

Bachelor thesis preliminary project

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Tentative title of the Bachelor thesis: [Ventricular heartbeats filtering and the relationship with heart rate variability](#)

Objective or objectives (maximum 150 words): The main objective of this project is to analyze different heart beats of multiple patients, regardless of gender and age, studied previously by cardiologists. The ventricular heart beats are filtered, partially or totally, and some statistical studies are carried out due to check if this filtering affects the heart rate variability (HRV) and in if it does, in which proportion of filtering is possible to still have an acceptable and representative heart rate analysis compared with the sample control. Furthermore, all study parameters and estimators are studied due to constate which of them are more affected when filtering is done, and which ones are highly correlated and affect the analysis in a major way.

Brief justification of the technical relevance of the Bachelor thesis (maximum 200 words):

Heart rate variability (HRV) is a non-invasive tool that helps to analyze and study the autonomic nervous systems activity and helps to look for some pathology markers. Heart rate variability can be used as a predictive factor in the appearance of coronary events, cerebrovascular accidents, and sudden death, among others. So, that's why it's important to work in the development of the software of analysis systems that helps in the medical screening and aids the patient if more specific studies must be done to diagnose their disease.

The thesis is carried out with an R-studio package RHRV, that contains a complete set of tools that are used on the development of HRV analysis algorithms and performing clinical experiments. The software is mainly designed by humans, but it may also be used in animal research, so defining a well-structured human heart rate analysis could be extrapolated and used for another species.

The heart rate variability studies algorithms could be in the future integrate in a HOLTER or POLAR devices, that could inform in real time if a patient is likely to suffer a cardiology event and notify them. Another application could be for the doctors, that after the electrocardiogram is recorded, they can access for the whole 'raw' electro and to all the statistical analysis applied to it, due to have more information and facilitate the diagnosis.

