**Tasks for Contest:**

The volumes of calls that arrives at the call center and call handling time are 2 key factors of call center’s workforce management and affect critical decisions such as annual budget planning, monthly capacity planning, staff hiring planning, and agent scheduling during a day, thus accurate forecasting plays a key role. In order to better plan for the future, the call center for ‘ABC Financial Institute’ would like to get important insights from historical data and predict potential volumes and distributions.

To help ‘ABC Financial Institute’ better manage the workforce, you are required to deliver the following 3 tasks:

**Q1.** Forecast the call volume that arrived on each day in the following month (December, 1999) from 01Dec1999 to 31Dec1999. These calls could end in IVR, or in the queue, or directly to agent service. For your reference, call volume of Jan1999 is provided in table1 in the Appendix.

**Q2.** For better intraday management, that is to say, to make better plan for each half hour during a day, you’re additionally required to predict the call volume arrived during each interval (half hour) each day in December1999. For your reference, call volume of 03Jan1999 is provided in table2 in the Appendix.

**Q3.** It is very helpful for the call center to know in advance about the handling time for agent calls. Therefore, you are also required to predict the total agent handling time (in seconds) for each day in December1999. Agent calls refer to those calls that end up with agents ( you may select outcome=’AGENT’ for these calls). And handling time is the time duration of service measured by variable servc\_time in the data. For your reference, handling time of Jan1999 is provided in table1 in the Appendix.

For your final submission, please follow the document template ‘4.Template of Model Document \_Team Name XXX .docx’ and forecast number template ‘5.Template of Submission\_Team Name XXX.xlsx’.

**Important Notes:**

1. Please be aware that there may be extremely low or high call volumes in a certain day, due to office close on holidays or system issues.
2. Due to unknown reasons, there may be some invalid records, for instance IVR\_time<0.

**Evaluation Criteria**:

For Q1, performance will be measured by Monthly Rolling MAPE:

Here is the actual total received call volume for the th day, and is forecasted total received call volume for the th day, .

For Q2, performance will be measured by Average of Daily Rolling MAPE

Here is the actual total received call volume for the th interval on the day, and is forecasted total received call volume for the same interval, .

For Q3, performance will be measured by Monthly Rolling MAPE:

Here is the actual total handling time for the th day, and is forecasted total handling time for the th day, .

**Appendix:**

*Table1: Call volumes arrived on each day for Jan2015*

|  |  |  |
| --- | --- | --- |
| Date | Call Volume | Handling\_time |
| 1/1/1999 | 600 | 93895 |
| 1/2/1999 | 253 | 38265 |
| 1/3/1999 | 2110 | 319282 |
| 1/4/1999 | 1830 | 251323 |
| 1/5/1999 | 1628 | 260412 |
| 1/6/1999 | 1404 | 249110 |
| 1/7/1999 | 1655 | 276628 |
| 1/8/1999 | 439 | 69962 |
| 1/9/1999 | 201 | 27054 |
| 1/10/1999 | 1986 | 288000 |
| 1/13/1999 | 1752 | 259431 |
| 1/14/1999 | 1655 | 256986 |
| 1/15/1999 | 500 | 83553 |
| 1/16/1999 | 207 | 34696 |
| 1/17/1999 | 1601 | 246273 |
| 1/18/1999 | 1558 | 210460 |
| 1/19/1999 | 1455 | 223425 |
| 1/20/1999 | 1310 | 197143 |
| 1/21/1999 | 1423 | 231556 |
| 1/22/1999 | 381 | 69400 |
| 1/23/1999 | 194 | 31312 |
| 1/24/1999 | 1172 | 197072 |
| 1/25/1999 | 1099 | 184670 |
| 1/26/1999 | 1185 | 196838 |
| 1/27/1999 | 1008 | 173047 |
| 1/28/1999 | 1190 | 194994 |
| 1/29/1999 | 375 | 62769 |
| 1/30/1999 | 159 | 29812 |
| 1/31/1999 | 1236 | 203435 |

*Table2: Call volumes arrived during each interval for 03 Jan1999.*

| Call\_date | Interval | Call Volume |
| --- | --- | --- |
| 1/3/1999 | 0:00:00 | 8 |
| 1/3/1999 | 0:30:00 | 5 |
| 1/3/1999 | 1:00:00 | 2 |
| 1/3/1999 | 1:30:00 | 1 |
| 1/3/1999 | 2:00:00 | 0 |
| 1/3/1999 | 2:30:00 | 0 |
| 1/3/1999 | 3:00:00 | 0 |
| 1/3/1999 | 3:30:00 | 0 |
| 1/3/1999 | 4:00:00 | 1 |
| 1/3/1999 | 4:30:00 | 0 |
| 1/3/1999 | 5:00:00 | 2 |
| 1/3/1999 | 5:30:00 | 1 |
| 1/3/1999 | 6:00:00 | 2 |
| 1/3/1999 | 6:30:00 | 4 |
| 1/3/1999 | 7:00:00 | 36 |
| 1/3/1999 | 7:30:00 | 35 |
| 1/3/1999 | 8:00:00 | 57 |
| 1/3/1999 | 8:30:00 | 83 |
| 1/3/1999 | 9:00:00 | 57 |
| 1/3/1999 | 9:30:00 | 73 |
| 1/3/1999 | 10:00:00 | 92 |
| 1/3/1999 | 10:30:00 | 79 |
| 1/3/1999 | 11:00:00 | 72 |
| 1/3/1999 | 11:30:00 | 64 |
| 1/3/1999 | 12:00:00 | 71 |
| 1/3/1999 | 12:30:00 | 59 |
| 1/3/1999 | 13:00:00 | 67 |
| 1/3/1999 | 13:30:00 | 71 |
| 1/3/1999 | 14:00:00 | 73 |
| 1/3/1999 | 14:30:00 | 77 |
| 1/3/1999 | 15:00:00 | 88 |
| 1/3/1999 | 15:30:00 | 77 |
| 1/3/1999 | 16:00:00 | 105 |
| 1/3/1999 | 16:30:00 | 152 |
| 1/3/1999 | 17:00:00 | 113 |
| 1/3/1999 | 17:30:00 | 74 |
| 1/3/1999 | 18:00:00 | 53 |
| 1/3/1999 | 18:30:00 | 36 |
| 1/3/1999 | 19:00:00 | 33 |
| 1/3/1999 | 19:30:00 | 45 |
| 1/3/1999 | 20:00:00 | 38 |
| 1/3/1999 | 20:30:00 | 37 |
| 1/3/1999 | 21:00:00 | 22 |
| 1/3/1999 | 21:30:00 | 43 |
| 1/3/1999 | 22:00:00 | 25 |
| 1/3/1999 | 22:30:00 | 23 |
| 1/3/1999 | 23:00:00 | 31 |
| 1/3/1999 | 23:30:00 | 23 |