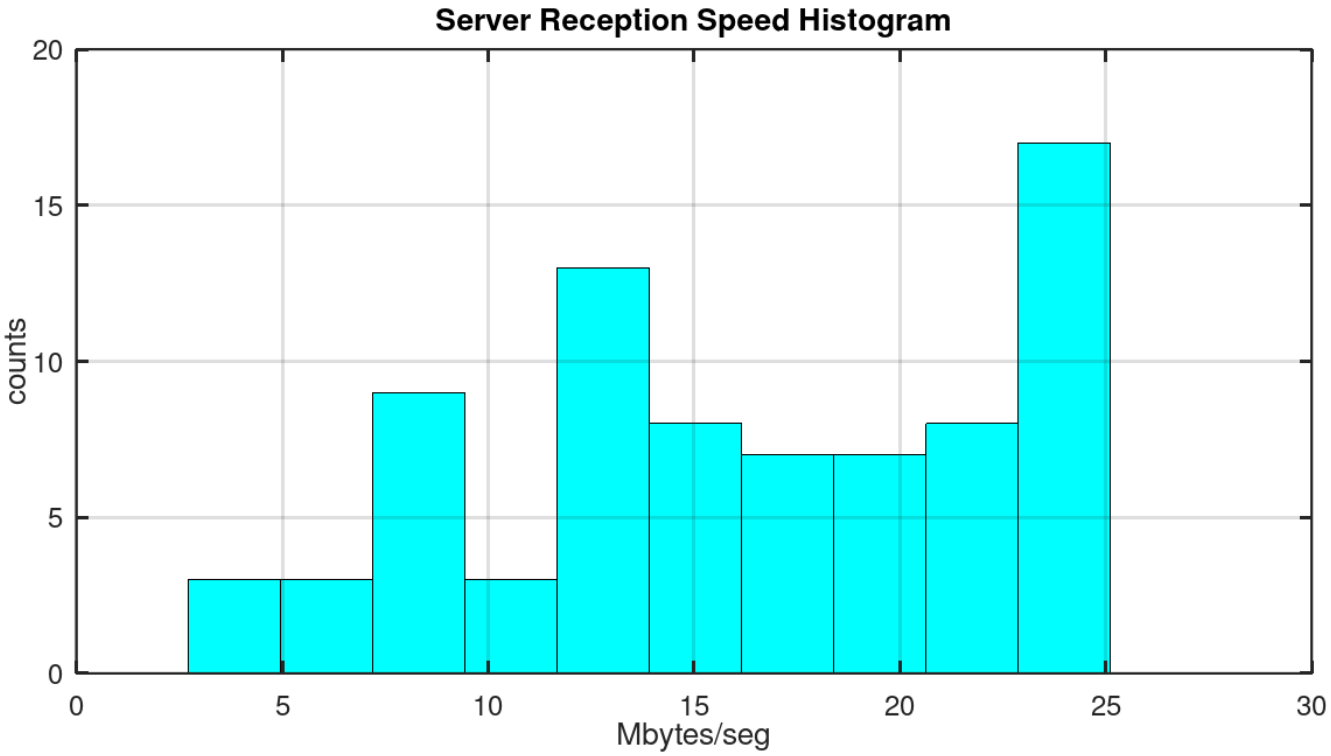
REAL CASE 2

Context: The reception speed in Mbytes/sec of a server was recorded. This information helps to monitor network load, detect anomalies, plan an increase or decrease in the contracted service, optimize applications, billing, etc.

Objective: Estimate parameters of the speed value curve.

Input data: Speed in Mbytes/sec every 5 seconds, 78 samples.

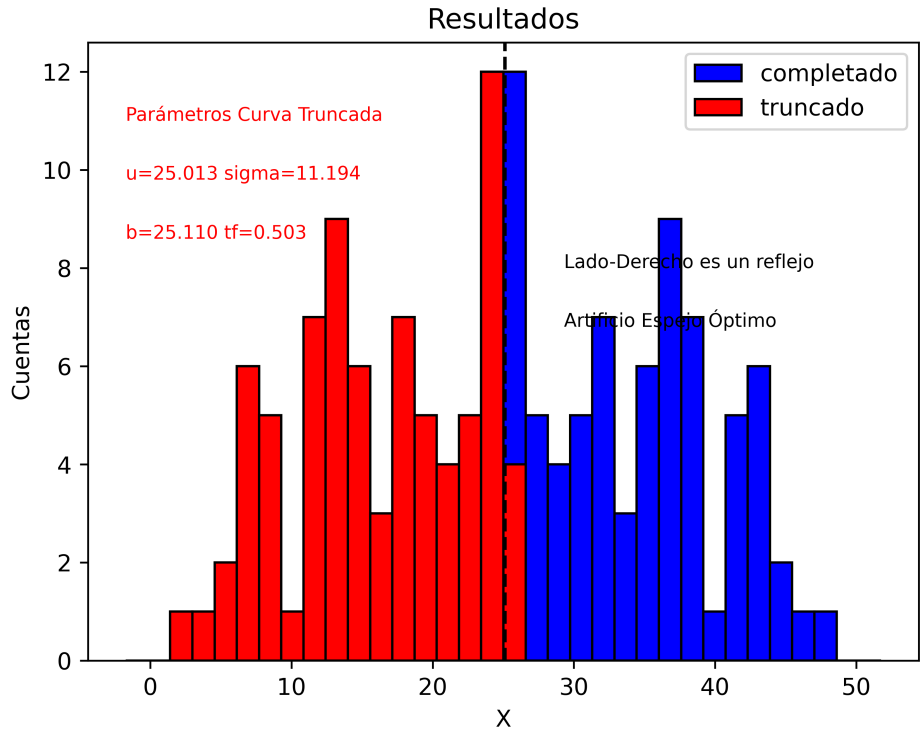
The data histogram:



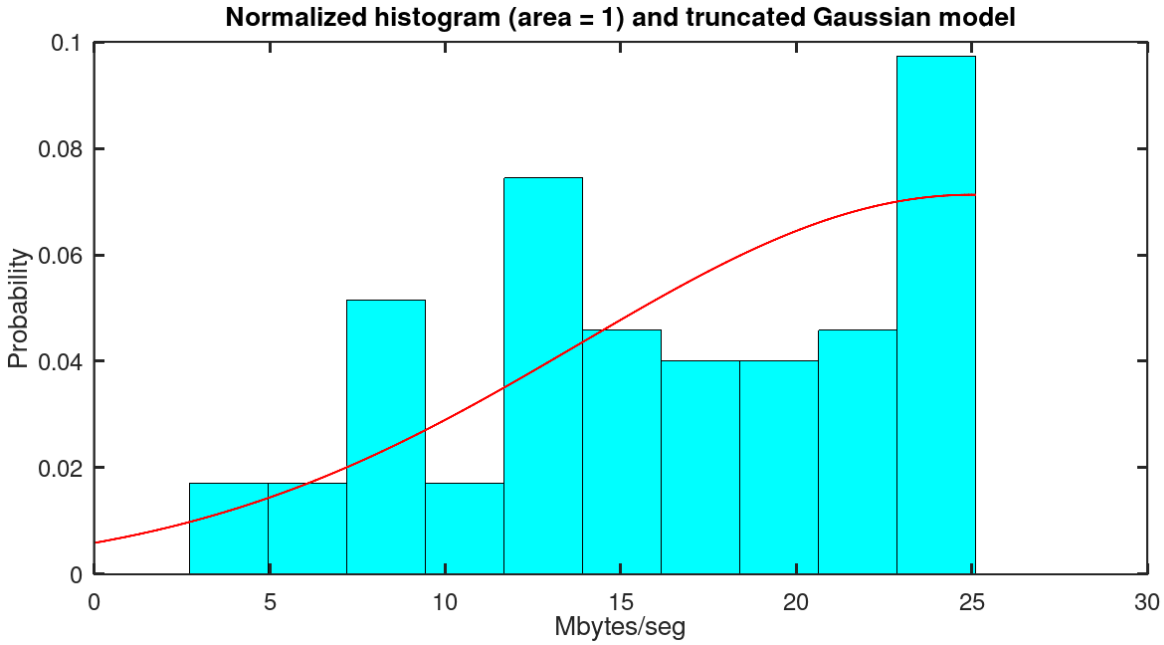
Comment: It can be seen that the data is truncated at 25.11 Mbytes/sec, which corresponds to the router/firewall limit. The mode in the histogram is also close to 25.11 Mbytes/sec, so the truncation would be close to 50%.

SOLUTION

The “Artifice Optimal Mirror” [1] is applied to complete the truncated curve:

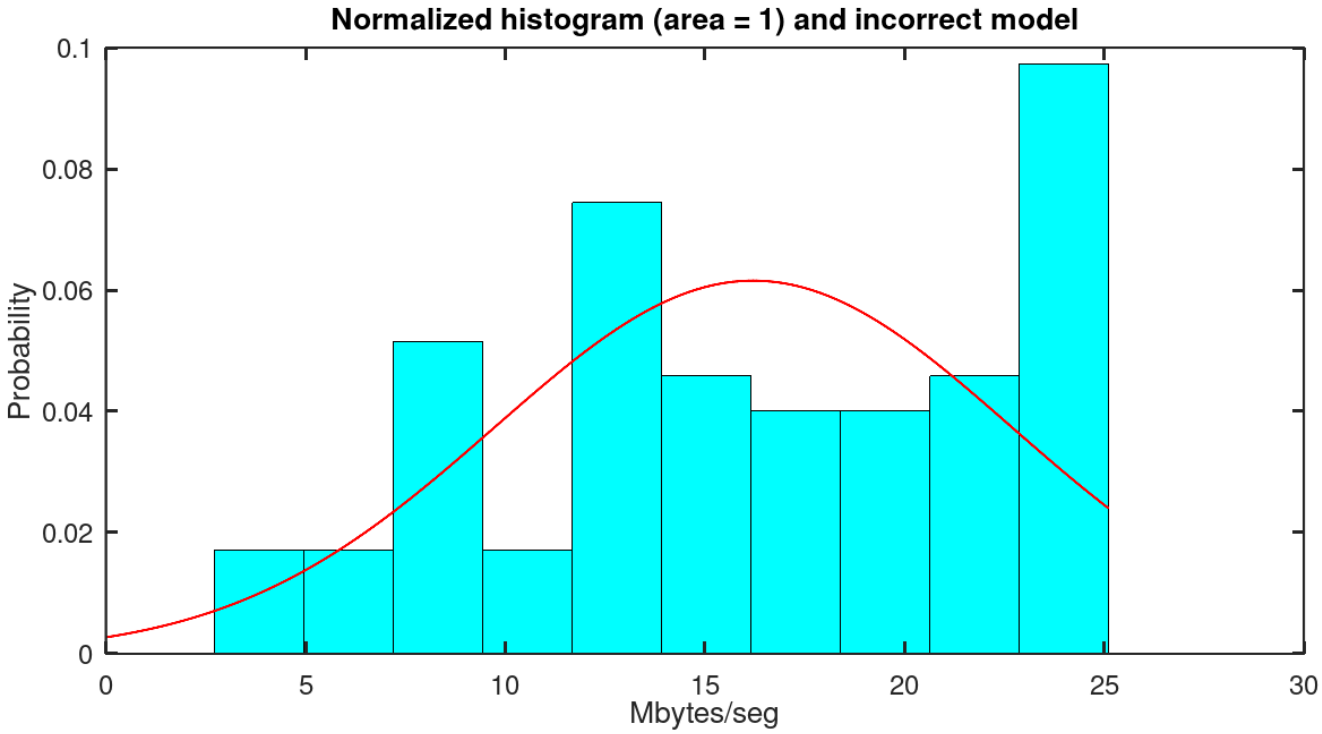


With the curve completed:
The model is calculated: u=25.01 Mbyte/sec sigma = 11.19 (standard deviation)
The truncated Gaussian model is plotted:



What error is introduced, if the Artifice Optimal Mirror technique is not used ?

Average input data = u_int = 16.21 Mbytes/sec
Standard deviation of input data = 6.48



The error for the average = (16.21-25.01)/25.01 = -35.19%
The error for the standard deviation = (6.48-11.19)/11.19 = -42.09%

The errors are enormous. This example illustrates how important it is to recognize the input data as truncated (limited by the channel capacity) and therefore give it special treatment.

References

[1] C. San Roman. The Practical Guide To Truncated Probability Distributions . 2020. https://liberotecno.com/PracGuideTrunc.php