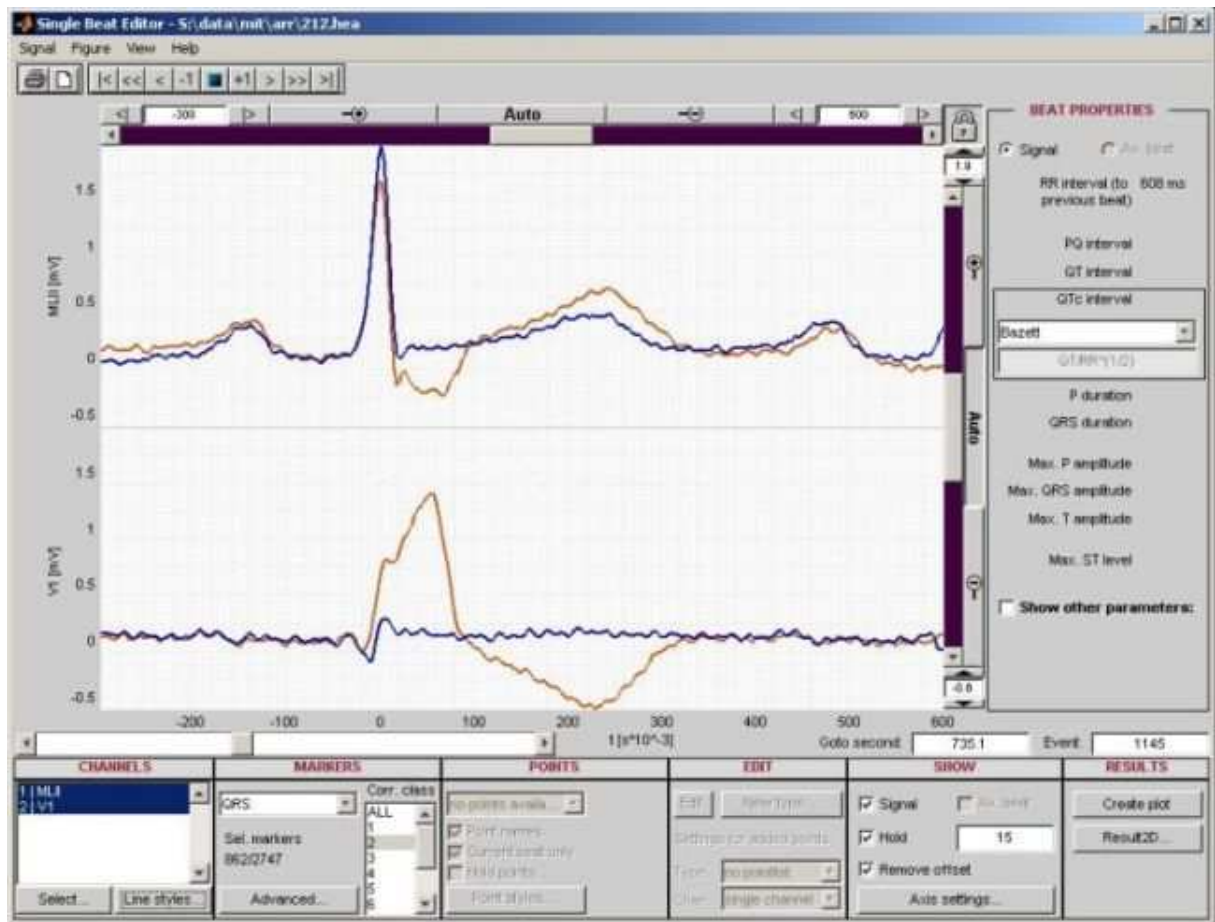
Open the signal 212.heg, which is taken from the MIT-BIH Arrhythmia Database on PhysioNet and scroll to second 320. What you see is an ECG in normal sinus rhythm. This ECG seems to stem from a sane patient. The first step in ECG analysis would be QRS detection. Therefore, start the QRS Detector and additionally apply the correlation classifier to the signal. Make sure that the checkbox **Open with Single Beat Editor** is selected when starting the classifier.

Signal 212.heg is quite an interesting signal, since there are two different types of cardiac activities, which cannot be separated by analyzing the RR intervals only. E.g. you could select **Result 2D** on the lower right side of the Single Beat Editor and select **BCI** (beat coupling intervals) as the Y-Parameter. From the resulting figure no abnormalities can be detected:



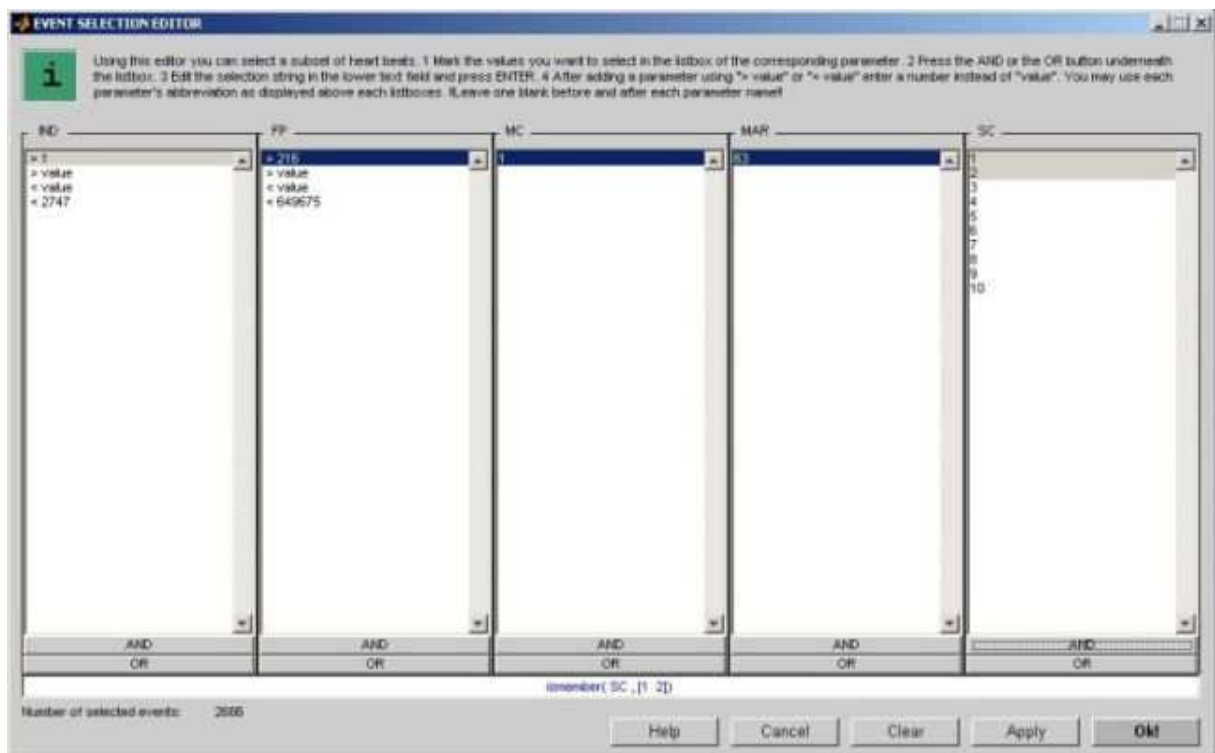
Beat Coupling Interval (BCI) as a function of time for signal 212.heg, taken from the MIT-BIH Arrhythmia Database from PhysioNet

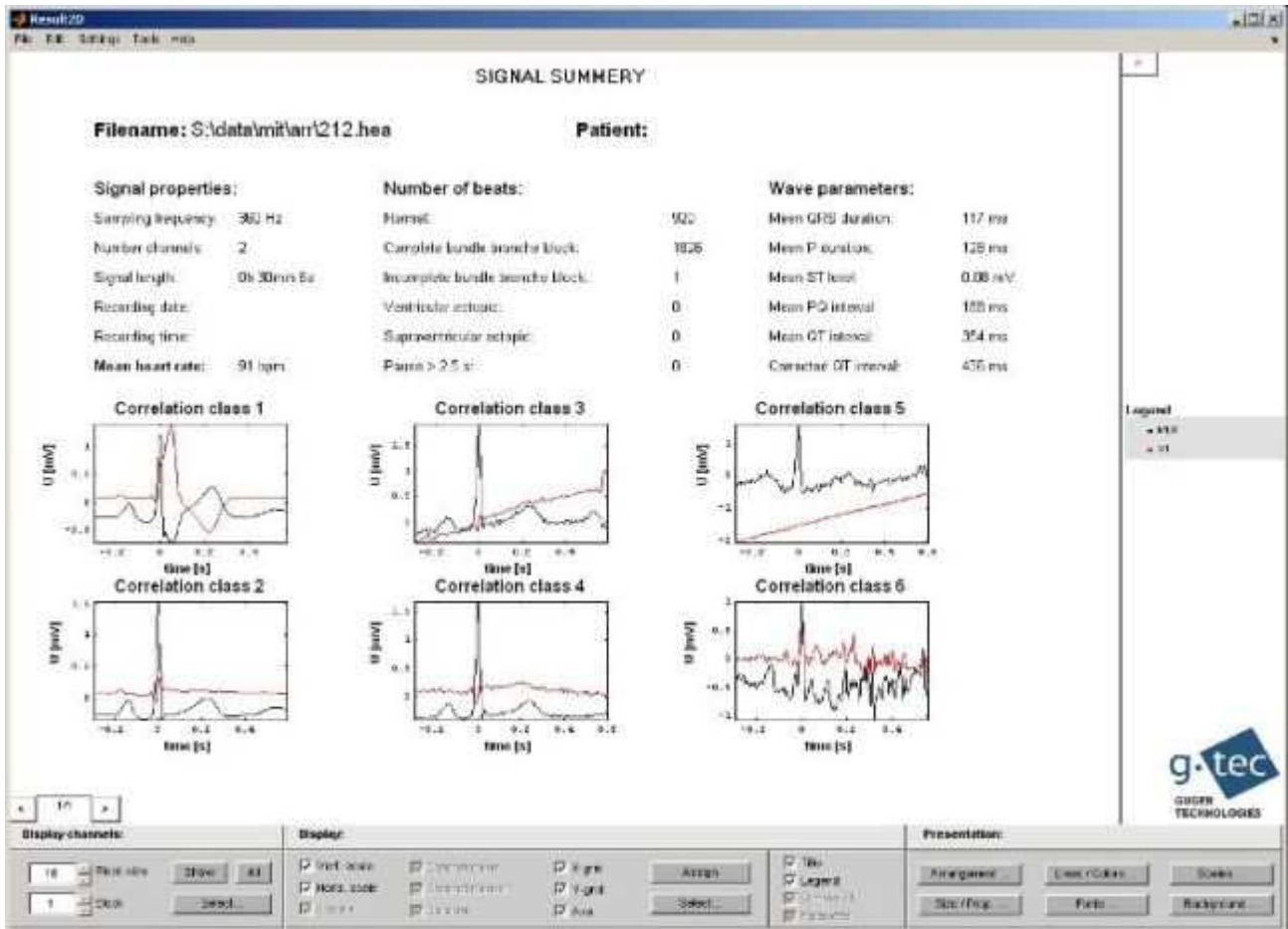
Looking at the Single Beat Editor you can see the signal from two leads of one single heart beat. When the Single Beat Editor is opened after the Correlation Classification, the first beat of correlation class 1 is displayed. Select **Line styles...** in the lower left **Channels** menu, press **Select all ->>**, choose a color, line style and line width and press **Apply to signal**. Now enable the **Hold** checkbox in the lower **Show** menu of the Single Beat Editor. Thereafter choose correlation class 2 in the **Markers** menu. Select another linestyle in the Line Style Editor and press **Apply to signal** again. What you see is a figure similar to the one below.



Two beat classes displayed with the Single Beat Editor. Correlation class 1 is plotted in brown, class 2 in blue.

Both beat classes show very similar morphologies at the beginning of the QRS complexes, but - due to a bundle branch block - the QRS complexes of beat class 1 are widened. Select **Result2D...** again and choose **SC** (correlation class) as the Y-Parameter. In order to focus on the two classes "Normal" and "Right Bundle Branch Block" - represented by the correlation classes 1 and 2 - press **Advanced selection...**, mark "1" and "2" in the SC field and press the **AND** button. Select **OK** to close the Event Selection Editor and click on **Ok** to start Result2D.





Signal summary as achieved from the Advanced Classification