



Métodos de Imputación basados en la Función de Verosimilitud

Subdepartamento de Investigación Estadística

Departamento de Metodologías e Innovación Estadística

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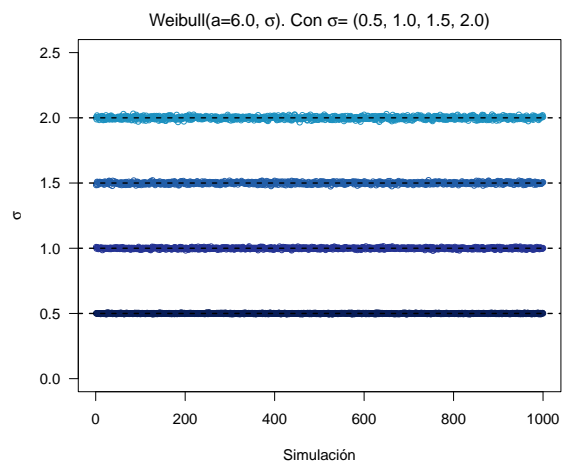
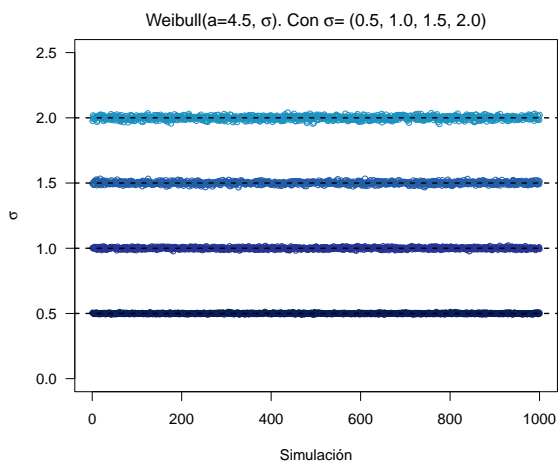
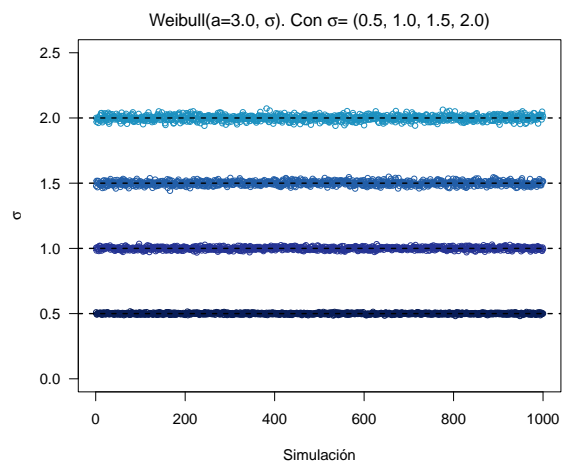
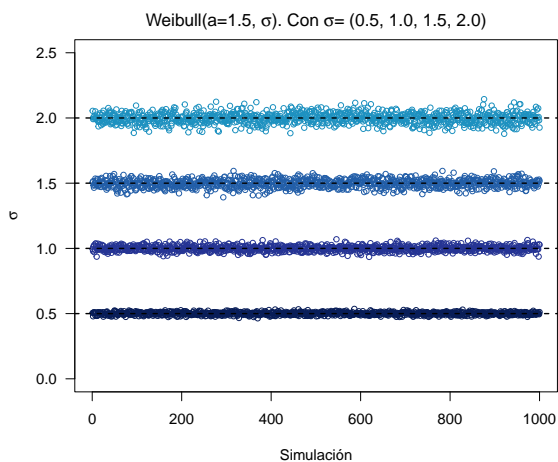
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1 Anexo 1: Distribución Weibull(σ)

```
load('FUNs_MLE_WEIBULL1.RData')

As <- seq(1.5, 6, 1.5)
Sigmas <- seq(0.5, 2.0, 0.5)
set.seed(12358)
at <- 1
for(a in As){
  st <- 1
  for(s in Sigmas){
    nmMTX <- paste('MLE_Weib_', 'A', at, '_', 'S', st, sep = "")
    assign(nmMTX, FUN_SIM_MLE_Weibull1(arg_a = a, arg_s = s) )
    st <- st + 1
  }
  at <- at + 1
}
```



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Table 1: Weibull: 1-2

| | Scale | Prom. | Min. | Max. | S.D. | | Scale | Prom. | Min. | Max. | S.D. |
|----|-------|--------|--------|--------|--------|----|-------|--------|--------|--------|--------|
| S1 | 0.5 | 0.5003 | 0.4640 | 0.5360 | 0.0108 | S1 | 0.5 | 0.4999 | 0.4815 | 0.5171 | 0.0052 |
| S2 | 1.0 | 0.9998 | 0.9349 | 1.0699 | 0.0212 | S2 | 1.0 | 1.0000 | 0.9685 | 1.0350 | 0.0106 |
| S3 | 1.5 | 1.4981 | 1.3917 | 1.5938 | 0.0316 | S3 | 1.5 | 1.5000 | 1.4415 | 1.5495 | 0.0160 |
| S4 | 2.0 | 1.9983 | 1.8784 | 2.1443 | 0.0417 | S4 | 2.0 | 1.9999 | 1.9399 | 2.0727 | 0.0204 |

Table 2: Weibull: 3-4

| | Scale | Prom. | Min. | Max. | S.D. | | Scale | Prom. | Min. | Max. | S.D. |
|----|-------|--------|--------|--------|--------|----|-------|--------|--------|--------|--------|
| S1 | 0.5 | 0.5001 | 0.4901 | 0.5121 | 0.0035 | S1 | 0.5 | 0.4998 | 0.4921 | 0.5077 | 0.0026 |
| S2 | 1.0 | 0.9999 | 0.9769 | 1.0211 | 0.0068 | S2 | 1.0 | 0.9998 | 0.9809 | 1.0151 | 0.0051 |
| S3 | 1.5 | 1.5004 | 1.4668 | 1.5332 | 0.0106 | S3 | 1.5 | 1.4998 | 1.4744 | 1.5218 | 0.0075 |
| S4 | 2.0 | 1.9994 | 1.9525 | 2.0409 | 0.0141 | S4 | 2.0 | 1.9996 | 1.9653 | 2.0315 | 0.0101 |

2 Anexo 2: Distribución Gamma(α)

```
load('FUNs_MLE_GAMMA1.RData')

Alfas <- seq(1.5, 6, 1.5)
Sigmas <- seq(0.5, 2.0, 0.5)
set.seed(12358)
at <- 1
for(a in Alfas){
  st <- 1
  for(s in Sigmas){
    nmMTX <- paste('MLE_Gamma_', 'A', at, '_', 'S', st, sep = "")
    assign(nmMTX, FUN_SIM_MLE_Gamma(arg_a = a, arg_s = s) )
    st <- st + 1
  }
  at <- at + 1
}
```

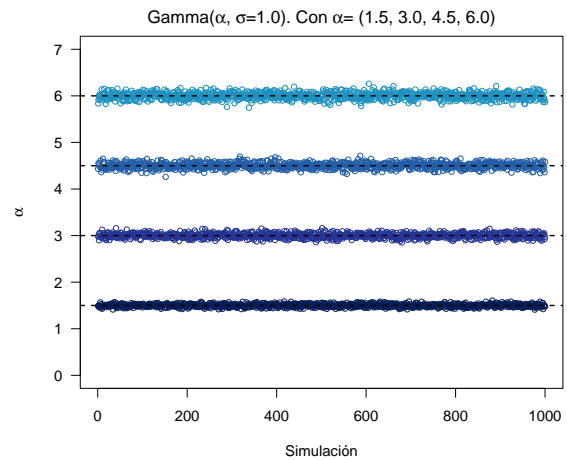
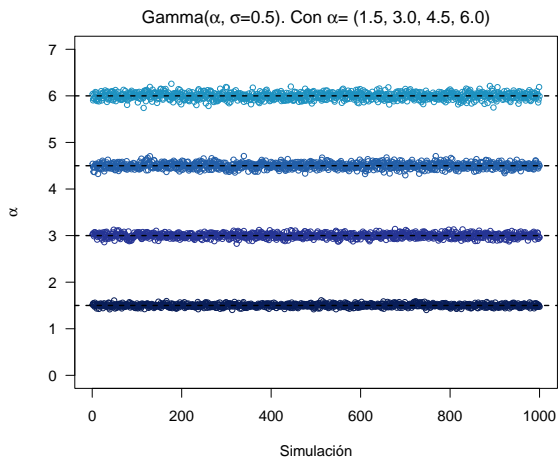
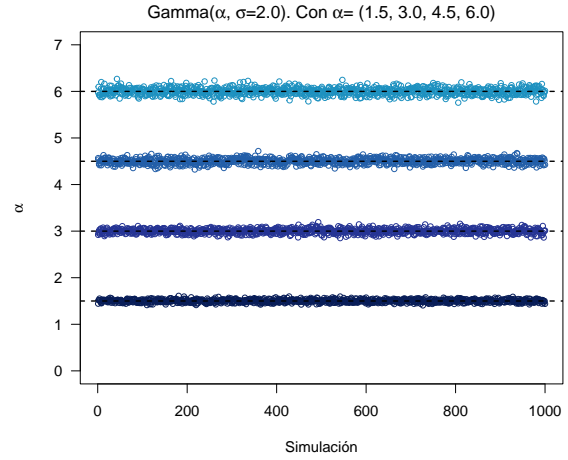
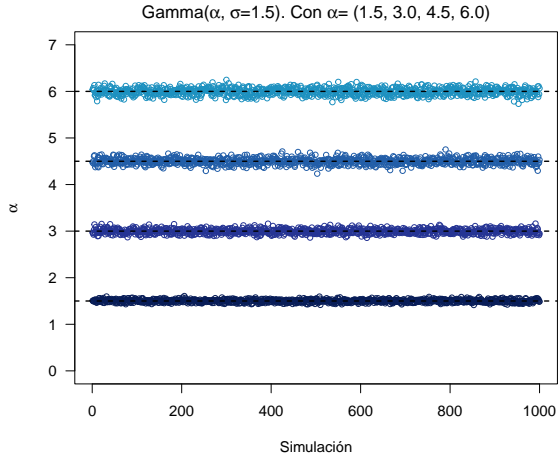


Table 3: Gamma: 1-2

| | Shape | Prom. | Min. | Max. | S.D. | | Shape | Prom. | Min. | Max. | S.D. |
|----|-------|--------|--------|--------|--------|----|-------|--------|--------|--------|--------|
| A1 | 1.5 | 1.5006 | 1.4031 | 1.6105 | 0.0326 | A1 | 1.5 | 1.4999 | 1.4107 | 1.6033 | 0.0316 |
| A2 | 3.0 | 3.0000 | 2.8256 | 3.1416 | 0.0492 | A2 | 3.0 | 2.9990 | 2.8536 | 3.1603 | 0.0504 |
| A3 | 4.5 | 4.5013 | 4.2956 | 4.7076 | 0.0621 | A3 | 4.5 | 4.5022 | 4.2611 | 4.7129 | 0.0624 |
| A4 | 6.0 | 5.9981 | 5.7411 | 6.2593 | 0.0730 | A4 | 6.0 | 5.9999 | 5.7463 | 6.2590 | 0.0724 |

Table 4: Gamma: 3-4

| | Shape | Prom. | Min. | Max. | S.D. | | Shape | Prom. | Min. | Max. | S.D. |
|----|-------|--------|--------|--------|--------|----|-------|--------|--------|--------|--------|
| A1 | 1.5 | 1.5014 | 1.4059 | 1.6103 | 0.0324 | A1 | 1.5 | 1.5014 | 1.4059 | 1.6103 | 0.0324 |
| A2 | 3.0 | 3.0015 | 2.8499 | 3.1927 | 0.0505 | A2 | 3.0 | 3.0015 | 2.8499 | 3.1927 | 0.0505 |
| A3 | 4.5 | 4.5036 | 4.3232 | 4.7190 | 0.0594 | A3 | 4.5 | 4.5036 | 4.3232 | 4.7190 | 0.0594 |
| A4 | 6.0 | 6.0010 | 5.7577 | 6.2675 | 0.0748 | A4 | 6.0 | 6.0010 | 5.7577 | 6.2675 | 0.0748 |



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3 Distribución Weibull(a, σ)

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Bibliografia

- Dempster, Arthur P., Nan M. Laird, and Donald B. Rubin. 1977. “Maximum Likelihood from Incomplete Data via the EM Algorithm.” *Journal of the Royal Statistical Society: Series B (Methodological)* 39 (1): 1–22.
- Dobson, Annette J., and Adrian G. Barnett. 2018. *An Introduction to Generalized Linear Models*. Texts in Statistical Science Series. CRC Press.
- Dunn, Peter K., and K. Smyth Gordon. 2018. *Generalized Linear Models with Examples in R*. Springer Texts in Statistics. Springer.
- Enders, Craig K. 2022. *Applied Missing Data Analysis*. Guilford Publications.
- He, Yulei, Guangyu Zhang, and Chiu-Hsieh Hsu. 2021. *Multiple Imputation of Missing Data in Practice: Basic Theory and Analysis Strategies*. CRC Press.
- Lindsey, James. K. 1997. *Applying Generalized Linear Models*. Springer Texts in Statistics. Springer.
- Little, Roderick J. A., and Donald B. Rubin. 2020. *Statistical Analysis with Missing Data*. Wiley Series in Probability and Statistics. John Wiley & Sons.
- McCullagh, P., and J. A. Nelder. 1989. *Generalized Linear Models*. Monographs on Statistics and Applied Probability 37. Chapman; Hall, London.
- Molenberghs, G., G. Fitzmaurice, M. G. Kenward, A. Tsiatis, and G. Verbeke. 2015. *Handbook of Missing Data Methodology*. Chapman & Hall/CRC Handbooks of Modern Statistical Methods. CRC Press.
- Nelder, J. A., and R. W. M. Wedderburn. 1972. “Generalized Linear Models.” *Journal of the Royal Statistical Society A135* (3): 370–84.
- Rubin, Donald B. 1976. “Inference and Missing Data.” *Biometrika* 63 (3): 581–92.
- Tan, Ming T., Guo L. Tian, and Kai W. Ng. 2010. *Bayesian Missing Data Problems: EM, Data Augmentation and Noniterative Computation*. Chapman & Hall/CRC Biostatistics Series. CRC Press.
- Van Buuren, Stef. 2012. *Flexible Imputation of Missing Data*. Chapman & Hall/CRC Interdisciplinary Statistics Series. CRC Press.