

Research Notes:

Introduction to Dynamic Spatio-Temporal Models

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Abstract:

In the geometric distribution, θ represents the probability of succes in each trial. Furthermore, it should follow that y is countable and greater than one. In general, in the negative binomial distribution, y is the number of trials until get the k first success. For this reason, the negative binomial distribution has certain assumptions considering that each event come from a Bernoulli distribution.(i) Each x_i is independent of any.

Keywords:

Spatiotemporal, Climate variability, Malaria prevalence.

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1. Section 1

In the geometric distribution, θ represents the probability of succes in each trial. Furthermore, it should follow that y is countable and greater than one. In general, in the negative binomial distribution, y is the number of trials until get the k first success.

Statement:

$p(y > r|\theta) = (1 - \theta)^r$, where $r = 1, 2, \dots$

Proof:

$$\begin{aligned}
 p(y > r|\theta) &= 1 - p(y \leq r|\theta) \\
 p(y > r|\theta) &= 1 - \sum_{k=1}^r (1 - \theta)^{k-1} \theta \\
 p(y > r|\theta) &= 1 - \theta \sum_{k=1}^r (1 - \theta)^{k-1} \\
 p(y > r|\theta) &= 1 - \theta \left[\frac{1 - (1 - \theta)^r}{1 - (1 - \theta)} \right] \\
 p(y > r|\theta) &= 1 - \theta \left[\frac{1 - (1 - \theta)^r}{\theta} \right] \\
 p(y > r|\theta) &= 1 - [1 - (1 - \theta)^r] = (1 - \theta)^r \quad \blacksquare
 \end{aligned}$$

For this reason, the negative binomial distribution has certain assumptions considering that each event come from a Bernoulli distribution.(i) Each x_i is independent of any other x_j , (ii). They are identically distributed $x_i \sim \theta^{x_i} (1 - \theta)^{1-x_i}$, where $i = 1, 2, \dots$ (iii) The variance is greater than the mean. For this reason is used in overdispersed countable data. (iv) This distribution is unimodal.

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