NU-Sense

SYSC 5709 F

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Problem Statement:

This software aims to gather data using various sensors as to maintain correctness. For this purpose, it collects value from multiple sensors. Various checks and formulas are implemented to these values in order to obtain single accurate value. This is done using “sensor fusion algorithm”, in which data is passed using single csv file that represents three type of parameters: time, sensor name, temperature at given time.

Functionality:

- Figure out accurate temperature after performing computation on data collected from multiple sensors at a time.
- Set of sensors that give values outside specified range.
- List of stuck sensors i.e. sensors whose values do not change after a specific time t.

Library used:

GSL-2.6 library may be used for performing mathematical computations.

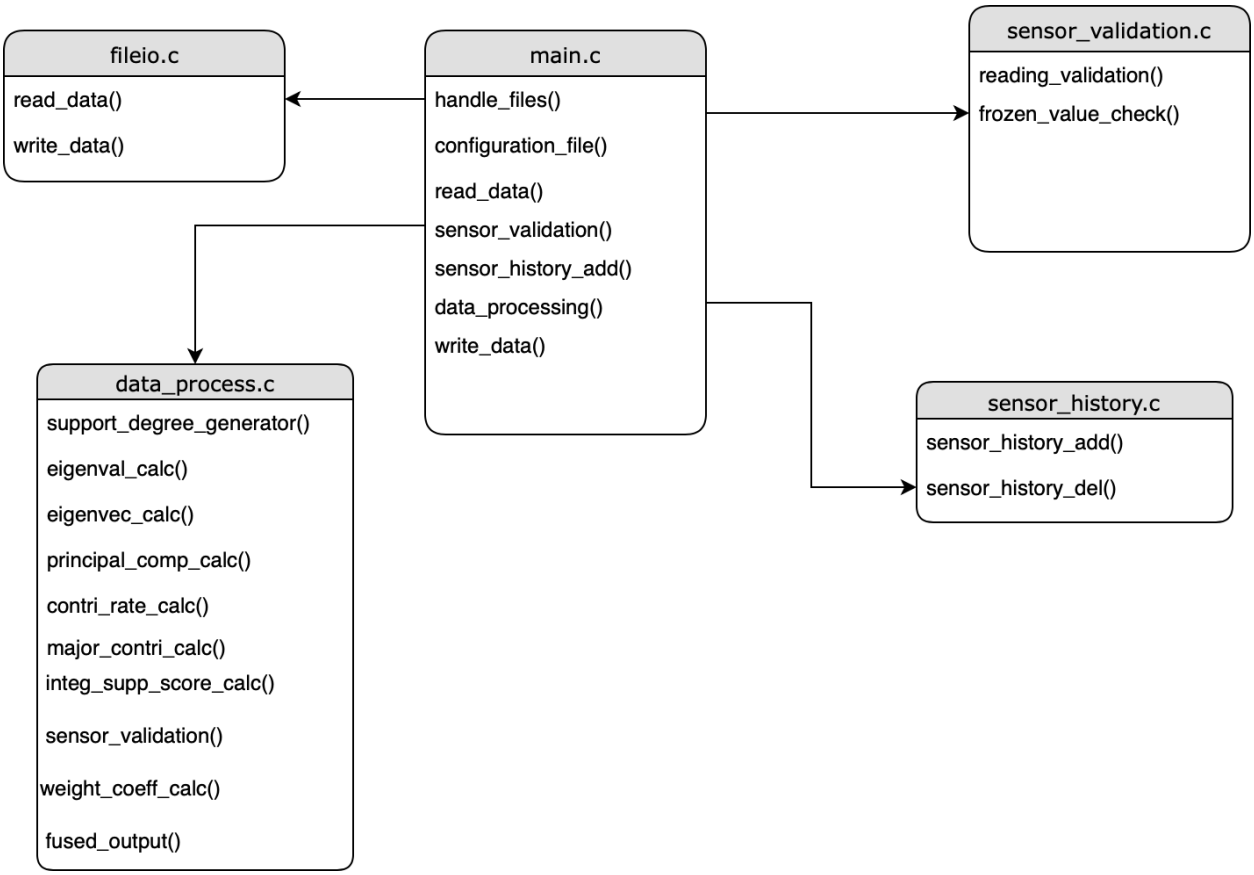
Milestone:

Completion and testing of software before 16th December 2019.

Description:

An input file will be supplied in .csv format that would include three features: time, sensor name, temperature. Temperature readings will be thus validated if they lie within a specific range. If not, error message will be displayed, and computations will be avoided for certain values. Values will be saved in sensor history. Next step is data processing, in this step sensor fusion algorithm will be implemented. Its starts with analysing support degree generate among sensors followed by calculation of eigen values and eigen vectors. With use of these, major principal component will be calculated, and contributor rate will be analyzed for each sensor. Apart from this, sensor with major contribution will be analysed too. Thus, calculation of Integrated support score will be done. Next step is validation, purpose of this step is to validate if sensor is functioning appropriately or it has stuck at some value(malfunctioning). If it is stuck, values of those sensors will not be taken into consideration. In next step, weight coefficients will be determined leading to fused output. This, output will be stored in file and given to client.

Architecture:



Link to GitHub:

https://github.com/karanbirsandhu/nu-sense.git

FLOW DIAGRAM: