

Hellenic Complex Systems Laboratory

Calculator for Diagnostic Accuracy Measures

Technical Report XIII

Theodora Chatzimichail
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Theodora Chatzimichail ^a

^a Hellenic Complex Systems Laboratory

Search Terms: sensitivity, specificity, diagnostic test, clinical accuracy, diagnostic accuracy, positive predictive value, negative predictive value, likelihood ratio, odds ratio

Abstract

This Demonstration calculates various accuracy measures of a diagnostic test for a disease. This is done for differing negative and positive test results of nondiseased and diseased populations. The measures calculated are the sensitivity, the specificity, the positive predictive value ("PPV"), the negative predictive value ("NPV"), the (diagnostic) odds ratio ("OR"), the likelihood ratio for a positive test result ("LR+"), and the likelihood ratio for a negative test result ("LR-"). The negative and positive test results of the nondiseased and diseased populations are selected using the sliders.

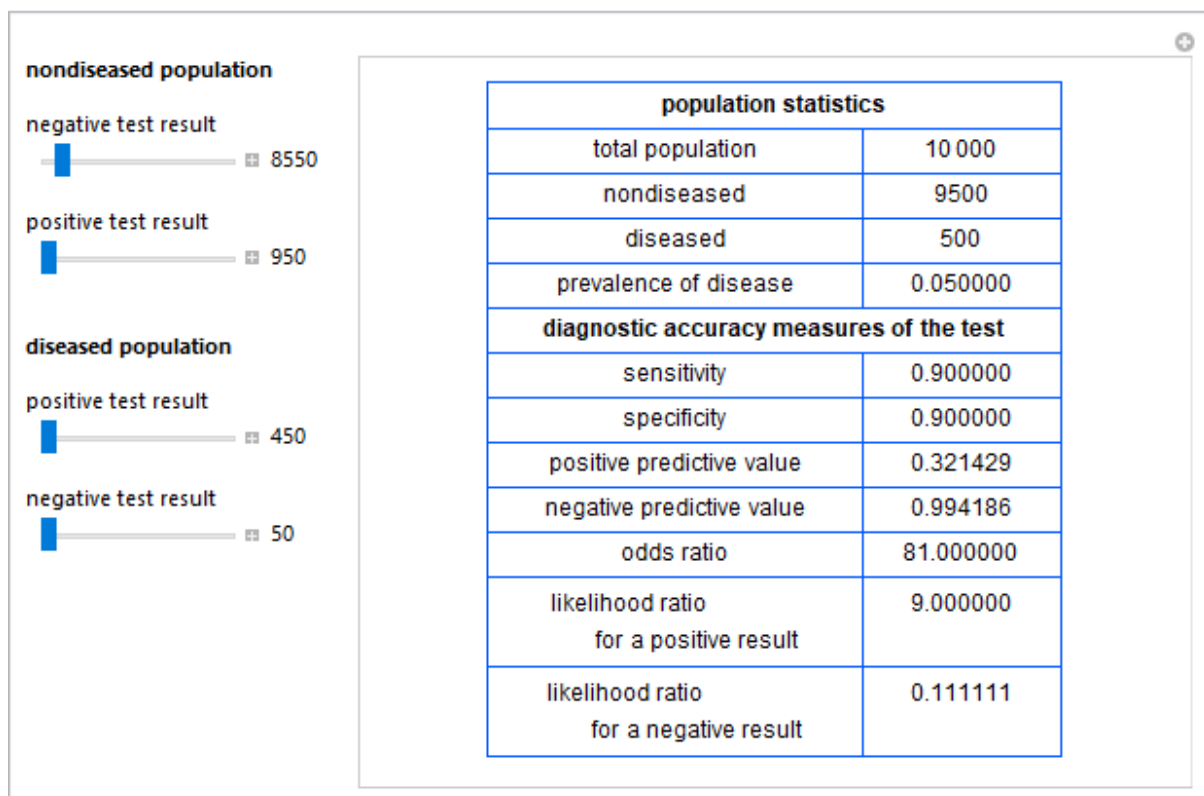


Figure 1: Population statistics and diagnostic accuracy measures of a diagnostic test. Negative and positive test results on a nondiseased population: 8550 and 950 respectively, positive and negative test results on a diseased population: 450 and 50 respectively.

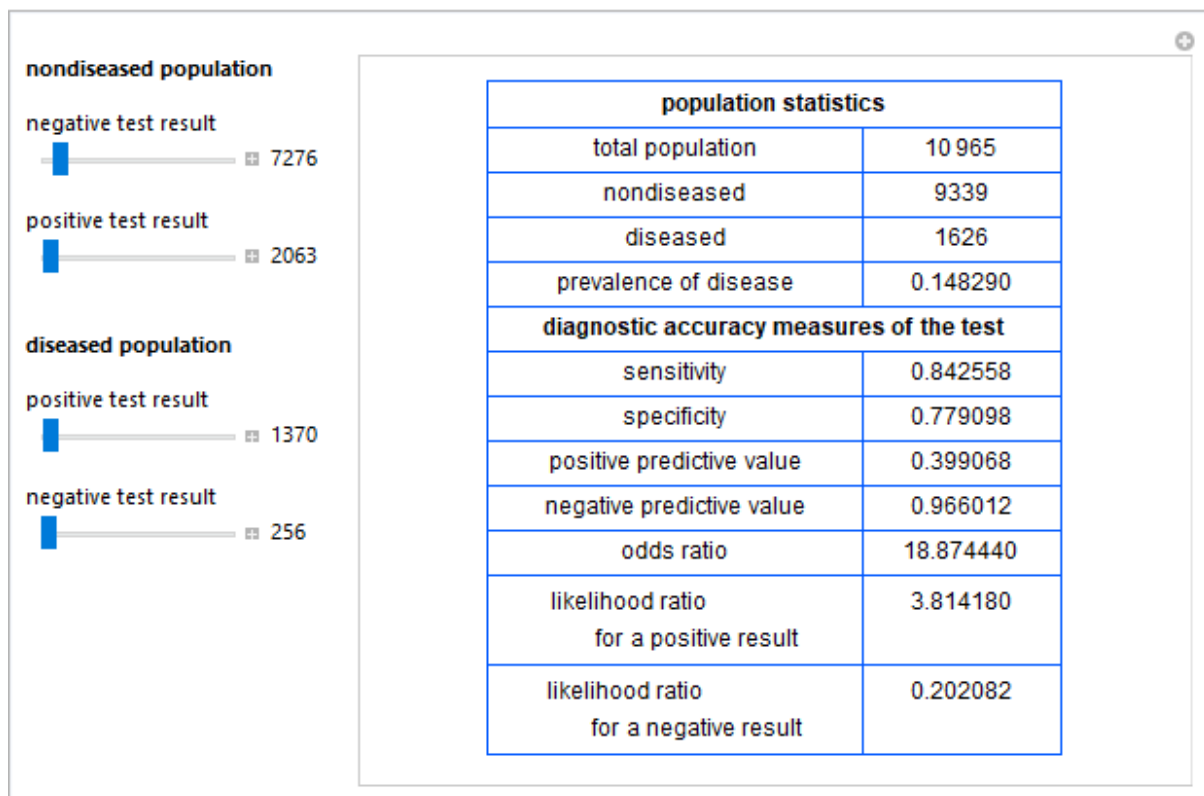


Figure 2: Population statistics and diagnostic accuracy measures of a diagnostic test. Negative and positive test results on a nondiseased population: 7276 and 2063 respectively, positive and negative test results on a diseased population: 1370 and 256 respectively.

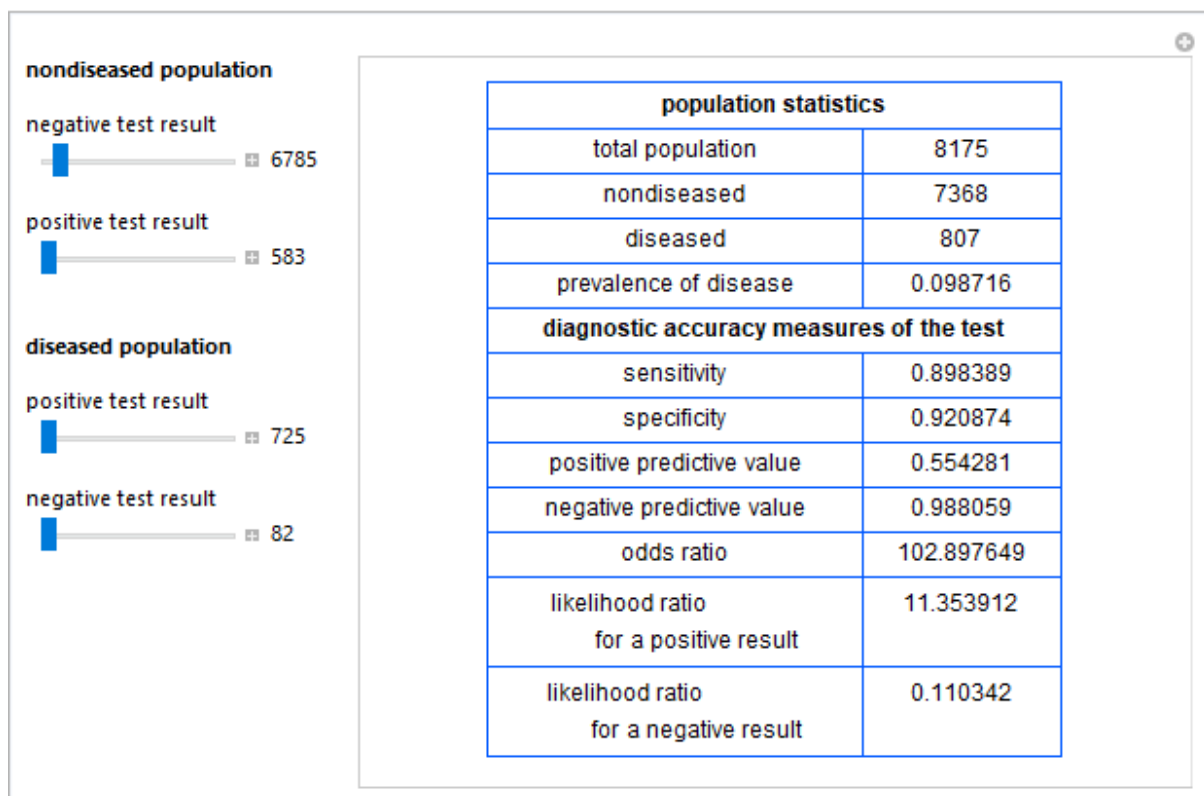


Figure 3: Population statistics and diagnostic accuracy measures of a diagnostic test. Negative and positive test results on a nondiseased population: 6785 and 583 respectively, positive and negative test results on a diseased population: 725 and 82 respectively.

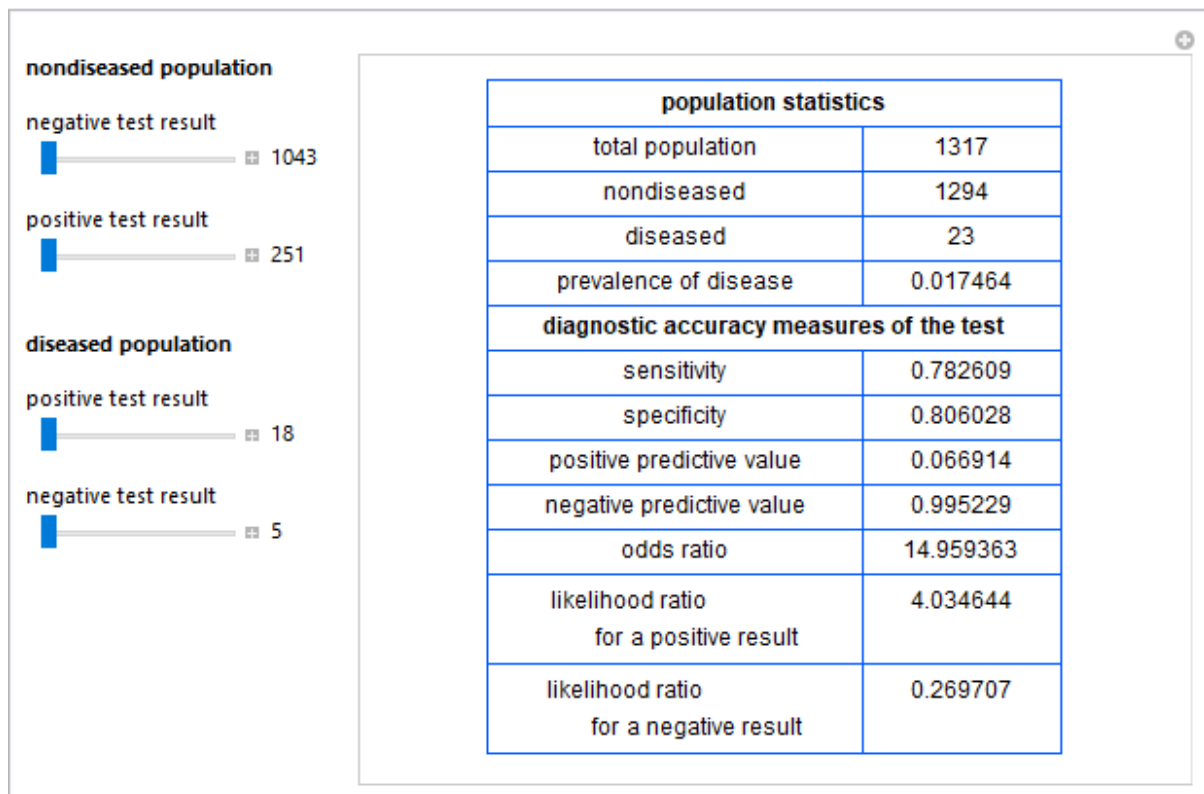


Figure 4: Population statistics and diagnostic accuracy measures of a diagnostic test. Negative and positive test results on a nondiseased population: 1043 and 251 respectively, positive and negative test results on a diseased population: 18 and 5 respectively.

Details

Sensitivity is the fraction of the diseased population with a positive test result, while specificity is the fraction of the nondiseased population with a negative test result. Positive predictive value is the fraction of the population with a positive test result that is diseased, while negative predictive value is the fraction of the population with a negative test result that is nondiseased. Prevalence of the disease is the ratio of the diseased population to the total (nondiseased and diseased) population. If we denote by *sens* the sensitivity, *spec* the specificity, and *pr* the prevalence, we have:

$$OR = \frac{\frac{sens}{1 - sens}}{\frac{1 - spec}{spec}}$$

$$LR+ = \frac{sens}{1 - spec}$$

$$LR- = \frac{1 - sens}{spec}$$

The Demonstration is appropriate as an educational tool for medical students.

Source Code

The updated Wolfram Mathematica® source code is available at:

<https://www.hcsl.com/Tools/CalculatorForDiagnosticAccuracyMeasures-author.nb>

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<http://demonstrations.wolfram.com/CalculatorForDiagnosticAccuracyMeasures/>

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