Degree of Irregularity Idea

Let’s suppose that we have two subsets of an EKG signal and that we would like to quantify the extent to which their shape varies. Now let’s define as the average persistence of all detected P-waves in the first subset and as the average persistence of all detected P-waves in the other subset. Additionally, let’s define as the average center of mass of the detected P-waves in the first subset and likewise for . To compute this average center of mass, we could average the time-coordinate of the center of mass of each P-wave within the subset with respect to the preceding and subsequent Q-wave and simply average the voltage-coordinates. The T-wave counterparts of the above variables are defined similarly. With these ideas in mind, we are in a position to define

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where is the degree of irregularity between the average center of mass of the P-waves from the first subset () and the average center of mass of the P-waves from the second subset (). This is simply computed as the distance between their average centers of mass. Also, is the degree of irregularity between the average persistence of the P-waves from the first subset () and the average persistence of the P-waves from the second subset () and is computed simply as the absolute difference between them. Note that the T-wave counterparts are defined similarly. To calculate the total degree of irregularity between the two subsets of EKG data, we can then assign a weight to certain measures of irregularity depending on how much we want to emphasize the change in that measure of irregularity in the calculation of the total degree of irregularity. Lastly, I’ll point out that Q-waves and S-waves can be included in this analysis.