

mapper

March 17, 2025

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[1]: # Example mapper() function to visualize Var[b] in (x1,x2)-plane
mapper <- function(x0 = 1, s = 1) {
  # Create sequences for the range of x1 and x2 to explore
  x1_seq <- seq(-1.5, 1, length.out = 100)
  x2_seq <- seq(-1.5, 1.5, length.out = 100)

  # Initialize matrix to store variance values
  Var_b <- matrix(nrow = length(x1_seq), ncol = length(x2_seq))

  # Calculate Var[b] numerically at each (x1, x2) point
  for (i in 1:length(x1_seq)) {
    for (j in 1:length(x2_seq)) {
      X <- matrix(c(1, 1, 1, x0, x1_seq[i], x2_seq[j]), ncol = 2)
      Fisher_info <- t(X) %*% X / s^2
      Cov_matrix <- solve(Fisher_info)
      Var_b[i, j] <- Cov_matrix[1, 1]
    }
  }

  # Plot the contour of log10 variance of the intercept
  contour(x1_seq, x2_seq, log10(Var_b),
    xlab = "x1", ylab = "x2",
    main = expression(paste("Contours of ", log[10], "(Var[b]) with fixed_",
    ↪, x[0], "=1")),
    levels = seq(min(log10(Var_b)), max(log10(Var_b)), length.out = 20))

  # Optional: Indicate optimal condition x1 + x2 = -1
  abline(a = -1 - x0, b = -1, col = "green", lwd = 2)
}
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