Discussion Section 2

case study: roulette

AMS 131 28 Jun 18

single-#

sample the observed spins

all possible spins

38 or 6

your net gain

$-1	0
⋮	⋮
-1	5
+35	6
-1	7
⋮	⋮
-1	36

I

"new"

mean μ =

$$\frac{(37)(\$-1)+(1)(\$+35)}{38}$$

$$= \frac{\$-2}{38} \approx \$-0.05$$

(utility)

II

your net gain

$\$-1$
$+35$
⋮

$n = 1{,}000$

sum S = ?
(ex. $\$-64$)

$\left[\ \right]$ $n = 1000$

sum S^* = ?
(ex. $\$-28$)

repeated-sampling data set ①

(possible values of S^*)

-64
-28
⋮

S_1^*
S_2^*

M = large

$$\hat{p}(S > \$0) = \frac{\#\ S^* > 0}{M}$$

Monte Carlo method

simulation

(~1941)

Metropolis & Ulam (1949)

$\frac{1000}{38}$ (+35)

$\sim$

$\div 26$

the world

Your bet gain after $n = 1,000$

$26(+35) + (97\$.$

$(-\$11$

$-\$64$

$1 bets on a single # is like

the sum S of n IID random draws from the population dataset

real-world

the model of the world

$P(\text{coming out ahead}) = P(S > \$0)$

$= ?$

$27(+35) + 973(-1) = -\$28$

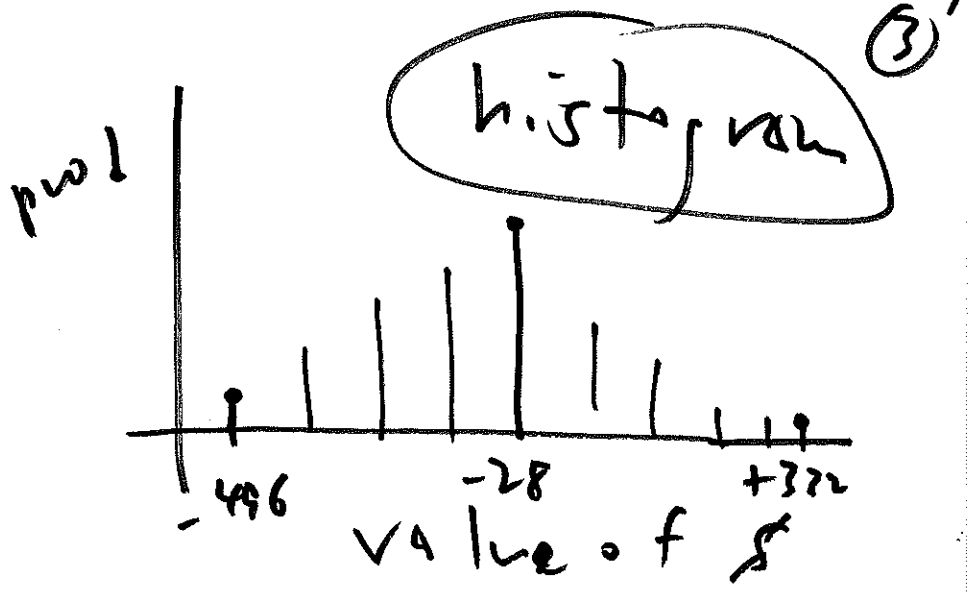
(R) free open-source prob. & stat software

RStudio

(1941) Von Neumann ← random # generators

value of (s)	estimated pmf.
⋮	
-496	0.01
-424	0.02
⋮	
⋮	
+332	0.01

1



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