03 - 23

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```r
set.seed(69420)
library(maxLik)
```

1

```r
rn <- rnorm(100, mean = 5, sd = 2);
logLikeNorm <- function(param)
{
  sum(dnorm(rn,mean = param[1], sd = param[2], log = TRUE ))
}
normal_mle <- maxLik(logLik = logLikeNorm, start = c(mean = 0, sd = 1))
normal_mle
```

```
## Maximum Likelihood estimation
## Newton-Raphson maximisation, 10 iterations
## Return code 8: successive function values within relative tolerance limit (reltol)
## Log-Likelihood: -213.271 (2 free parameter(s))
## Estimate(s): 5.145412 2.041676
```

```r
# Pasikliovimo intervalai
confint(normal_mle)
```

```
##          2.5 %    97.5 %
## mean 4.744998 5.545826
## sd   1.758709 2.324644
```

2

```r
ch <- unlist(read.table("C:/Users/user/Desktop/VU/4 pusmetis/Parametrinė statistika/03-23/chemija.txt",

logLikelogNorm <- function(param)
{
  sum(dlnorm(ch,meanlog = param[1], sdlog = param[2], log = TRUE ))
}
lognormal_mle <- maxLik(logLik = logLikelogNorm, start = c(meanlog = 0, sdlog = 1))
lognormal_mle$estimate[1]
```

```
##  meanlog
## 2.458869
```

```r
confint(lognormal_mle, parm = c("meanlog"))
```

```
##            2.5 %    97.5 %
## meanlog 2.306372 2.611365
```

3

```r
data<- c(1, 0, 1, 2, 0, 0, 0, 0, 1, 0)
data
```

```
##  [1] 1 0 1 2 0 0 0 0 1 0
```

```r
logLikeBinom <- function(param)
{
  sum(dbinom(data,size = 5, prob = param[1], log = TRUE ))
}
logbinom_mle <- maxLik(logLik = logLikeBinom, start = c(prob = .50))
logbinom_mle
```

```
## Maximum Likelihood estimation
## Newton-Raphson maximisation, 2 iterations
## Return code 1: gradient close to zero (gradtol)
## Log-Likelihood: -9.12325 (1 free parameter(s))
## Estimate(s): 0.1
```

```r
confint(logbinom_mle)
```

```
##          2.5 %     97.5 %
## prob 0.01684524 0.1831548
```

4

```r
pois <- rpois(50, 3)

# Taškinis įvertinys
logLikePoisson <- function(param)
{
  sum(dpois(pois,lambda = param[1], log = TRUE ))
}
logpois_mle <- maxLik(logLik = logLikePoisson, start = c(lambda = .05))
logpois_mle
```

```
## Maximum Likelihood estimation
## Newton-Raphson maximisation, 11 iterations
## Return code 1: gradient close to zero (gradtol)
## Log-Likelihood: -105.7995 (1 free parameter(s))
## Estimate(s): 2.98
```

```r
# Intervalinis įvertinys Q = 0.95
bottom <- mean(pois) - 1.96*sqrt(mean(pois)/50)
top <- mean(pois) + 1.96*sqrt(mean(pois)/50)

interval_ivert<-(top+bottom)/2
interval_ivert
```

```
## [1] 2.98
```

5

```r
55/520
```

```
## [1] 0.1057692
```

```r
bin<-rbinom(1000, 1, 55/520)
logLikeBinom2 <- function(param)
{
  sum(dbinom(bin,size = 1, prob = param[1], log = TRUE ))
}
logbinom_mle2 <- maxLik(logLik = logLikeBinom2, start = c(prob = .50))
logbinom_mle2
```

```
## Maximum Likelihood estimation
## Newton-Raphson maximisation, 2 iterations
## Return code 8: successive function values within relative tolerance limit (reltol)
## Log-Likelihood: -311.696 (1 free parameter(s))
## Estimate(s): 0.09399999
```

```r
# upper confidence limit =  1 - (1-level)/2 , level = 1-(1-limit)*2
level = 1-(1-0.987)*2
confint(logbinom_mle2, level = level)
```

```
##           1.3 %    98.7 %
## prob 0.07345533 0.1145447
```