Last updated on April 9, 2026

BM5163 Bayesian Inference in Bioengineering

Course project

Instructions

1. You are expected to work on one of these problems in a group of 3. Update your team composition here.
2. Answer the specific question(s) asked for each problem. Any anaysis that does not link with the question will not be rewarded.
3. This exercise is designed to apply Bayesian inference methods from the course to real-world datasets. The primary goal is to practice implementing Bayesian approaches—even in cases where alternative modeling frameworks may be more suitable or perform better.

Questions

1. Using following dataset answer the following
   (a) How does heart function depend on the physical activity?
   (b) How is it affected by other system parameters, such as subject age, Oxygen consumption etc.

   Dataset: Cardiorespiratory measurement from graded cycloergometer exercise testing
2. Salt-sensitive hypertension (SS-HT), a condition where blood pressure increases in response to excessive dietary salt consumption, poses a significant risk factor for cardiovascular disease, kidney damage, and associated morbidity. Using the data answer the following
   (a) Can you build a Bayesian inference model to predict salt intake levels from measured blood pressure in rats.

   Dataset: Blood Pressure in Salt-Sensitive Dahl Rats
3. Studies indicate that suppression of mildly symptomatic ventricular premature complexes in myocardial infarction survivors can improve survival. Using the following dataset answer the following
   (a) Can suppression of mildly symptomatic ventricular premature complexes in myocardial infarction survivors improve survival ?
   (b) Is there any effect of the drug involved in the study/dataset?

   Dataset: CAST RR Interval Sub-Study Database
4. Type-2 diabetes is known to affect the permeability of the blood-brain barrier. Using the data answer the following
   (a) Does type-2 diabetes have an effect on microcirculation in the brain?
   (b) If yes, can you build a predictive model of it?

   Dataset: Cerebromicrovascular Disease in Elderly with Diabetes
5. During the COVID-19 pandemic and its aftermath, infrared thermographs became widely used in public places to measure body temperature by scanning facial thermal patterns. In a more traditional setting, the temperature is measured orally using a thermometer. Using the dataset, answer the following
   (a) Do thermographs give as good information about body temperature as a thermometer?
   (b) Quantify the difference, if any.

   Dataset: Facial and oral temperature data from a large set of human subject volunteers