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Objective Functions Optimized in ODA

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ODA models may be developed to maximize (i.e., optimize) overall classification accuracy, mean sensitivity across class categories, or precision forecasting of specific class categories.

As of this writing, ODA models have been developed to maximize (i.e., optimize) three different objective functions. First, if one's modeling objective is to correctly classify as many observations in the sample as possible, regardless of the actual class membership status of observations, the objective function is called Percentage Accuracy in Classification or PAC. Second, if one's modeling objective is to correctly classify as many observations—in every class category—in the sample as possible, the objective function is called Effect Strength for Sensitivity or ESS. Third, if one's modeling objective is to correctly classify as many observations—of a particular class category—in the sample as possible, the objective function is called Precision Modeling or PM.[1,2]

All three of these objective functions are bounded by 100 at the high end of the scale: this maximum-attainable value indicates all sample observations were correctly classified in PAC- and ESS-based analyses, and indicates that all sample observations of a particular user-selected class category were correctly classified for PM-based analyses.

The PAC and PM objective functions are bounded by 0 at the low end of the scale: this minimum-attainable value respectively indicates that no sample observations—or that no sample observations of a particular class category, were correctly classified. For the ESS objective function, 0 indicates the level of classification accuracy that is expected by chance (defined as a uniform random process). For ESS, negative values indicate classification accuracy worse than expected by chance, and -100 is the minimum-attainable value—indicating that no sample observations were correctly classified.

All three objective functions are solved vis-à-vis novometric statistical analysis—in particular, by the globally-optimal (GO) classification tree analysis (CTA) algorithm.[2-7]

References

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Author Notes

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