**Daily Forecast**

**MULTIPLE REGRESSION**

**Input values**: Date, Day, Volumes.

**Values Used**: Intercept, ParDay, ParWeek, ParMonth, ParDay Factor, ParWeek Factor, ParMonth Factor.

|  |  |
| --- | --- |
| **MAPE** | IF(ISERROR(AVERAGE(Ape column)),"", AVERAGE(Ape column)) Eg: *IF(ISERROR(AVERAGE($M$4:$M$1048576)),"", AVERAGE($M$4:$M$1048576))* |
| **String** | Month & Week  Eg:  *D4&C4* |
| **Day Factor** | VLOOKUP(Day, Factors!(Day : Volumes),6,0)  Eg:  *VLOOKUP(B4,Factors!$B:$I,6,0)* |
| **Week factor** | VLOOKUP(String, Factors!(String : Volumes)I,4,0)  Eg: *VLOOKUP(B4,Factors!$B:$G,6,0)* |
| **Month Factor** | VLOOKUP(Month, Factors: (Y-Hat-MR),6,0)  Eg:  *VLOOKUP(D4,Factors!Month!D:I,6,0)* |
| **Y-Mat-MR** | Intercept+(Day\*ParDay)+(ParWeek\*Week)+(ParMonth\* Month)+(ParDay Factor\*Day Factor)+(ParWeek factor \*Week Factor)+(ParMonth factor\*Month Factor)  Eg:  *$U$4+(B4\*$U$5)+($U$6\*C4)+($U$7\*D4)+($U$8\*F4)+($U$9\*G4)+($U$10\*H4)* |
| **Error** | (Y-Mat-MR)-volumes  Eg:  *J4-I4* |
| **APE** | IF(ISERROR(ABS(Error)/Volume),"",ABS(Error)/Volume)  Eg:  *IF(ISERROR(ABS(K4)/I4),"",ABS(K4)/I4)* |

**Factors**

**Monthly Factors:**

|  |  |
| --- | --- |
| **Average** | AVERAGEIF(Input Month: Volume, Month, Volume: Volume)  Eg:  =AVERAGEIF($D:$F,Z3,$F:$F) |
| **Total** | SUMIF(Input Month : Volume, Month, Volume : Volume)  Eg:  *=SUMIF($D:$F,Z3,$F:$F)* |
| **Factor** | Current Total/Total Average  Eg:  *=AB3/$AB$15* |

**Weekly Factors:**

|  |  |
| --- | --- |
| **Total** | IF(SUMIF(String : Volume, Week, Volume : Volume)>0,  SUMIF(String : Volume, Week, Volume : Volume)," ")  Eg:  *= IF(SUMIF(E:F,AE3,$F:$F)>0,SUMIF(E:F,AE3,$F:$F),"")* |
| **Average** | AVERAGE(Current Total : Nth Total)  Eg:  *=AVERAGE(AF3:AF7)* |
| **Factor** | IF(ISERROR(Total/Average),0,Total/Average)  Eg:  *=IF(ISERROR(AF3/AG3),0,AF3/AG3)* |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Date** | **Day** | **Week** | **Month** | **String** | **Day Factor** | **Week factor** | **Month Factor** | **Volumes** | **Y-Hat-MR** | **Error** | **Error^2** | **APE** | **String** | **Seasonal Index** | **Reseasonalized Forecast** |
| 3-Jan-12 | 3 | 2 | 1 | 12 | 1.26 | 0.82 | 1.25 | 452 | **441** | (11) | 127 | 2% |  |  |  |
| 4-Jan-12 | 4 | 2 | 1 | 12 | 1.11 | 0.82 | 1.25 | 396 | **397** | 1 | 1 | 0% |  |  |  |
| 5-Jan-12 | 5 | 2 | 1 | 12 | 0.95 | 0.82 | 1.25 | 342 | **355** | 13 | 172 | 4% |  |  |  |
| 6-Jan-12 | 6 | 2 | 1 | 12 | 0.98 | 0.82 | 1.25 | 351 | **360** | 9 | 76 | 2% |  |  |  |
| 9-Jan-12 | 9 | 3 | 1 | 13 | 1.08 | 0.98 | 1.25 | 387 | **397** | 10 | 92 | 2% |  |  |  |
| 10-Jan-12 | 10 | 3 | 1 | 13 | 1.09 | 0.98 | 1.25 | 391 | **398** | 7 | 43 | 2% |  |  |  |
| 11-Jan-12 | 11 | 3 | 1 | 13 | 1.08 | 0.98 | 1.25 | 388 | **393** | 5 | 28 | 1% |  |  |  |
| 12-Jan-12 | 12 | 3 | 1 | 13 | 1.03 | 0.98 | 1.25 | 369 | **377** | 8 | 66 | 2% |  |  |  |
| 13-Jan-12 | 13 | 3 | 1 | 13 | 0.86 | 0.98 | 1.25 | 307 | **329** | 22 | 489 | 7% |  |  |  |
| 16-Jan-12 | 16 | 4 | 1 | 14 | 0.20 | 0.86 | 1.25 | 70 | **160** | 90 | 8044 | 128% |  |  |  |
| 17-Jan-12 | 17 | 4 | 1 | 14 | 1.28 | 0.86 | 1.25 | 459 | **446** | (13) | 167 | 3% |  |  |  |
| 18-Jan-12 | 18 | 4 | 1 | 14 | 1.21 | 0.86 | 1.25 | 434 | **425** | (9) | 73 | 2% |  |  |  |
| 19-Jan-12 | 19 | 4 | 1 | 14 | 0.99 | 0.86 | 1.25 | 355 | **365** | 10 | 97 | 3% |  |  |  |
| 20-Jan-12 | 20 | 4 | 1 | 14 | 0.85 | 0.86 | 1.25 | 304 | **325** | 21 | 441 | 7% |  |  |  |
| 23-Jan-12 | 23 | 5 | 1 | 15 | 1.02 | 1.34 | 1.25 | 366 | **386** | 20 | 386 | 5% |  |  |  |
| 24-Jan-12 | 24 | 5 | 1 | 15 | 1.12 | 1.34 | 1.25 | 400 | **409** | 9 | 77 | 2% |  |  |  |
| 25-Jan-12 | 25 | 5 | 1 | 15 | 0.98 | 1.34 | 1.25 | 350 | **370** | 20 | 387 | 6% |  |  |  |
| 26-Jan-12 | 26 | 5 | 1 | 15 | 0.91 | 1.34 | 1.25 | 327 | **351** | 24 | 556 | 7% |  |  |  |
| 27-Jan-12 | 27 | 5 | 1 | 15 | 0.77 | 1.34 | 1.25 | 275 | **310** | 35 | 1224 | 13% |  |  |  |
| 30-Jan-12 | 30 | 5 | 1 | 15 | 1.12 | 1.34 | 1.25 | 400 | **397** | (3) | 12 | 1% |  |  |  |
| 31-Jan-12 | 31 | 5 | 1 | 15 | 1.12 | 1.34 | 1.25 | 402 | **396** | (6) | 36 | 2% |  |  |  |
| 1-Feb-12 | 1 | 1 | 2 | 21 | 1.09 | 0.73 | 1.15 | 360 | **359** | (1) | 2 | 0% |  |  |  |
| 2-Feb-12 | 2 | 1 | 2 | 21 | 1.10 | 0.73 | 1.15 | 361 | **357** | (4) | 13 | 1% |  |  |  |
| 3-Feb-12 | 3 | 1 | 2 | 21 | 1.26 | 0.73 | 1.15 | 288 | **400** | 112 | 12438 | 39% |  |  |  |

|  |  |
| --- | --- |
| **Intercept** | **-218.11** |
| **Day** | **-2.04** |
| **Week** | **14.07** |
| **Month** | **-2.39** |
| **Day Factor** | **265.68** |
| **Week Factor** | **14.07** |
| **Month Factor** | **234.98** |

**Weekly Forecast**

**MULTIPLE REGRESSION**

**Input values**: Date, Day, Volumes

**Parameters**: Intercept, Week, Week factor, Month, Month Factor

|  |  |
| --- | --- |
| **MAPE** | IF(ISERROR(AVERAGE(Ape value as whole)),"", AVERAGE(Ape value as whole))  Eg:  *=IF(ISERROR(AVERAGE($K$4:$K$1048576)),"",AVERAGE($K$4:$K$1048576))* |
| **Week factor** | VLOOKUP(String, Factors!$E:$I,4,0)  Eg:  *=VLOOKUP(B4,Factors!$B:$G,6,0)* |
| **Month Factor** | VLOOKUP(Month, Factors: (Y-Hat-MR),6,0)  Eg:  *=VLOOKUP(C4,Factors!Month!D:I,6,0)* |
| **Y-Mat-MR** | Intercept+( ParWeek\*Week)+(ParMonth\*Month)+( ParWeek factor\*Week Factor)+(ParMonth factor\*Month Factor)  Eg:  *=$S$4++($S$5\*B4)+($S$6\*C4)++($S$7\*E4)+($S$8\*F4)* |
| **Error** | (Y-Mat-MR)-volumes  Eg:  *=H4-G4* |
| **APE** | IF(ISERROR(ABS(Error)/Volume),"",ABS(Error)/Volume)  Eg:  *=IF(ISERROR(ABS(I4)/G4),"",ABS(I4)/G4)* |

**Factors**

**Monthly Factors:**

|  |  |
| --- | --- |
| Average | AVERAGEIF(Input Month : Volume, Month, Volume : Volume)  *Eg:*  *AVERAGEIF($D:$F,Z3,$F:$F)* |
| Total | SUMIF(Input Month : Volume, Month, Volume : Volume)  *Eg:*  *SUMIF($D:$F,Z3,$F:$F)* |
| Factor | Current Total/Total Average  *Eg:*  *AB3/$AB$15* |

**Weekly Factors:**

|  |  |
| --- | --- |
| Total | IF(SUMIF(String : Volume, Week, Volume : Volume)>0,  SUMIF(String : Volume, Week, Volume : Volume)," ")  *Eg:*  *IF(SUMIF(E:F,AE3,$F:$F)>0,SUMIF(E:F,AE3,$F:$F),"")* |
| Average | AVERAGE(Current Total : Nth Total)  *Eg:*  *AVERAGE(AF3:AF7)* |
| Factor | IF(ISERROR(Total/Average),0,Total/Average)  *Eg:*  *IF(ISERROR(AF3/AG3),0,AF3/AG3)* |

**INDICES**:

Using Day:

|  |  |
| --- | --- |
| **Year1** | IF(DAY="Monday", Year, Year 1)  *Eg:*  *IF(B3="Monday",A3,C2)* |
| **String** | Year & Day  *Eg:*  *C3&B3* |
| **Non-normalized Seas. Index** | IF(ISERROR(AVERAGEIF(Daily!$F:$K,$D3, Daily!$K:$K)),0,AVERAGEIF(Daily!$F:$K,$D3,Daily!$K:$K))  *Eg:* *IF(ISERROR(AVERAGEIF(Daily!$F:$K,$D3,Daily!$K:$K)),0,AVERAGEIF(Daily!$F:$K,$D3,Daily!$K:$K))* |
| **Normalized Seas. Index** | IF(ISERROR((Non-normalized season Index)\*5/Total1),0,( Non-normalized season Index)\*5/Total1)  *Eg:*  *IF(ISERROR(E3\*5/$G$2),0,E3\*5/$G$2)* |
| **Total1** | SUM(Non-normalized season Index for all days this year)  *Eg:*  *SUM(E2:E6)* |
| **Total2** | SUM(Normalized season Index for all days this year)  *Eg:*  *SUM(F2:F6)* |
| **Volumes** | IF(ISERROR(AVERAGEIF(Daily!$F$9:$G$1048576,Indices!D2,Daily!$G$9:$G$1048576)),"",AVERAGEIF(Daily!$F$9:$G$1048576,Indices!D2,Daily!$G$9:$G$1048576))  *Eg:* *IF(ISERROR(AVERAGEIF(Daily!$F$9:$G$1048576,Indices!D2,Daily!$G$9:$G$1048576)),"",AVERAGEIF(Daily!$F$9:$G$1048576,Indices!D2,Daily!$G$9:$G$1048576))* |

Using Time:

|  |  |
| --- | --- |
| **Year1** | IF(Time=TIME(HOUR(Time),MINUTE(Time),SECOND(Time)),Year,Year1)  *Eg:*  *IF(N2=TIME(HOUR(N2),MINUTE(N2),SECOND(N2)),M2,O1)* |
| **String** | O2&TEXT(TIME(HOUR(N2),MINUTE(N2),SECOND(N2)),"HH:MM:SS")  *Eg:*  *Year1&TEXT(TIME(HOUR(Time),MINUTE(Time),SECOND(Time)),"HH:MM:SS")* |
| **Non-normalized Seas. Index** | *Eg:*  *=IF(ISERROR(AVERAGEIF(Daily!$F$9:$K$1048576,Indices!P2,Daily!$K$9:$K$1048576)),0,AVERAGEIF(Daily!$F$9:$K$1048576,Indices!P2,Daily!$K$9:$K$1048576))* |
| **Normalized Seas. Index** | IF(ISERROR(Non-normalized season Index \*22/Total1),0, Non-normalized season Index \*22/Total)  *Eg:*  *=IF(ISERROR(Q2\*22/$S$2),0,Q2\*22/$S$2)* |
| **Total1** | SUM(Non-normalized season Index for all days this year)  *Eg:*  *=SUM(Q2:Q23)* |
| **Total2** | SUM(Normalized season Index for all days this year)  *Eg:*  *=SUM(R2:R23)* |
| **Volumes** | *Eg:*  *=AVERAGEIF(Daily!$D$9:$G$1048576,Indices!W2,Daily!$G$10:$G$1048576)* |

Using Week:

|  |  |
| --- | --- |
| **Non-normalized Seas. Index** | IF(ISERROR(AVERAGEIF(Daily!$F$9:$K$1048576,Indices!AC2,Daily!$K$9:$K$1048576)),0,AVERAGEIF(Daily!$F$9:$K$1048576, Indices!AC2,Daily!$K$9:$K$1048576))  *Eg:*  *=IF(ISERROR(AVERAGEIF(Daily!$F$9:$K$1048576,Indices!AC2,Daily!$K$9:$K$1048576)),0, AVERAGEIF(Daily!$F$9:$K$1048576,Indices!AC2,Daily!$K$9:$K$1048576))* |
| **Normalized Seas. Index** | IF((Non-normalized season Index =0%,100%,IF(ISERROR((Non-normalized season Index \*53/$Total),0, (Non-normalized season Index \*53/$Total))  *Eg:*  *IF(AD2=0%,100%,IF(ISERROR(AD2\*53/$AF2),0,AD2\*53/$AF2))* |
| **Total** | SUM(Non-normalized season Index for all days this year)  *Eg:*  *SUM(AD2:AD54)* |
| **Volumes** | IF(ISERROR(AVERAGEIF(Daily!$F$9:$G$1048576,Indices!AC2,Daily!$G$9:$G$1048576)),"",AVERAGEIF(Daily!$F$9:$G$1048576,Indices!AC2,Daily!$G$9:$G$1048576))  *Eg:*  *IF(ISERROR(AVERAGEIF(Daily!$F$9:$G$1048576, Indices!AC2,Daily!$G$9:$G$1048576)),"",AVERAGEIF(Daily!$F$9:$G$1048576,Indices!AC2,Daily!$G$9:$G$1048576))* |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Date** | **Week** | **Month** | **String** | **Week factor** | **Month Factor** | **Volumes** | **Y-Hat-MR** | **Error** | **Error^2** | **APE** | **String** | **Seasonal Index** | **Reseasonalized Forecast** |
| 1-Jan-00 | 1 | 1 | 11 | 1.37 | 1.32 | 1926 | **1897** | (29) | 866 | 2% |  |  |  |
| 2-Jan-00 | 2 | 1 | 12 | 1.31 | 1.32 | 1842 | **1835** | (7) | 48 | 0% |  |  |  |
| 3-Jan-00 | 3 | 1 | 13 | 1.15 | 1.32 | 1622 | **1634** | 12 | 138 | 1% |  |  |  |
| 4-Jan-00 | 4 | 1 | 14 | 1.22 | 1.32 | 1718 | **1757** | 39 | 1539 | 2% |  |  |  |
| 5-Jan-00 | 5 | 1 | 15 | 1.31 | 1.32 | 2005 | **1911** | (94) | 8865 | 5% |  |  |  |
| 6-Jan-00 | 5 | 2 | 25 | 1.31 | 1.20 | 1682 | **1804** | 123 | 15049 | 7% |  |  |  |
| 7-Jan-00 | 6 | 2 | 26 | 1.30 | 1.20 | 1837 | **1823** | (14) | 206 | 1% |  |  |  |

**Monthly Forecast**

**Input values**: Date, Day, Volumes

**INDICES**:

Using Day:

|  |  |
| --- | --- |
| **Year1** | IF(DAY="Monday", Year, Year 1)  *Eg:*  *IF(B3="Monday",A3,C2)* |
| **String** | Year & Day  *Eg:*  *C3&B3* |
| **Non-normalized Seas. Index** | IF(ISERROR(AVERAGEIF(Daily!$F:$K,$D3, Daily!$K:$K)),0,AVERAGEIF(Daily!$F:$K,$D3,Daily!$K:$K))  *Eg:* *IF(ISERROR(AVERAGEIF(Daily!$F:$K,$D3,Daily!$K:$K)),0,AVERAGEIF(Daily!$F:$K,$D3,Daily!$K:$K))* |
| **Normalized Seas. Index** | IF(ISERROR((Non-normalized season Index)\*5/Total1),0,( Non-normalized season Index)\*5/Total1)  *Eg:*  *IF(ISERROR(E3\*5/$G$2),0,E3\*5/$G$2)* |
| **Total1** | SUM(Non-normalized season Index for all days this year)  *Eg:*  *SUM(E2:E6)* |
| **Total2** | SUM(Normalized season Index for all days this year)  *Eg:*  *SUM(F2:F6)* |
| **Volumes** | IF(ISERROR(AVERAGEIF(Daily!$F$9:$G$1048576,Indices!D2,Daily!$G$9:$G$1048576)),"",AVERAGEIF(Daily!$F$9:$G$1048576,Indices!D2,Daily!$G$9:$G$1048576))  *Eg:* *IF(ISERROR(AVERAGEIF(Daily!$F$9:$G$1048576,Indices!D2,Daily!$G$9:$G$1048576)),"",AVERAGEIF(Daily!$F$9:$G$1048576,Indices!D2,Daily!$G$9:$G$1048576))* |

Using Time:

|  |  |
| --- | --- |
| **Year1** | IF(Time=TIME(HOUR(Time),MINUTE(Time),SECOND(Time)),Year,Year1)  *Eg:*  *IF(N2=TIME(HOUR(N2),MINUTE(N2),SECOND(N2)),M2,O1)* |
| **String** | O2&TEXT(TIME(HOUR(N2),MINUTE(N2),SECOND(N2)),"HH:MM:SS")  *Eg:*  *Year1&TEXT(TIME(HOUR(Time),MINUTE(Time),SECOND(Time)),"HH:MM:SS")* |
| **Non-normalized Seas. Index** | *Eg:*  *=IF(ISERROR(AVERAGEIF(Daily!$F$9:$K$1048576,Indices!P2,Daily!$K$9:$K$1048576)),0,AVERAGEIF(Daily!$F$9:$K$1048576,Indices!P2,Daily!$K$9:$K$1048576))* |
| **Normalized Seas. Index** | IF(ISERROR(Non-normalized season Index \*22/Total1),0, Non-normalized season Index \*22/Total)  *Eg:*  *=IF(ISERROR(Q2\*22/$S$2),0,Q2\*22/$S$2)* |
| **Total1** | SUM(Non-normalized season Index for all days this year)  *Eg:*  *=SUM(Q2:Q23)* |
| **Total2** | SUM(Normalized season Index for all days this year)  *Eg:*  *=SUM(R2:R23)* |
| **Volumes** | *Eg:*  *=AVERAGEIF(Daily!$D$9:$G$1048576,Indices!W2,Daily!$G$10:$G$1048576)* |

Using Week:

|  |  |
| --- | --- |
| **Non-normalized Seas. Index** | IF(ISERROR(AVERAGEIF(Daily!$F$9:$K$1048576,Indices!AC2,Daily!$K$9:$K$1048576)),0,AVERAGEIF(Daily!$F$9:$K$1048576, Indices!AC2,Daily!$K$9:$K$1048576))  *Eg:*  *=IF(ISERROR(AVERAGEIF(Daily!$F$9:$K$1048576,Indices!AC2,Daily!$K$9:$K$1048576)),0, AVERAGEIF(Daily!$F$9:$K$1048576,Indices!AC2,Daily!$K$9:$K$1048576))* |
| **Normalized Seas. Index** | IF((Non-normalized season Index =0%,100%,IF(ISERROR((Non-normalized season Index \*53/$Total),0, (Non-normalized season Index \*53/$Total))  *Eg:*  *IF(AD2=0%,100%,IF(ISERROR(AD2\*53/$AF2),0,AD2\*53/$AF2))* |
| **Total** | SUM(Non-normalized season Index for all days this year)  *Eg:*  *SUM(AD2:AD54)* |
| **Volumes** | IF(ISERROR(AVERAGEIF(Daily!$F$9:$G$1048576,Indices!AC2,Daily!$G$9:$G$1048576)),"",AVERAGEIF(Daily!$F$9:$G$1048576,Indices!AC2,Daily!$G$9:$G$1048576))  *Eg:*  *IF(ISERROR(AVERAGEIF(Daily!$F$9:$G$1048576, Indices!AC2,Daily!$G$9:$G$1048576)),"",AVERAGEIF(Daily!$F$9:$G$1048576,Indices!AC2,Daily!$G$9:$G$1048576))* |

Using Month:

|  |  |
| --- | --- |
| **Non-normalized Seas. Index** | =IF(ISERROR(AVERAGEIF(Daily!$F$9:$K$1048576,Indices!AC2,Daily!$K$9:$K$1048576)),0,AVERAGEIF(Daily!$F$9:$K$1048576,Indices!AC2,Daily!$K$9:$K$1048576))  *Eg:*  *=IF(ISERROR(AVERAGEIF(Daily!$F$9:$K$1048576, Indices!AL2,Daily!$K$9:$K$1048576)),0,AVERAGEIF( Daily!$F$9:$K$1048576,Indices!AL2,Daily!$K$9:$K$1048576))* |
| **Normalized Seas. Index** | IF((Non-normalized season Index =0%,100%,IF(ISERROR((Non-normalized season Index \*53/$Total),0, (Non-normalized season Index \*53/$Total))  *Eg:*  *=IF(AM2=0%,100%,IF(ISERROR(AM2\*12/$AO2),0,AM2\*12/$AO2)* |
| **Total** | =SUM(Non-normalized season Index for all days this year)  *Eg:*  *=SUM(AM2:AM13)* |
| **Volumes** | IF(ISERROR(AVERAGEIF(Daily!$F$9:$G$1048576,Indices!AC2,Daily!$G$9:$G$1048576)),"",AVERAGEIF(Daily!$F$9:$G$1048576,Indices!AC2,Daily!$G$9:$G$1048576))  *Eg:*  *=IF(ISERROR(AVERAGEIF(Daily!$F$9:$G$1048576,Indices!AL2,Daily!$G$9:$G$1048576)),"",AVERAGEIF(Daily!$F$9:$G$1048576,Indices!AL2,Daily!$G$9:$G$1048576))* |

SI no-- =ROW()-9

Date-- input date: eg: 6/5/2017

Time/Day =CHOOSE(WEEKDAY(C10),"Sunday","Monday","Tuesday","Wednesday","Thursday","Friday","Saturday")

Year= =YEAR(C10)--input will be decoded and then and get respective year

volume== input

outliers-- = =IF(ABS(G10-$Q$6)>2\*$Q$7,"Outlier","Normal")---use the values of volume-avg and compare it with twice of std.dev

volume===IF(H10="Normal",G10,VLOOKUP(F10,Indices!$D:$I,6,0))

CMA--- =SUM(AVERAGE(I8:I11)+AVERAGE(I9:I12))/2----includes error since it is refferring to empty cells