

Maximum Likelihood

Setup

Setup
Uniform
Poisson
Submission

[Start Over](#)

Here are the data and functions that are currently in this `LearnR` environment, where `true_parameter` is a value that you will seek out in the exercises.

```
N <- 1000 #resolution (number of guesses)
data_unif <- runif(N, true_parameter, 1)
data_pois <- rpois(N, lambda = true_parameter)

likelihood_unif <- function(a, data){
  prod(dunif(data, a, 1), na.rm = TRUE)
}
LL_poisson <- function(lambda, y){
  sum(dpois(y, lambda, log=TRUE))
}
```

[Next Topic](#)

Maximum Likelihood

Uniform

Setup

Uniform

Poisson

Submission

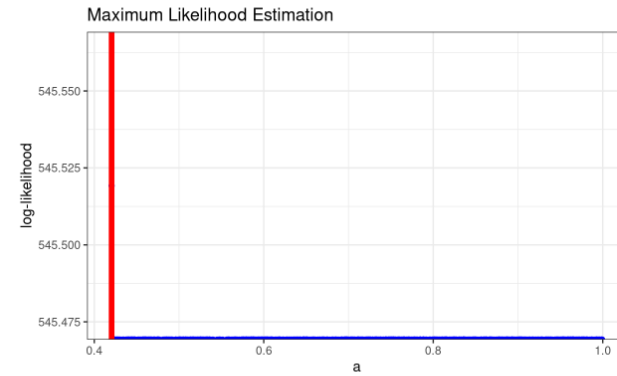
Start Over

Using the `data_unif` sample of data that were sampled from a $U(a, 1)$ distribution, use R code to graph the search for the maximum likelihood estimate (MLE) for the value of a . Hint: $a > 0$.

Code [Start Over](#)

[Run Code](#)

```
1 a_values <- data_unif
2 likelihood_values <- sapply(a_values, function(x){ likelihood_unif(x, a_values)})
3 df <- data.frame(a_values, likelihood_values)
4 df %>%
5   ggplot(aes(x = a_values, y = log(likelihood_values))) +
6   geom_point(color = "blue") +
7   geom_vline(xintercept = a_values[which.max(likelihood_values)],
8             color = "red", size = 2) +
9   labs(title = "Maximum Likelihood Estimation", x = "a", y = "log-likelihood") +
10  theme_bw()
```



Use the `which.max` function to extract the MLE.

Code [Start Over](#)

[Run Code](#)

```
1 a_values <- data_unif
2 likelihood_values <- sapply(a_values, function(x){ likelihood_unif(x, a_values)})
3 which.max(likelihood_values)
```

[1] 992

[Previous Topic](#)

[Next Topic](#)

Maximum Likelihood

Poisson

Setup

Uniform

Poisson

Submission

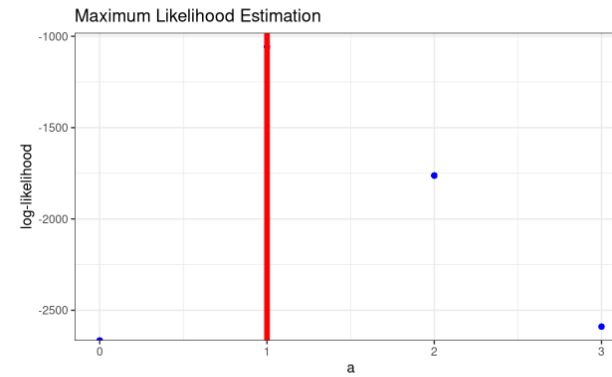
Start Over

Using the `data_pois` sample of data that were sampled from a $Pois(\lambda)$ distribution, use R code to graph the search for the maximum likelihood estimate (MLE) for the value of λ . Hint: $\lambda > 0$.

Code [Start Over](#)

[Run Code](#)

```
1 lambda_values <- data_pois
2 likelihood_values <- sapply(lambda_values, function(x){ LL_poisson(x, lambda_values)})
3 df <- data.frame(lambda_values, likelihood_values)
4 df %>%
5   ggplot(aes(x = lambda_values, y = likelihood_values)) +
6   geom_point(color = "blue") +
7   geom_vline(xintercept = lambda_values[which.max(likelihood_values)],
8             color = "red", size = 2) +
9   labs(title = "Maximum Likelihood Estimation", x = "a", y = "log-likelihood") +
10  theme_bw()
```



Use the `which.max` function to extract the MLE.

Code [Start Over](#)

[Run Code](#)

```
1 lambda_values <- data_pois
2 likelihood_values <- sapply(lambda_values, function(x){ LL_poisson(x, lambda_values)})
3 which.max(likelihood_values)
```

[1] 3

[Previous Topic](#)

[Next Topic](#)

Maximum Likelihood

Setup

Uniform

Poisson

Submission

[Start Over](#)

Submission

- take a screenshot of each page of this assignment (try not to include the left-hand menu to “zoom in” on the content)
- copy and paste the screenshots onto a Word document (or Google Doc or equivalent)
- be sure that your name appears on the document
- save as a PDF
- upload the PDF back to our CatCourses page

[Previous Topic](#)