

Equity Introduced in 1992 by Gandin and Murphy [1] the equity property relates to categorical forecasts. In this case there are n complete and mutually exclusive categories, probabilities are assigned to each category and one occurs. Following Gandin and Murphy [1], define a ‘performance matrix’ P where p_{ij} is the relative frequency of the event in which the i th category is forecast and the j th arises. A scores matrix S has elements s_{ij} which denotes the score given in the situation stated. They note that ‘climatology’ is defined as $p_j = \sum_i p_{ij}$ and the ‘predictive probability vector’ is $q_i = \sum_j p_{ij}$. A random forecast is, they define, one where $p_{ij} = p_j q_i$. Then a score is ‘**equitable**’ when the level of skill ascribed to a constant forecast is the same as the average level of skill ascribed to a random forecast. They argue that both these situations represents a zero skill situation and hence should not differ. Specifically [1],

$$\sum_i \sum_j q_i p_j s_{ij} = \sum_j p_j s_{ij} \quad (1)$$

The left hand side being the average score of a random forecast and the right hand side the score when the forecast is constantly set at category i . Equation 1 imposes some constraints on the values s_{ij} , but still allows for many score types particularly for larger values of n . Jolliffe and Stephenson [2] show that for a large class of Proper scores it is impossible for the score to be both equitable and Proper at the same time.

Bibliography

- [1] L. Gandin and A. Murphy. Equitable skill scores of categorical forecasts. Monthly Weather Review, AMS, 120:361–370, February 1992.
- [2] I. Jolliffe and D. Stephenson. Proper scores for probability forecasts can never be equitable. Monthly Weather Review, AMS, 136:1505–1510, April 2008.