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SKILL IN SELECTING THE "BEST" FORECAST

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In making his official forecast a weather officer may select one of several forecasts that have been supplied to him by different individuals. After the forecast period has elapsed it may be possible for him to decide which of the forecasts should have been used. The question may then arise whether over a period of time he has shown any skill in selecting the forecast which subsequently verified best. A simple method of measuring this skill is suggested here.

If, on each occasion, one or more forecasts are used and one or more are subsequently called best, it is possible to determine the probabilities of the different results when chance alone is operating. For example, if there are three forecasts and one of them is used and one is subsequently called best the probability of getting a "hit" is $1/3$. If to each "hit" a score is assigned that is the reciprocal of the probability of the event the average score expected is unity, and for N forecasts the expected total score will be N . (The scores are based on the assumption that the cases are mutually exclusive but in practice this may not be the case. No attempt is made here to allow for the possibility that the forecasts may be similar to each other, or in other words, are not independent.)

Table 1 presents the scores to be assigned to the different events when three forecasts are involved. The same principle can be applied when four or more forecasts are used and similar tables constructed.

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Table 1

Scores to be assigned when three forecasts are used.

Forecast Followed			Forecast Subs. called best			Probability of a "hit"	Score of event			
<u>A</u>	<u>B</u>	<u>C</u>	<u>A</u>	<u>B</u>	<u>C</u>					
1	0	0	1	0	0	1/3	3			
1	0	0	0	1	0		0			
1	0	0	tie {	T	T	0	2/3	3/2		
1	0	0		0	T	T		0		
{	T	T	0	1	0	1	2/3	3/2		
	{	T	T	0	0	1		0		
tie {	{	T	T	0	tie {	T	T	0	1/3	3
	{	T	T	0		0	T	T		0

The use of Table 1 is illustrated in the following hypothetical example where a total of 20 official forecasts were made.

<u>Forecast Date</u>	<u>Forecast Followed</u>	<u>Forecast subs. called best</u>	<u>Score</u>	<u>Perfect Score</u>
June 1	A	C	0	3
4	B	AB	3/2	3
8	AB	A	3/2	3
11	C	B	0	3
15	C	C	3	3
18	B	B	3	3
22	C	C	3	3
25	AC	A	3/2	3
29	BC	AC	0	3
July 2	B	AC	0	3
6	B	A	0	3
9	AC	B	0	3
13	A	A	3	3
16	BC	BC	3	3
20	C	A	0	3
23	B	B	3	3
27	A	C	0	3
30	AB	BC	0	3
Aug 3	C	A	0	3
6	B	B	3	3
TOTAL			25.5	60

Expected score = number of forecasts = 20

A percentage skill score can be computed by using the formula:

$$\text{skill} = 100 \frac{(\text{observed score}) - (\text{expected score})}{(\text{perfect score}) - (\text{expected score})}$$

The example given would thus have a skill of $\left(\frac{25.5 - 20}{60 - 20} \right) 100 = 14\%$