**Synopsis of the project:**

The focus of this project is to gather information on heart disease presence or absence, using a limited number of parameters. One of the parameters that I mainly focused on is the heart rate, which is commonly measured by health trackers in real time. To determine the parameter that aligns with the MAX.HR, I used Bayesian analysis and analyzed three different probability models. The first model consists of all predictor variables to predict MAX.HR, while the second model contains the elements that are of interest when examining the heart rate. The third model includes the most accurate parameters obtained by analyzing the first two models.

* **MODEL-1**-Beta (Max.HR ~all\_predictor variables) ∼ N(m0,s.d^2)
* **MODEL-2**-Beta (Max.HR~Age+BP+FBS.over.120+Cholesterol+Sex) ∼ N(m1, s.d^2)
* **MODEL-3**-Beta (Max.HR~Chest.pain.type+FBS.over.120+Slope.of.ST+Number.of. vessels.fluro) ∼ N(m3, s.d^2)

From this analysis, it can be concluded that the human heart rate is not solely accountable for predicting heart disease presence but analyzing it can provide useful insights. By analyzing the above models, it was found that Chest Pain Type followed by FBS.OVER.120 and the slope of ST retain the most significant information. Therefore, I used decision tree models and SVM linear regression techniques to filter the type of chest pain among the four different types which are TA, ATA, NAP, and ASY. Since my data set is mainly related to the medical field, Sensitivity is considered the most accurate among the remaining predictor variables (Quave, C. L., Pardo-de-Santayana, M., & Pieroni, A. (2012)). Sensitivity values show that ASY is the most detectable, followed by NAP, ATA, and TA. Variable importance across all three decision tree models showed that MAX.HR followed by the cholesterol level has a greater importance level with the Chest pain type.

I performed logistic regression analysis across four different models:

* Model-1- **HeartDisease\_Presence ~ Max.HR+ASY\_ChestPain**
* Model-2- **HeartDisease\_Presence ~ Max.HR**
* Model-3**- HeartDisease\_Presence ~ ASY\_ChestPain**
* Model-4**- HeartDisease\_Presence~.(All the predictor variables)**

By performing different analyses for the prediction of heart disease. We can conclude that MAX.HR and ASY types of chest pain are not solely responsible for the prediction of heart disease but on the other hand, they provide valuable insights for the prediction of heart disease and provide a better-fit model.

**Future analysis:**

* In future I will be analyzing different models to increase the predictability
* I will be implementing a visualization representation of the results for better understanding.
* Parallelly I will be focusing on the detection of the type of heart disease and suggest a diagnosis based on the results generated.

The reason for dropping the web application idea is that I was not able to combine the front end of the project to the backend of the project to produce insights of the heart disease.