Combination of forecasts

When more than one forecast are available the combination of those forecasts has the advantage of reducing the forecast error.

Assume that two forecasts are available (a linear regression model, and an exponential smoothing forecast). Denote them by f_1 and f_2. Then, the combined forecast (f_c) can be obtained as a weighted average of both forecasts. That is,

$$f_c = w_1 f_1 + w_2 f_2 \qquad\qquad w_1 + w_2 = 1$$

One way to select the weights w_1 and w_2 is by looking at the past performance of both methods and assigning the larger weight to that method that perform the best, for instance based on the value of the MSE (mean squared error). The weight can be proportional to the inverse of the MSE, and can be calculated in the following way:

$$w_1 = \frac{\frac{1}{MSE_1}}{\frac{1}{MSE_1} + \frac{1}{MSE_2}} = \frac{MSE_2}{MSE_1 + MSE_2}$$

and

$$w_2 = 1 - w_1 = \frac{MSE_1}{MSE_1 + MSE_2}$$