**Supplementary File**

Table S1: Pearson correlation test values between COVID-19 cases and primarily selected variables to exclude insignificant variables. The cut-off threshold is 0.85, and significant level 5%.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variables | COVID-19 cases | Avg. Temperature | Avg. Relative Humidity | Mean Diurnal range | Temperature seasonality | Mean temperature of coldest month | Mean Temperature of Coldest Quarter | No of Passengers | API values |
| COVID-19 cases | 1.0000 | -0.3048 | 0.0894 | -0.0417 | 0.2344 | -0.2444 | -0.2593 | 0.4080 | 0.0157 |
| Avg. Temperature | -0.3048 | 1.0000 | -0.3295 | -0.0734 | -0.8002 | 0.9055 | 0.9437 | -0.2049 | 0.0039 |
| Avg. Relative Humidity | 0.0894 | -0.3295 | 1.0000 | -0.4666 | -0.0260 | -0.0872 | -0.1754 | -0.0249 | 0.0408 |
| Mean Diurnal range | -0.0417 | -0.0734 | -0.4666 | 1.0000 | 0.3800 | -0.3451 | -0.2276 | 0.0329 | -0.1714 |
| Temperature seasonality | 0.2344 | -0.8002 | -0.0260 | 0.3800 | 1.0000 | -0.9046 | -0.8877 | 0.2226 | -0.0223 |
| Mean temperature of coldest month | -0.2444 | 0.9055 | -0.0872 | -0.3451 | -0.9046 | 1.0000 | 0.9878 | -0.1884 | 0.0591 |
| Mean Temperature of Coldest Quarter | -0.2593 | 0.9437 | -0.1754 | -0.2276 | -0.8877 | 0.9878 | 1.0000 | -0.1881 | 0.0363 |
| No of Passengers | 0.4080 | -0.2049 | -0.0249 | 0.0329 | 0.2226 | -0.1884 | -0.1881 | 1.0000 | 0.0174 |
| API values | 0.0157 | 0.0039 | 0.0408 | -0.1714 | -0.0223 | 0.0591 | 0.0363 | 0.0174 | 1.0000 |

Table S2: Showing Variance Inflation factor (VIF) value to check significant variable from the primarily selected variables

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Term** | **Estimate** | **Std Error** | **t Ratio** | **Prob>|t|** | **VIF** |
| Intercept | 3597.3204 | 3698.796 | 0.97 | 0.3330 | . |
| Avg. Temperature |  -25.22334 | 113.3874 |  -0.22 | 0.8244 | 6.1392849 |
| Avg. Relative Humidity |  -11.16929 | 23.89495 |  -0.47 | 0.6411 | 1.9539564 |
| Mean Diurnal range |  -199.7291 | 212.19 |  -0.94 | 0.3487 | 3.9149944 |
| Temperature seasonality | 21.726566 | 24.70188 | 0.88 | 0.3811 | 6.1399372 |
| Mean temperature of coldest month | 148.30745 | 300.3049 | 0.49 | 0.6224 | 111.50138 |
| Mean Temperature of Coldest Quarter |  -116.9129 | 336.9731 |  -0.35 | 0.7293 | 126.26264 |
| No of Passengers | 8.3254e-6 | 2.908e-6 | 2.86 | 0.0051\* | 1.04387 |
| API values |  -31.63317 | 184.9953 |  -0.17 | 0.8646 | 1.0610794 |

Table S3. Model settings for the bag fraction (0.50 and 0.75) comparison for relative importance of the selected predictors settings in BRT models

|  |  |
| --- | --- |
| Countries & climatic regions | Predictors importance (%) to the COVID-19 cases |
| Bag fraction | Avg. Temperature (°C) | Temperature seasonality (%) | Avg. Relative Humidity (%) | Mean Diurnal range (°C) | No of Passengers | API values(per 1000 pops) |
| USA | 0.75 | 75.1 | 21.5 | 2.4 | 0.8 | 0.2 | - |
| 0.50 | 74.4 | 20.9 | 2.3 | 0.7 | 0.2 |  |
| Spain | 0.75 | 0.70 | 0.21 | 99.0 | 0.07 | 0.02 | - |
| 0.50 | 0.60 | 0.22 | 98.2 | 0.06 | 0.01 |  |
| Italy | 0.75 | 4.00 | 64.3 | 32.2 | 0.3 | 0.01 | - |
| 0.50 | 3.80 | 63.1 | 31.1 | 0.2 | 0.01 |  |
| Germany | 0.75 | 34.3 | 1.0 | 4.4 | 60.2 | 0.1 | - |
| 0.50 | 33.9 | 0.8 | 4.3 | 59.6 | 0.07 |  |
| UK | 0.75 | 39.4 | 3.0 | 56.6 | 3.0 | 0.3 | - |
| 0.50 | 38.7 | 3.2 | 56.2 | 2.9 | 0.23 |  |
| Russia | 0.75 | 2.70 | 92.30 | 4.3 | 0.4 | 0.3 | - |
| 0.50 | 2.50 | 90.43 | 4.1 | 0.3 | 0.33 |  |
| Turkey | 0.75 | 82.8 | 3.7 | 7.4 | 5.1 | 1.0 | - |
| 0.50 | 82.6 | 3.8 | 7.2 | 4.9 | 0.8 |  |
| France | 0.75 | 90.7 | 0.1 | 6.0 | 3.1 | 0.1 | - |
| 0.50 | 90.5 | 0.1 | 6.3 | 2.9 | 0.8 |  |
| Brazil | 0.75 | 11.6 | 41.4 | 10.3 | 23.1 | 1.4 | 12.2 |
| 0.50 | 11.5 | 41.3 | 9.8 | 23.0 | 1.3 | 12.1 |
| India | 0.75 | 13.0 | 1.4 | 2.0 | 80.7 | 0.9 | 2.0 |
| 0.50 | 12.6 | 1.3 | 1.7 | 79.4 | 0.6 | 1.8 |
| Tropical | 0.75 | 4.00 | 33.3 | 6.7 | 54.7 | 1.7 | 10.0 |
| 0.50 | 4.10 | 33.4 | 5.8 | 53.4 | 1.3 | 10.2 |
| Sub-tropical | 0.75 | 66.5 | 5.5 | 22.3 | 5.5 | 0.8 | - |
| 0.50 | 66.1 | 5.6 | 21.3 | 5.3 | 0.6 |  |
| Temperate | 0.75 | 47.7 | 12.0 | 30.5 | 9.2 | 0.9 | - |
| 0.50 | 47.1 | 12.3 | 31.3 | 9.3 | 0.6 |  |