

CONFIDENCE INTERVALS AND REGIONS FOR DIAGNOSTIC TEST LIKELIHOOD RATIOS

D.E. Matthews

University of Waterloo, Waterloo, Canada

E-mail: *dematthews@uwaterloo.ca*

Let p_1 and p_2 represent the individual probabilities of response to a particular diagnostic test in two subpopulations consisting of diseased and disease-free individuals, respectively. In the terminology of diagnostic testing, p_1 is called the sensitivity of the given test, and p_2 is the probability of a false positive error, i.e., the complement of $1 - p_2$, which is the test specificity. Since 1975, the ratios $\rho_+ = p_1/p_2$ and $\rho_- = (1 - p_1)/(1 - p_2)$ have been of particular interest to advocates of evidence-based medicine. These functions of sensitivity and specificity have been called the “likelihood ratio of a positive test result” and the “likelihood ratio of a negative test result.” We describe new methods of deriving individual interval estimates of ρ_+ and ρ_- , and a simultaneous confidence region for both ratios. Using the exact coverage probability and other performance characteristics of these confidence intervals, we compare our estimates with methods of interval estimation in common use. Via examples from various studies of diagnostic tests, we illustrate the merits of our computationally simple methods of deriving interval estimates of these medically relevant characteristics of diagnostic tests.