NavFuse Base Filter Design Description

Parker Barrett

February 6th, 2023

1 Class Overview

- Header File: NavFuse/include/filter/BaseFilter.hpp
- Implementation: NavFuse/src/filter/BaseFilter.cpp

The NavFuse Base Filter class contains functions for Filter initialization along with state and covariance getters. The base filter is inherited from in several derived filter classes.

2 Public Class Members

The following sub-sections describe the inputs, outputs and internal algorithms used in the public interface of the Base Filter class.

2.1 BaseFilter::filterInitialize()

- Inputs
  - Eigen::VectorXd x0: nx1 dimensional vector containing the initial filter state
  - Eigen::MatrixXd P0: nxn dimensional matrix containing the initial filter covariance
- Outputs
  - No Outputs
- Algorithm
  - The protected class member BaseFilter::filterState is initialized to the value of the input state vector, x0
  - The protected class member BaseFilter::filterCovariance is initialized to the value of the input covariance matrix, P0

2.2 BaseFilter::getCovariance()

- Inputs
  - No Inputs
- Outputs
  - Eigen::MatrixXd Pk: nxn dimensional filter covariance matrix
- Algorithm
  - Return the current filter covariance matrix

2.3 BaseFilter::getState()

- Inputs
  - No Inputs
- Outputs
  - Eigen::VectorXd xk: nx1 dimensional filter state vector
- Algorithm
  - Return the current filter state vector

3 Protected Class Members

The following sub-sections describe the inputs, outputs and internal algorithms used in the protected interface of the Base Filter class.

3.1 BaseFilter::filterCovariance

- Data Type: Eigen::MatrixXd
- Description: nxn dimensional matrix which stores the most up to date filter covariance estimate

3.2 BaseFilter::filterState

- Data Type: Eigen::VectorXd
- Description: nx1 dimensional vector which stores the most up to date filter state estimate