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ERRATUM

Bias-free rainfall forecast and temperature trend-based temperature forecast using T-170 model output during the monsoon season

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The author has since noted that section 4 of this article held some incorrect information and has since submitted the corrected version of section 4 which appears as follows:

Section 4.

$T_f(I)$ and $T_o(I)$ are the forecast and observed temperatures (°C), respectively, on day I $(I = 1, \ldots, n)$, where n is the number of days of observation considered during the season.

T_f(I) and $T_o(I)$ for $I = 1, \ldots, n$, have significant positive correlation. Forecast temperature values are for 24, 48, 72 and 96 h forecast from the T-170 model.

If $Td_f(I)$ and $Td_o(I)$ are the forecast and observed temperature trends, respectively, on day I $(I = 1, \ldots, n)$, then:

$$Td_f(I) = T_f(I) - T_f(I-1) \tag{1}$$

$$Td_o(I) = T_o(I) - T_o(I-1) \tag{2}$$

Tb_f and Tb_o is the minimum value of the forecast and observed temperatures, respectively, and *Tb* is the minimum of Tb_f and Tb_o. Considering *Tb* as the base value the forecast and observed temperatures can be represented in terms of the new series of positive values as:

$$T_f(I) = Tb + c(I) \tag{3}$$

$$T_o(I) = Tb + d(I) \tag{4}$$

where $c(I)$ and $d(I)$ are positive for all I, $I = 1, \ldots, n$ and are positively correlated.

Therefore;

$$\sum_{I=2}^{n} (Td_f(I) - Td_o(I))^2 = \sum_{I=2}^{n} ((T_f(I) - T_f(I-1)) - (T_o(I) - T_o(I-1)))^2 \text{(from Equations (1) and (2))}$$

$$= \sum_{I=2}^{n} ((c(I) - c(I-1)) - (d(I) - d(I-1)))^2 \text{(from Equations (3) and (4))}$$

As c(I) and $d(I)$ are both positive and have a significant positive correlation, $I = 1, \ldots, n$. Hence, it is expected that the unit rate of change in $c(I)$ and in $d(I)$ is the same, as per the definition of correlation coefficient. Hence, $(c(I) - c(I-1))$ and $(d(I) - d(I-1)$ are expected to be of same order and, thus, $((c(I) - c(I-1)) - (d(I) - d(I-1)))^2$ is expected to be less than or equal to $(c(I) - d(I))^2$, for $I = 1, \ldots, n$.

Hence,

$$\sum_{I=2}^{n} (Td_f(I) - Td_o(I))^2 \le \sum_{I=1}^{n} (c(I) - d(I))^2 \text{(expected to be true in statistical sense)}$$

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$$= \sum_{I=1}^{n} ((c(I) + Tb) - (d(I) + Tb))^2$$

$$= \sum_{I=1}^{n} (T_f(I) - T_o(I))^2 \quad (5) \text{ (from Equations (3) and (4))}$$

Hence, from equation (5) it is clear that root mean square error (RMSE) for the observed and forecast temperature trends is expected to be less than the RMSE for the observed and forecast temperatures having significant positive correlation (for samples of moderately large size from nearly-normal populations having significant positive correlation at a given level of confidence).

This contention is due to the NWP model's bias, i.e. the tendency of the model to over predict or under predict the temperatures. Hence if temperature trends are used, such biases will be removed and will not contribute to the RMSE. Moreover, the accuracy of forecast trends is strengthened further by observing the marked resemblance between the observed temperature trends and the forecast temperature trends for the 24, 48 and 72 forecasting hours between any two particular days, as given in Figures 2–5.

Hence the temperature trend forecast is obtained for maximum and minimum temperature for all 602 districts of India based upon the T-170 model. The user can add the present day temperature to the trends in order to obtain the temperature forecasts for future days.

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