Although assuming a Poisson distribution is only valid if NBN=Infinity, this way of calculating the log-likelihood is useful because it avoids having to take into account the latent random variables.

#-------------------------------------------------------------

Therefore

Therefore, we approximate the log-likelihood as:

Not sure if this is 100% accurate as it is not clear that is independent of the other y’s in the same location, leading to the multinomial distribution.

#-------------------------------------------------------------

What is the distribution of the sum of two negative binomial random variables?