吴云泥-Assignment3

From the data set you obtained in the last assignment or new data set you will collect please get 2 different random samples.

1. Estimate the mean and variance for each sample by using moment method and maximum likelihood method.

2. Find the standard errors and mean squared errors of the estimators in 1.

3. Please find 95% and 99% confidence intervals for mean respectively according to 1. (Please try to involve the normal and student distributions with appropriate conditions.)

4. Please compute 95% prediction intervals on mean of your samples and compare the length of the prediction intervals with the length of the 95% CIs in 3.

From last assignment, we randomly selected 50 *RBrecs* and recorded corresponding lengths of their red sides as.

We now randomly selected another 50 *RBrecs* and recorded as. Let *X* denote the length of *RBrecs’* red side and we assume *X*~*N* (7, 0.2).

(1)By moment method:

(1)By maximum likelihood method and suppose random variable *X*=length of red side (1)of *RBrecs* has a normal distribution, then it has likelihood function:

(2)Standard error and mean squared error of, sinceis an unbiased estimator of:

(2)Standard error of: random variable *X*~*N* (7, 0.2), hence has chi-square (2)distributionwith.

(2)Mean squared error of: and since is an unbiased estimator of,

(3)For Sample 1, 95% CI of,is known, hence:

(3)Supposeis unknown, then:

(2)

(3)99% CI of,is known, hence:

(3)Supposeis unknown, then:

(3)For Sample 2, 95% CI of,is known, hence:

(3)Supposeis unknown, then:

(2)

(3)99% CI ofis known, hence:

(3)Supposeis unknown, then:

(4)A 95% PI of fifty-first predictionof sample 1:

(1)Length of PI:

(1)Length of its corresponding 95% CI:

(4)A 95% PI of fifty-first predictionof sample 2:

(1)Length of PI:

(1)Length of its corresponding 95% CI:

(2)Each length of the 95% prediction intervals on the mean of these two samples is (2)longer than its corresponding 95% CIs.