

ON ASSESSING EFFICIENCY OF AN ALTERNATIVE CLASSIFIER THROUGH SENSITIVITY AND SPECIFICITY

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ABSTRACT

We examine the efficiency of a competing classifier through sensitivity and specificity, utilizing a Monte Carlo Study. We observed that when sensitivity or specificity or both are low, the efficiency of such classifier is poor and not desirable. We found that even with large sample size empirical efficiency does not show any appreciable difference. Our results suggest that estimation of efficiency is not good when we have small sample sizes (≤ 30). We found that if the sensitivity or specificity or both are high (≥ 0.75), such classifier have good efficiency. This is slightly more relaxed than the results by other researchers where sensitivity and specificity of .80 or higher was recommended.

1. Introduction

A variety of Health, Biological and Social Science data come in the form of cross-classified table of counts commonly referred to as contingency tables. Categorical data usually consists of counts rather than measurements resulting mostly from surveys that can be expressed only in qualitative or categorical terms. The units of a sampled population in such circumstances are cross-classified according to each of two categories such as Male/Female, Positive/Negative, Yes/No, Agree/Disagree, Alive/Dead, Present/Absent, etc. These categorical terms may also evolve from classifying aggregating quantitative variables. There might be the need to screen population for deadly diseases such as HIV/AIDS, Tuberculosis, Cholera, etc. In screening of subjects there are possibility of two errors, depending on the instrument used:

- (i) A diseased subject might be misclassified as being free of the disease.
- (ii) A subject free from the disease might be wrongly classified as having the disease.

To this effect there is a need to ensure that the above two errors are reduced to the barest minimum if they can not be completely avoided. Because there is no perfection in life, there is a need to examine property of instruments that are used for screening purposes. Thus a good screening test must be sensitive enough to be able to identify correctly all the affected subjects and also specific enough, that is, classify correctly all subjects that are free of the disease. Therefore efficiency of screening instruments is a function of its sensitivity and specificity.

Keywords : Sensitivity, Specificity, Efficiency, Competing Classifier, Screening Test.