

Estimating the size of a population through repeated sampling: a new view on capture-recapture procedures

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SUMMARY

There should be a single paragraph summary which should not contain formulae or symbols, followed by some key words in alphabetical order. Typically there are 3–8 key words, which should contain nouns and be singular rather than plural. The summary contains bibliographic references only if they are essential. It should indicate results rather than describe the contents of the paper: for example, ‘A simulation study is performed’ should be replaced by a more informative phrase such as ‘In a simulation our estimator had smaller mean square error than its main competitors.’

Some key words: Capture-recapture estimator; Inclusion probability; Population size.

1. INTRODUCTION

2. MODEL

Consider a closed population of N individuals ($i = 1, \dots, N$) from which we draw T samples ($t = 1, \dots, T$) using some sampling scheme. Define S_t to be the set of individuals included into sample t and n_t to be the size of S_t . Furthermore, let π_i and $X_{i(T)}$ denote respectively the

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inclusion probability of i and the count of i being included into a sample after T draws

$$\pi_i = \text{pr}(i \in S_t), \quad X_{i(T)} = \sum_{t=1}^T \mathbb{1}\{i \in S_t\};$$

If $n_t = n$ for all t and $\pi_i = n/N$ for all i , then $X_{i(T)}$ iid