BAYESIAN AND MAXIMUM ENTROPY INFERENCE FOR THE MEAN AND STANDARD DEVIATION OF A POPULATION WHEN ONLY THE SAMPLE SIZE, MEAN AND RANGE ARE OBSERVED

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Abstract

De Alba, Fernández-Durán and Gregorio-Domínguez (2004) considered the following problem: Let $X_1, X_2, \ldots, X_n$ be a random sample from a normal population with unknown mean and standard deviation. Only the sample size, mean and range are recorded and it is necessary to estimate the unknown population mean and standard deviation. The estimation of the mean and standard deviation was made from a Bayesian perspective by using a Monte Carlo Markov Chain (MCMC) algorithm to simulate samples from the intractable joint posterior distribution of the mean and standard deviation. In this talk we present how to approach this problem for a general population using the maximum entropy principle. The proposed methodology is applied to simulated and real data. The real data refers to the acidity contents (BRIX levels) of orange juice produced in different countries.

References:
    [1] de Alba, E., Fernández-Durán, J.J. and Gregorio-Domínguez, M.M. (2004) Bayesian Inference for the Mean and Standard Deviation of a Normal Population When Only the Sample Size, Mean and Range are Observed. Working Paper DE-C04.4, Departamento de Estadística, ITAM.

Key Words: Range, Standard Deviation, MCMC, Maximum Entropy.