

Lookup table for Toolbox GUI 'RAFD(Jun08)'

1. Max. pattern number: 5.
2. Max. fault number : 3.
3. Start with 'Start.m.
4. Insert all data in GUI.
5. Open 'f_parameter' under 'fileData.mat' .

Data : Model-based=1, Data-driven =2

Data_type : Data type I =1, Data type II =2, Dynamic process model =3

Pattern_Nr: total number of pattern

Fault_ Number : total number of fault

Sample_Size : calculated sample size N

Fault_Pattern : to show which fault(s) is(are) chosen for certain pattern


	f1	f2	f3	
Fault_Pattern =	X	X	X	pattern s1
	X	X	X	pattern s2
			⋮

Pattern_pro : to show probabilities of all patterns

	pattern s1	pattern s2	.....
Pattern_pro =	X	X	.....

Hidden_pro : hidden layer for each cause of certain fault

	combination 01	combination 10	combination 11	
Hidden_pro (:, :, 1) =	X	X	X	cause1
	X	X	X	cause2
	X	X	X	cause3



Fault 1				
---------	--	--	--	--

Cause_Nr : number of cause for certain fault

$$\begin{array}{c} \text{f 1} \quad \text{f 2} \quad \text{f 3} \\ \text{Cause_Nr} = \begin{bmatrix} \text{X} & \text{X} & \text{X} \end{bmatrix} \end{array}$$

Fault_function : to show function(s) which is (are) chosen for each cause

$$\begin{array}{c} \text{Fault_function} (:, :, 1) = \\ \downarrow \\ \text{Fault 1} \end{array} \begin{array}{c} \text{constant} \quad \text{ramp} \quad \text{exponential} \\ \begin{bmatrix} \text{X} & \text{X} & \text{X} \\ \text{X} & \text{X} & \text{X} \\ \text{X} & \text{X} & \text{X} \end{bmatrix} \end{array} \begin{array}{c} \text{cause1} \\ \text{cause2} \\ \text{cause3} \end{array}$$

Fault_range : to show parameters which are set for each cause

$$\begin{array}{c} \text{Fault_range} (:, :, 1) = \\ \downarrow \\ \text{Fault 1} \end{array} \begin{array}{c} \text{constant} \quad \text{ramp} \quad \text{exponential} \\ \begin{bmatrix} \text{min max} & \text{min max} & \text{min max} \\ \text{min max} & \text{min max} & \text{min max} \\ \text{min max} & \text{min max} & \text{min max} \end{bmatrix} \end{array} \begin{array}{c} \text{cause1} \\ \text{cause2} \\ \text{cause3} \end{array}$$

Fault_position : to show on which measurement occurs the fault and type of the fault

$$\text{Fault_position} = \begin{array}{c} \text{Position} \quad \text{addictive fault} \quad \text{multiplicative fault} \\ \begin{bmatrix} \text{X} & \text{X} & \text{X} \\ \text{X} & \text{X} & \text{X} \\ \text{X} & \text{X} & \text{X} \end{bmatrix} \end{array} \begin{array}{c} \text{fault 1} \\ \text{fault 2} \\ \text{fault 3} \end{array}$$

Covariance : data for covariance matrix

$$\text{Covariance} = [\text{dimension} \quad \text{eigen value(min)} \quad \text{eigen value(max)} \quad \text{uncertainty_case}]$$

Detection_method : detection method for different data type

Detection_method = [	X	X	X	X]
Data type I :	GLR	PCA	0	custom	
Data type II:	PLS	CCA	LS	custom	
Dynamic process model:	CCA	dPCA	0	custom	

Estimation_method : performance evaluation method

	FAR	FDR	
Estimation_method =[	X	X]

FAR_estimation (cell) : parameter for FAR performance evaluation

FAR_estimation {1} = threshold

FAR_estimation {2} =	only with disturbance	probability(only with disturbance)
	only with uncertainty	probability(only with uncertainty)
	disturbance and uncertainty	probability(disturbance and uncertainty)

*Data-driven : only the first row (without choosing disturbance and uncertainty)

Dpmodel : dynamic process model

	n	ni	no	method	delta_min
Dpmodel =	X	X	X	X	X
	X	X	X	X	X
	A	B	C	D	delta_max

Samp_time: sampling time

Sys_dim : system dimension

	state	input	output	disturbance	
Sys_dim = [X	X	X	X]

Sys_matrix (cell): system matrix

	A0	B0	C0	Ed0	Fd0	
Sys_matrix = {	X	X	X	X	X	}

Input_data (cell): information about input signal U

Input_data{1} = signal length

Input_data{2} =

duration1_min	duration1_max	range1_min	range1_min
duration2_min	duration2_max	range2_min	range2_min
duration3_min	duration3_max	range3_min	range3_min

Residual (cell): information about residual and evaluation function

	Kalman filter	Unified solution	Given L	
Residual {1} = {	X	X	X	}

Residual {2} =

function1(peak)	0
function2(RMS)	N for function1

- When L is given :
Residual {3} = L matrix (3x3)

Uncertainty (cell): information about uncertainty (6 cells for polytopic and 7 cells for parameter uncertainty)

Polytopic uncertainty:

	A	B	C	E	F	value of L	
Uncertainty {1} = {	X	X	X	X	X	X	}
Uncertainty {2} = A	Uncertainty {3} = B		Uncertainty {4} = C				
Uncertainty {5} = E	Uncertainty {6} = F						

Parameter uncertainty:

	A	B	C	E	F	
Uncertainty {1} = {	X	X	X	X	X	} matrix selection

	A	B	C	E	F	
Uncertainty {2} = {	X	X	X	X	X	} distribution selection

*not chosen =0

*uniform distribution = 1

*normal distribution = 2

Uncertainty {3} = A Uncertainty {4} = B Uncertainty {5} = C

Uncertainty {6} = E Uncertainty {7} = F

Fault_position_mb : to show whether it's a sensor or actuator fault as well as the type of the fault

	sensor1	sensor2	sensor2	sensor2	addictive fault	multiplicative fault	
Fault_position =	X	X	X	X	X	X	fault1
	X	X	X	X	X	X	fault2
	X	X	X	X	X	X	fault 3

Threshold_chosen : shows which threshold is used for FD

	given threshold	threshold ensuring FAR=0	
Threshold_chosen =	[	X	X]

User-customized :

customData.mat -> c_parameter

Model-based part :

Name saved in loaded mat. file	*Name saved in program (c_parameter)	Type	Meaning	*Value saved in 'Choice' (c_parameter)	*Representation	*Position
A0, B0, C0, D0, Ed0, Fd0	Process_model	6 elements in a cell structure	Original system matrices	[X X 0 0]	[load, generate, 0]	1.row
Input_signal	Input_signal	1 element in a cell structure	Input signal	[X X X 0]	[load input signal, load disturbance signal, generate, 0]	2.row
Disturbance	Disturbance	1 element in a cell structure	Disturbance signal			
A, B, C, D, Ed, Fd	Poly_uncertainty	6 elements in a cell structure	Polytopic uncertainty matrices	[X X X X]	[polytopic, parameter, load, generate]	3.row
L	Filter_gain	1 element in a cell structure	Filter gain matrix	[X X 0 0]	[load, generate, 0, 0]	4.row
V	Filter	1 element in a cell structure	Filter matrix			
			Fault model/ fault data	[X X X 0]	[load fault model, load fault data, generate, 0]	5.row

Fault model / fault data :

Name saved in loaded mat. file	*Name saved in program (c_parameter)	Type	Meaning
Fault_Pattern	Fault_Pattern	Matrix	Detailed explanations and examples see lookup table above.
Pattern_pro	Pattern_pro	Matrix	
Hidden_pro	Hidden_pro	Matrix	
Fault_Number	Fault_Number	Number	
Pattern_Nr	Pattern_Nr	Number	
Cause_Nr	Cause_Nr	Matrix	
Fault_function	Fault_function	Cell	
Fault_range	Fault_range	Cell	

*For programmer

Jun.08.2017

xinyi.chen@stud.uni-due.de