

Statistical Inference, Course Project - Part1

Ivan Maksimov

08.01.2015

The exponential distribution can be simulated in R with `rexp(n, lambda)` where `lambda` is the rate parameter. The mean of exponential distribution is $1/\lambda$ and the standard deviation is also $1/\lambda$. Set $\lambda = 0.2$ for all of the simulations. In this simulation, you will investigate the distribution of averages of 40 exponential(0.2)s. Note that you will need to do a thousand or so simulated averages of 40 exponentials.

We should

1. Show the sample mean and compare it to the theoretical mean of the distribution.
2. Show how variable the sample is (via variance) and compare it to the theoretical variance of the distribution.
3. Show that the distribution is approximately normal.

Data Processing Exponential sampling parameters

```
# Exponential sampling parameters
lambda <- 0.2 #Set rate to 0.2
sampleSize <- 40 #Set sample size to 40
nSamples <- 1000 #Draw 1000 samples
```

Make DF

```
expoDist <- replicate(n = nSamples, expr = rexp(n = sampleSize, lambda))
```

Calculate theoretical and sample summary statistics Means

```
theoMean <- round((1/lambda), 3) #Theoretical
sampleMean <- round(mean(colMeans(expoDist)), 3) #Sample
```

Standard Deviations

```
theoSd <- round((1/lambda * (1/sqrt(sampleSize))), 3) #Theoretical
sampleSd <- round(sd(colMeans(expoDist)), 3) #Sample
```

Variance

```
theoVar <- round((theoSd^2), 3)
sampleVar <- round((sampleSd^2), 3)
```

Table 1: Summary statistics	Mean	Standart Diviation	Variance
—: Theoretical	5	0.791	0.626
Sample	4.984	0.786	0.618