

How to Gauge the Quality of a Multi-Class Classification When Ground Truth Is Known with Uncertainty

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Traditional methods of gauging the quality of a classification method assume that we know the ground truth – i.e., that for some elements, we know, with certainty, to which class they belong. For example, in medical diagnostics, we assume that for some patients, we know, with absolute certainty, what was the correct diagnosis.

In real life, however, we are rarely absolutely certain. Usually, there is some degree of uncertainty, some of the “known” classification may turn out to be wrong. Because of this, the values \tilde{v} of the quality measures that we get when we assume the known classifications to be absolutely true are, in general, different from the ideal values v – that we would have gotten if we knew the actual ground truth. How can we gauge the resulting uncertainty in v ?

In [1], this problem was analyzed for the case of 2-class (“yes”-“no”) classification. In this talk, we extend these ideas and results to the general multi-class case.

References

- [1] N. Gray, S. Ferson, and V. Kreinovich, “How to gauge the quality of a testing method when ground truth is known with uncertainty”, *Proceedings of the 9th International Workshop on Reliable Engineering Computing REC’2021*, Taormina, Italy, May 16–20, 2021, pp. 265–278.