simulation_Gibbs

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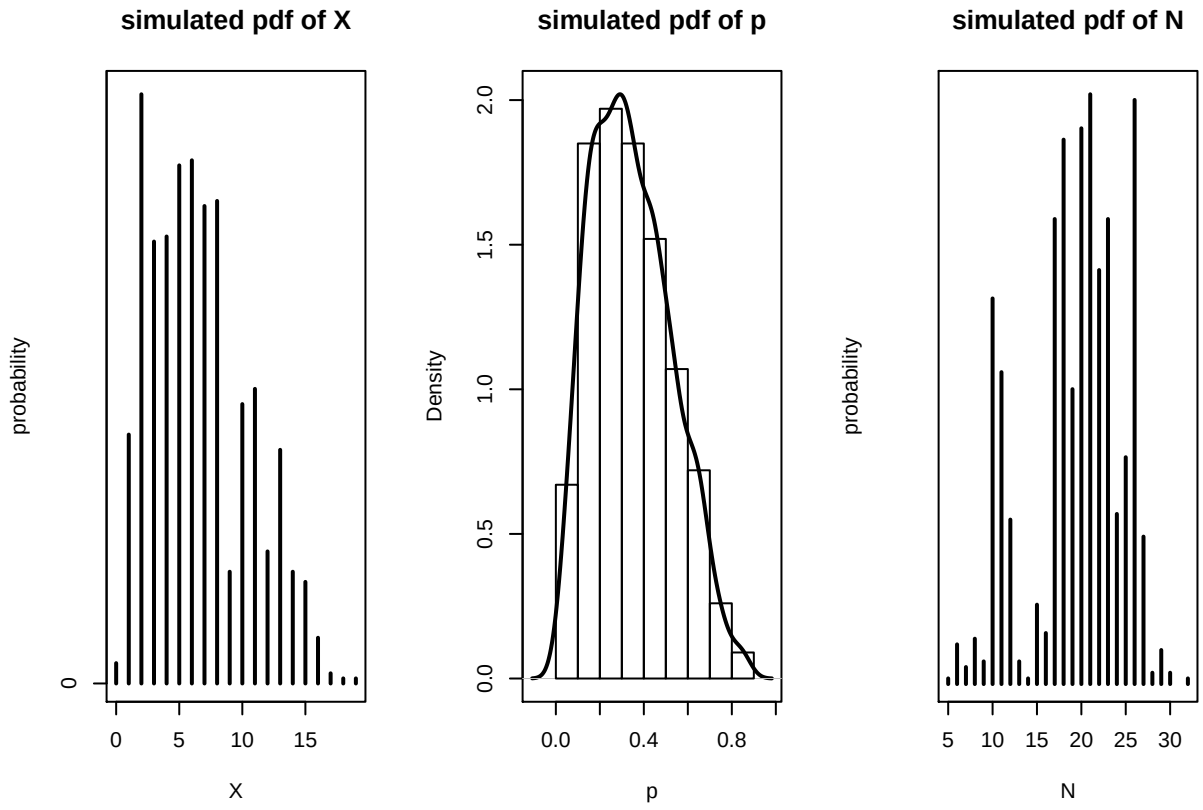
```
# Method for generating m samples of (x,p,N) values by the Gibbs sampler.
# In total J+m samples are generated but the first J are discarded.
# (x0,p0,N0) is the initial value
# If (x0,p0,N0) is not given, one can use x0=rbinom(1,16, 0.5), p0=rbeta(1,2,4)
# and N0=rpois(1,16) to generate it.
gibbs.f2=function(x0, p0, N0, m, J){
    x.seq <- p.seq <- N.seq <- rep(-1, J+m+1)
    x.seq[1] <- x0
    p.seq[1] <- p0
    N.seq[1] <- N0
    for(j in 2:(J+m+1)) {
            x.seq[j] <- rbinom(1, N.seq[j-1], p.seq[j-1])
            p.seq[j] <- rbeta(1, (x.seq[j] + 2), (N.seq[j-1] - x.seq[j] + 4))
            N.seq[j] <- rpois(1, 16 * (1 - p.seq[j])) + x.seq[j]
        }
    result <- list(X = x.seq[(J+2):(J+m+1)], p = p.seq[(J+2):(J+m+1)], N = N.seq[(J+2):(J+m+1)])
    result
}

set.seed(456)
m=1000
gibbsam2=gibbs.f2(8, 0.5, 16, m, 100)
par(mfrow=c(1,3))
plot(unique(gibbsam2$X), table(gibbsam2$X)/m, type='h',xlab="X", ylab="probability", lwd=2,main="simula
plot(density(gibbsam2$p), main="simulated pdf of p", xlab="p", lwd=2)
hist(gibbsam2$p, freq=F, add=T)
plot(unique(gibbsam2$N), table(gibbsam2$N)/m, type='h',xlab="N", ylab="probability", lwd=2,main="simula
```




```
table(gibbsam2$X)/m
```

```
##
##     0     1     2     3     4     5     6     7     8     9    10    11
## 0.049 0.087 0.088 0.116 0.094 0.095 0.103 0.102 0.055 0.058 0.046 0.022
##    12    13    14    15    16    17    18    19
## 0.026 0.020 0.022 0.009 0.004 0.001 0.001 0.002
```

```
table(gibbsam2$N)/m
```

```
##
##     5     6     7     8     9    10    11    12    13    14    15    16
## 0.001 0.004 0.004 0.009 0.014 0.029 0.055 0.068 0.082 0.098 0.096 0.104
##    17    18    19    20    21    22    23    24    25    26    27    28
## 0.103 0.082 0.073 0.052 0.040 0.030 0.026 0.008 0.007 0.006 0.003 0.002
##    29    30    32
## 0.002 0.001 0.001
```