

Simulation Lab(MC503)

Assignment 12

Try to solve all the problems

1. Consider the Burr Type XII distribution with:

$$\text{PDF } f(x; c, k) = ck \frac{x^{c-1}}{(1+x^c)^{k+1}}; x > 0; c, k > 0$$

$$\text{CDF } F(x; c, k) = 1 - (1+x^c)^{-k}; x > 0; c, k > 0$$

Simulate a random sample of size 50 from this distribution when the values of c and k are 1 and 0.5 respectively. Find maximum likelihood estimates (MLEs) of unknown parameters c and k and also find their 95% asymptotic confidence intervals.

2. Consider a real dataset with observations listed as

.70	.84	.58	.50	.55	.82	.59	.71	.72	.61	.62	.49	.54	.36	.36	.71	.35
.64	.85	.55	.59	.29	.75	.46	.46	.60	.60	.36	.52	.68	.80	.55	.84	.34
.34	.70	.49	.56	.71	.61	.57	.73	.75	.44	.44	.81	.80	.87	.29	.50	

Compute MLEs as well as CIs (confidence intervals) of c & k from both Burr X and Burr XII distributions using Newton- Raphson method and nleqslv package in R.

CDF of Burr X distribution is given by

$$F(x; c, k) = (1 - e^{-(cx)^2})^k; x > 0, c > 0, k > 0$$

3. Consider a real dataset with observation listed as

0.080	0.084	0.102	0.124	0.326	0.358	0.412	0.444	0.456	0.504	0.498	0.564	0.648
0.666	0.682	0.732	0.770	0.814	0.840	0.862	0.882	0.922	0.924	0.964	1.034	1.034
1.048	1.128	1.134	1.172	1.238	1.240	1.242	1.244	1.294	1.302	1.372	1.522	1.526

Compute the MLEs and CIs of β and η from the Gompertz distribution using nleqslv package in R.

PDF and CDF of Gompertz distribution is given by

$$f(x) = \beta \eta e^{\beta x} e^{-\eta(e^{\beta x}-1)}; x > 0, \beta, \eta > 0$$

$$F(x) = 1 - e^{-\eta(e^{\beta x}-1)}; x > 0, \beta, \eta > 0$$

... .. end