Computer Intensive Methods
Presentation 1

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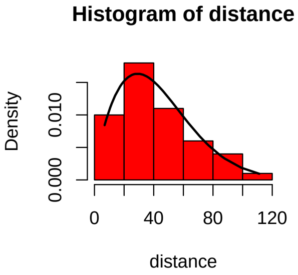
Exploration & Bootstrap Algorithm (Nonparametric)



i Draw $B = 5000, 50000, 100000$ from the data (stopping distance) with replacement

ii Compute statistic of interest(maximum) from each bootstrap sample(bootstrap replicates)

iii Approximate $se(\hat{\theta})$ by the sample standard deviation of bootstrap replicates.

Results, Problem & Remedies

Results

Replicates	5000	50000	100000
SError	13.75	13.74	13.77

Table: Standard Error estimates

Problems and Remedy

- Discrete not continuous distribution observed (see Appendix graph)
- Poor approximation of the distribution of maximum (Bickel, Gotze, and van Zwet (1997))
- Remedy includes m out of n bootstrapp (Bickel, Gotze, and van Zwet (1997)) and Semiparametric bootstrapp (Zelterman (1993)).

Bootstrap Algorithm (Parametric)

Candidate distributions based on extreme value theories include;

i Gumbel

ii Weibull

iii Generalized extreme value distribution (GEV)

i Draw $B = 5000, 50000, 100000$ from a distribution that best summarizes(weibull) the data with parameters replaced with their plugin estimates

ii Compute statistic of interest(maximum) from each bootstrap sample(bootstrap replicates)

iii Approximate $se(\hat{\theta})$ by the sample standard deviation of bootstrap replicates.

Question of the best distribution to assume

	Gumbel	Weibull	GEV
AIC	462.72	461.47	464.72

Table: AIC values of Candidate distributions

Results & Comarison

Results

Replicates	5000	50000	100000
SError	17.9	18.25	18.24

Table: Standard Error estimates

Comparison & Discussions

i Better approximation of the distribution of the maximum (See graph in appendix)

ii Continuous and not discrete distribution observed.

Bootstrap Algorithm (Non-Parametric) & Results

Algorithm

i Draw $B = 5000, 50000, 100000$ from the data (stopping distance) with replacement

ii Compute probability of interest $P(distance > 65ft) = \frac{\#(distance > 65)}{n}$ from each bootstrap sample (bootstrap replicates)

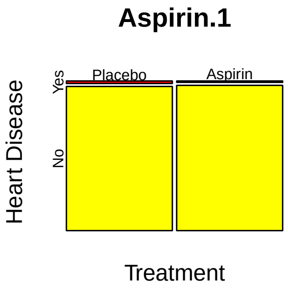
iii Approximate $P(distance > 65ft)$ by the mean of bootstrap replicates.

Results

Replicates	5000	50000	100000
Prob.	0.2	0.2	0.2

Table: Standard Error estimates

Odds Ratio and Confidence Interval



Results

i Observation unit are

ii Odds ratio is 1.83(1.44,2.33)

iii The odds of.....

Bootstrap Algorithm and Results

Bootstrap t Algorithm

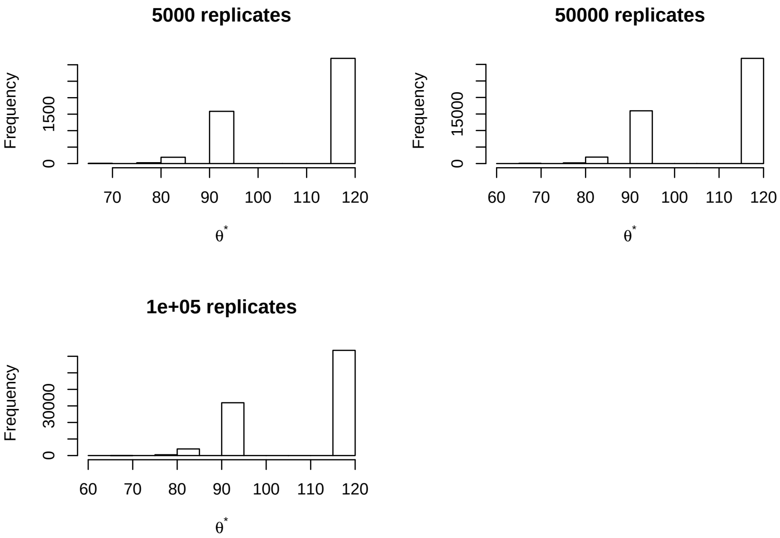
i. Draw B $=$ 5000 and 50000 bootstrap samples from the data and compute $Z^* = \frac{\hat{\theta^*} - \hat{\theta}}{se(\hat{\theta}^*)}$, where $\hat{\theta^*}$ is the bootstrap log-odds and $se(\hat{\theta^*})$ is the corresponding bootstrap standard error.
ii. Note that pairs are sampled
iii. obtain quantiles of the replicate Z^*
iv. Compute $(\hat{\theta} + \hat{t}_{1-\alpha} se(\hat{\theta}), \hat{\theta} + \hat{t}_{\alpha} se(\hat{\theta}))$, where $\hat{\theta}$ is the estimated odds ratio and $se(\hat{\theta})$ is the estimated standard error of the odds ratio.

Results

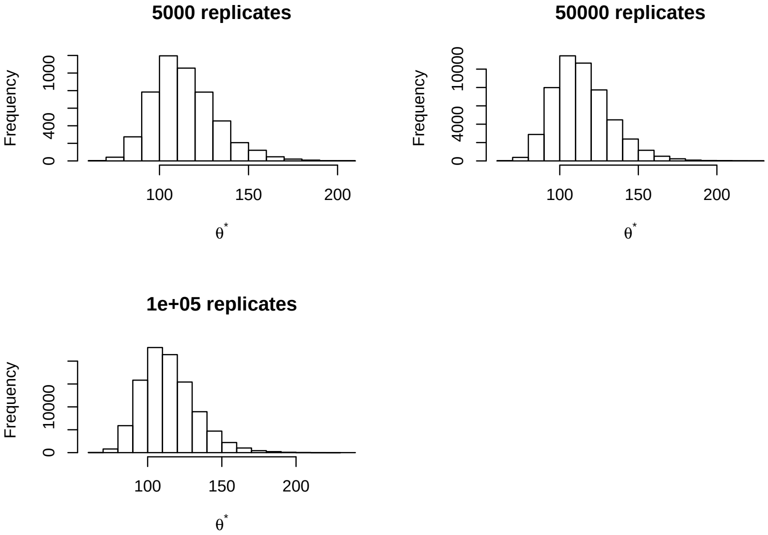
Replicates	5000	50000
Quantiles	-2.01,1.99	-1.97,1.93
CI	1.58,2.07	1.59,2.07

Table: Bootstrap Quantiles

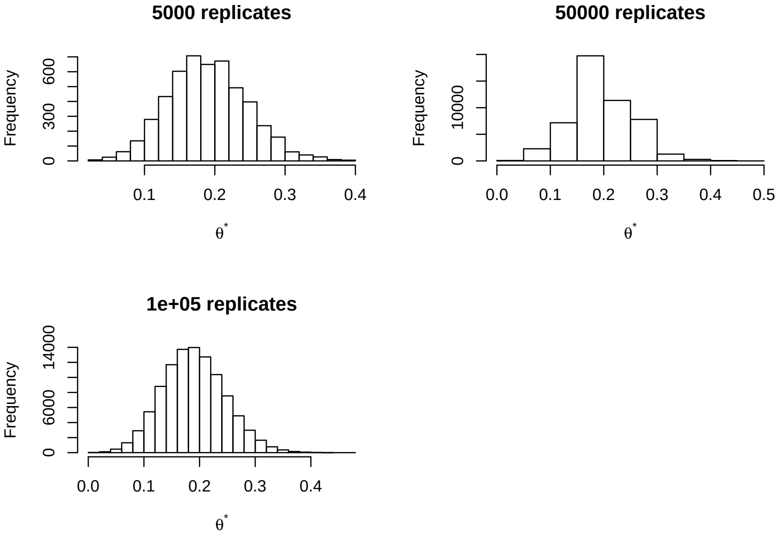
Distribution of Bootstrap Replicates (Non Parametric)



Distribution of Bootstrap Replicates (Parametric)



Distribution of Bootstrap Replicates (Probability)



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