Specification of Optimization

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## Objective of this document

* To track the changes of load forecasting function
* To make the clear what the function does

## Functional specification

You can use two codes "demandModelDev.m” and “demandForecast.m”.

# load\_calc

adjDtmLoad = load\_calc(DtmLoad, ESSschedule)

DtmLoad: matrix. deterministic load … (time instances) \* 1

ESSschedule: matrix. ESS hourly schedule … number of ESS \* 24

adjDtmLoad: matrix. Deterministic load applied ESS operation at each position … time instances \* positions

DtmLoad can have any time instances as “96\*1”, “1440\*1”

adjDtmLoad will be the same matrix as DtmLoad

# demandForecast

function flag = demandForecast(‘shortTermPastData.csv’, ‘ForecastData.csv’, ‘ResultData.csv’)

flag =1 ; if operation is completed successfully

flag = -1; if operation fails.

This function depends on demandModel.mat. If these files are not found return -1.

demandForecast displays calculation time of this function



1. Forecasting sequence diagram for demandForecast

# fitnet\_ANN

function yPred= fitnet\_ANN(flag, InputData, shortTermPastData, path)

yPred: Matrix. Predicted demand data (One day. 96 data set) Only for Forecasting mode.

Flag: Integer. Model development = 1, Forecasting = 2

InputData: Matrix. “LongTermPastData”(flag=1) or “ForecastData”(flag=2)

“ForecastData” is always for one day(96 data set)

shortTermPastData: Matrix. Always latest one week data set.

path: to save mat files. ex) C:\Users\ParkSeunghyeon\Desktop

# kmeans\_bayesian

function yPred= kmeans\_baysian(flag, InputData, shortTermPastData, path)

yPred: Matrix. Predicted demand data (One day. 96 data set) Only for Forecasting mode.

Flag: Integer. Model development = 1, Forecasting = 2

InputData: Matrix. “LongTermPastData”(flag=1) or “ForecastData”(flag=2)

“ForecastData” is always for one day(96 data set)

shortTermPastData: Matrix. Always latest one week data set.

path: to save mat files. ex) C:\Users\ParkSeunghyeon\Desktop

# PVModelDev

function flag = PVModelDev(‘LongTermPastData.csv’)

flag =1 ; if operation is completed successfully

flag = -1; if operation fails.

PVModelDev displays calculation time of this function



1. Model development sequence diagram for PVModelDev

# PVForecast

function flag = PVForecast(‘shortTermPastData.csv’, ‘ForecastData.csv’, ‘ResultData.csv’)

flag =1 ; if operation is completed successfully

flag = -1; if operation fails.

PVForecast displays calculation time of this function



1. Forecasting sequence diagram for PVForecast

# kmeansPV

function yPred = kmeansPV(Flag, InputData, shortTermPastData, path)

yPred: Matrix. Predicted demand data (One day. 96 data set) Only for Forecasting mode.

Flag: Integer. Model development = 1, Forecasting = 2

InputData: Matrix. “LongTermPastData”(flag=1) or “ForecastData”(flag=2)

“ForecastData” is always for one day(96 data set)

shortTermPastData: Matrix. Always latest one week data set. (96\*7 data set)

path: to save .mat files. ex) C:\Users\ParkSeunghyeon\Desktop



1. Model development sequence diagram for kmeansPV



1. Forecasting sequence diagram for kmeansPV

## Data format

* PastData.csv:

Must be csv file format.

* ForecastData.csv:

Must be csv file format. The format must follow as below:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| BuildingIndex | Year | Month | Day | Hour | Quarter | Predictor1 | ････ |
| 1 | 2018 | 6 | 29 | 11 | 1 | 5 | 4 |
| 1 | 2018 | 6 | 29 | 11 | 2 | 5 | 4 |
| 1 | 2018 | 6 | 29 | 11 | 3 | 5 | 4 |
| 1 | 2018 | 6 | 29 | 12 | 0 | 5 | 4 |
| 1 | 2018 | 6 | 29 | 12 | 1 | 5 | 4 |

* At least one predictor is necessary for the codes to be run.
* “ResultData.csv”:

Must be text format. This is for the name of the result file. The format must follow as below:

Table1 “ResultData.csv” for demandForecast and PVForecast:

|  |  |  |
| --- | --- | --- |
| **Data classification** | **Variable Name** | **Value** |
| **Time data**  **(Time data showing the estimated period you specify)** | BuildingIndex | Numbers indicates the buildings  E.g. 1,2,…, etc. |
| Year | A 4-digit number representing the year  E.g. 2017, 2018, etc. |
| Month | A double digit representing the month  E.g. 01, 02, 03, 04, 05, 06, 07, 08, 9, 10, 11, 12 |
| Day | A double-digit number representing the day  E.g. 01, 02, …, 30, 31 |
| Hour | A double-digit number representing time  E.g. 0, 1, …, 22, 23, 24 |
| Quarter | A one-digit number representing minutes  E.g. 00 minutes -> 0, :15 minutes - > 1, :30 minutes -> 2, :45 minutes -> 3 |
| **Load data**  **(Average of the expected power)** | DemandMean  PVGenMean | - the number, in kW, that indicates the average of the wattage predicted at that point in time.  - For instance, 100 expected values corresponding to the metadata at 12:15  E.g. 154.92689 |

|  |  |  |
| --- | --- | --- |
| **Data classification** | **Variable Name** | **Value** |
| **Statistical data**  **(Statistical data to convert deterministic forecasts into probabilistic forecasts)** | CIMin | - Lower boundary [kw] of confidence interval  - E.g. 151.332997 |
| CIMax | - Upper boundary of confidence interval  - E.g. 158.520783 |
| CILevel | - Confidence level [%]  E.g. 95 |
| pmfStartIndx | The start point of the histogarm |
| pmfStep | Width of the each bar of histogram |
| DemandpmfDataN | The number of bars in the histogram (10 is the default value) |



## Turning parameters

Please refer “Parameters.xls”.

## Q&A