Quick guide to the “Energy disaggregation” Matlab scripts

Scripts and functions

Introduction

The present document has the aim of giving a brief description of the functionalities of the scripts built for the energy disaggregation project. In any case, the scripts should be also extensively commented in Matlab.

For any doubts or question please contact me on alberto.pizzolato@gmail.com.

clearStructure

This simple script checks if the recorded data obtained through the GUI contain any empty component in the array of structure "data" and, if this condition is met, delete it.

dataRecognize

This script is used for event recognition of past events that has been saved with the GUI. It allows the user to interactively open some recordings and see if the event recognition works correctly.

KennyPrtHmmForSmartHome output must be open before launching the code. Please remember to change the directory of the file opening line.

detectEvent

This code launch the eventDetector code for the respective source selected. To be changed according to the user's preferences:

- Threshold, the minimum power wattage of the event
- timeLag is the waiting time after the wattage has dropped below the threshold to establish the end
- rate, which is the rate of refreshements of the data. Please note that the average communication capability of the TED device is above 1 second (i.e. 1.15) and that the timer object does not work with non-integer values. (suggested value for the TED device is 2 seconds)

Before using the TED device, It would be wise to charge the xml URL on your browser and launch the Matlab event detector only afterwards. In this you can avoid matlab failure.

In order for the event recognition code to work effectively, the output of the KennyPrtHmmForSmartHome must be open before to be available on the base workspace.

eguageEventDetector

This scripts is called in the timer command string of detectEvent in the case the source selected is eguage or none (default). The event detection code is based on comparing 2 or more values to

establish what is happening in the identified circuit. The chronological distance between the two values is assessed by the timeLag set in the DetectEvent script.

Four different possibilities are identified and accounted with an if loop:

1. no events
2. event starts
3. event continues
4. event finishes

The use of simple logical operators in the if loop establishes which is the case.

figurePopout

The figurePopout script is launched by the eventDetector script when the end of the end is established. This calls the results of KennyPrtHmmForSmartHome and establish a log-likelihood rank, display the picture of the most likely appliance, of the power series and gives some useful information about the energy consumption and the cost of the event.

The information about the last event are memorized in an array of structures on the base workspace called evenStruct. The figure only works on the last component of this array in order to read the most recent event.

For the right operation of this code modify the directory in which you stored the collected data. To get the directory interactively type "uigetdir" in the command window. To add visual output modify the string in the subplot with the handle ax(5).

Inizialization

"inizialization" is called by the detectEvent script to initialize the stream of data with both the devices used.

For the eguage device the default circuit source is "microwave". If another script needs to be monitored change the variable "source" either on the script or temporarily in the command window.

plotData

This script plots all the power recordings registered in data in the same graph with random colors. This is very useful to check for the existence of some strange recordings. Once again, please before the first use make sure you change the directory

tedEventDetector

This script works exactly with the same control logic as the eguageEventDetector and was built as the exact copy of it for another source. However, it was not updated with the possibility of setting the timeLag, because of the communications problems faced with the TED device.

In this case the event end is assessed to be as soon as the power readings drops below the threshold (here fixed to be 10 W) for more than 1 second (the time to switch the position of the powerReadings from 2 to 3).

testTedDataStream and testEguageDataStream

This two simple scripts are built to test the proficiency of the built classes tedDataStream and eguageDataStream.

timeConversion

Converts unix time in a readable time string. Reference day is January 1st 1970 and reference meridian is the Greenwich meridian.