# Uncertainties in the accuracy measurements of a diagnostic test

## Abbreviations and glossary

|  |  |
| --- | --- |
| Index test |  |
| Reference test |  |
| Gold standard test |  |
| Tp |  |
| Fp |  |
| Fn |  |
| Tn |  |
| Prevalence |  |
| Accuracy | The accuracy of a diagnostic test is characterized by its sensitivity and specificity.  Other measures of accuracy include the positive and negative predictive values (which depend on prevalence), diagnostic odds ratio, likelihood ratios for positive and negative test results, and area under the receiver operating characteristic curve |
| Sensitivity |  |
| Specificity |  |
| NPV |  |
| PPV |  |
| FP rate |  |
| FN rate |  |
| LR -ve |  |
| LR +ve |  |
| DOR |  |
| AUROC |  |
| PDF | Probability density function |

## Analysis

**Given (inputs):**

**For the index test:** its ***measured*** sensitivity, specificity (lower limit, mid-range estimate, upper limit, PDF = normal)

**For the reference test:** its ***assumed*** true sensitivity and specificity (lower limit, mid-range estimate, upper limit, PDF = normal)

**Population** for calculating confidence intervals from diagnostic accuracy data

**Prevalences**: for calculating predictive values (lower limit, mid-range estimate, upper limit, PDF = uniform)

**Derived (outputs):**

**Tabulate** (**for the index test**)

true accuracy measures, absolute errors, percentage errors (for mid-ranges of given parameters). And lower and upper uncertainty intervals with 95% limits derived from a probability sensitivity analysis which varies measured and assumed parameters across their limits with PDFs able to be selected by the user from on option list.

**graphs**

1. Mosaic plots (to be shown in facets)of:
   1. Index test: observed TP, FP, FN, TN
   2. Reference test: assumed TP, FP, FN, TN (derived from sensitivity etc)
   3. Index test: derived true TP, FP, FN, TN
   4. Error matrix: observed – true index test evaluation data
2. Dependence of measured sensitivity of the index test on true sensitivity of reference test

X = assumed true sensitivity of reference test  
(from lower to upper limit)

Y = derived true sensitivity of index test (ribbon with 95% limits derived from probability sensitivity analysis which varies measured and assumed parameters across their limits)

Y = measured sensitivity of index test (ribbon with given limits)

1. Dependence of measured specificity of the index test on true specificity of reference test
2. As above for specificity, mutatis mutandis
3. As above, mutatis mutandis, for predictive values, false positive and false negative rates
4. Animations of effects of univariate incremental changes in true sensitivity and specificity of reference test