AH2923 Global Navigation Satellite Systems

Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.01\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.2 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	28.432	6.758
10	48.120	2.542
15	75.421	7.029
20	95.292	10.675
25	121.287	9.271
30	149.363	19.478
35	166.578	15.806
40	197.909	15.581
45	221.134	18.264
50	248.965	24.260

Initial velocity: ve = 4.98 m/s, vn = 0.44 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
- filtered coordinates, velocities and their standard errors
- plot of the measured and filtered trajectory.

Stockholm 2010-01-21 Milan Horemuž

AH2923 Global Navigation Satellite Systems

Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	28.148	8.920
10	47.550	6.867
15	74.567	13.516
20	94.153	19.324
25	119.863	20.083
30	147.655	32.452
35	164.586	30.942
40	195.632	32.880
45	218.572	37.725
50	246.118	45.884

Initial velocity: ve = 4.92 m/s, vn = 0.87 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
- filtered coordinates, velocities and their standard errors
- plot of the measured and filtered trajectory.

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Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	27.676	11.049
10	46.606	11.126
15	73.151	19.904
20	92.265	27.841
25	117.503	30.729
30	144.823	45.228
35	161.281	45.847
40	191.855	49.914
45	214.323	56.888
50	241.398	67.176

Initial velocity: ve = 4.83 m/s, vn = 1.29 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
- filtered coordinates, velocities and their standard errors
- plot of the measured and filtered trajectory.

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Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	27.020	13.129
10	45.295	15.286
15	71.183	26.144
20	89.642	36.161
25	114.224	41.129
30	140.888	57.708
35	156.690	60.407
40	186.609	66.554
45	208.421	75.608
50	234.840	87.977

Initial velocity: ve = 4.70 m/s, vn = 1.71 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
- filtered coordinates, velocities and their standard errors
- plot of the measured and filtered trajectory.

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AH2923 Global Navigation Satellite Systems

Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	26.185	15.144
10	43.625	19.316
15	68.679	32.188
20	86.303	44.221
25	110.051	51.204
30	135.880	69.798
35	150.848	74.511
40	179.932	82.674
45	200.909	93.743
50	226.493	108.126

Initial velocity: ve = 4.53 m/s, vn = 2.11 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
- filtered coordinates, velocities and their standard errors
- plot of the measured and filtered trajectory.

Stockholm 2010-01-21 Milan Horemuž

AH2923 Global Navigation Satellite Systems

Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	25.178	17.079
10	41.611	23.185
15	65.658	37.992
20	82.275	51.959
25	105.016	60.877
30	129.838	81.405
35	143.799	88.053
40	171.875	98.150
45	191.846	111.154
50	216.423	127.471

Initial velocity: ve = 4.33 m/s, vn = 2.50 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
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- plot of the measured and filtered trajectory.

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Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	24.006	18.918
10	39.268	26.863
15	62.143	43.510
20	77.588	59.317
25	99.156	70.074
30	122.807	92.442
35	135.596	100.929
40	162.501	112.865
45	181.299	127.709
50	204.704	145.866

Initial velocity: ve = 4.10 m/s, vn = 2.87 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
- filtered coordinates, velocities and their standard errors
- plot of the measured and filtered trajectory.

Stockholm 2010-01-21 Milan Horemuž

AH2923 Global Navigation Satellite Systems

Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	23.854	22.175
10	36.049	29.719
15	58.395	48.865
20	70.834	66.891
25	91.439	78.184
30	114.819	104.958
35	123.717	113.226
40	151.436	126.091
45	168.347	142.832
50	191.400	163.992

Initial velocity: ve = 3.83 m/s, vn = 3.21 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
- filtered coordinates, velocities and their standard errors
- plot of the measured and filtered trajectory.

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AH2923 Global Navigation Satellite Systems

Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	22.381	23.783
10	33.102	32.935
15	53.975	53.689
20	64.940	73.323
25	84.072	86.224
30	105.978	114.606
35	113.403	124.481
40	139.648	138.955
45	155.086	157.304
50	176.665	180.072

Initial velocity: ve = 3.54 m/s, vn = 3.54 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
- filtered coordinates, velocities and their standard errors
- plot of the measured and filtered trajectory.

Stockholm 2010-01-21 Milan Horemuž

AH2923 Global Navigation Satellite Systems

Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	20.773	25.256
10	29.886	35.882
15	49.151	58.109
20	58.509	79.217
25	76.032	93.591
30	96.330	123.447
35	102.147	134.795
40	126.784	150.742
45	140.614	170.565
50	160.585	194.806

Initial velocity: ve = 3.21 m/s, vn = 3.83 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
- filtered coordinates, velocities and their standard errors
- plot of the measured and filtered trajectory.

Stockholm 2010-01-21 Milan Horemuž

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Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	19.043	26.584
10	26.425	38.537
15	43.960	62.093
20	51.587	84.527
25	67.380	100.230
30	85.948	131.413
35	90.035	144.089
40	112.942	161.364
45	125.042	182.514
50	143.283	208.083

Initial velocity: ve = 2.87 m/s, vn = 4.10 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
- filtered coordinates, velocities and their standard errors
- plot of the measured and filtered trajectory.

Stockholm 2010-01-21 Milan Horemuž

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Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	17.203	27.756
10	22.747	40.881
15	38.442	65.608
20	44.230	89.215
25	58.183	106.089
30	74.912	138.444
35	77.159	152.292
40	98.227	170.739
45	108.487	193.061
50	124.889	219.802

Initial velocity: ve = 2.50 m/s, vn = 4.33 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
- filtered coordinates, velocities and their standard errors
- plot of the measured and filtered trajectory.

Stockholm 2010-01-21 Milan Horemuž

AH2923 Global Navigation Satellite Systems

Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	15.269	28.763
10	18.877	42.895
15	32.638	68.629
20	36.492	93.243
25	48.510	111.124
30	63.305	144.486
35	63.617	159.342
40	82.751	178.795
45	91.076	202.124
50	105.543	229.872

Initial velocity: ve = 2.11 m/s, vn = 4.53 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
- filtered coordinates, velocities and their standard errors
- plot of the measured and filtered trajectory.

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Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	13.254	29.597
10	14.848	44.564
15	26.593	71.133
20	28.432	96.581
25	38.436	115.297
30	51.215	149.494
35	49.512	165.184
40	66.631	185.472
45	72.941	209.636
50	85.394	238.218

Initial velocity: ve = 1.71 m/s, vn = 4.70 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
- filtered coordinates, velocities and their standard errors
- plot of the measured and filtered trajectory.

Stockholm 2010-01-21 Milan Horemuž

AH2923 Global Navigation Satellite Systems

Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	11.174	30.253
10	10.687	45.876
15	20.353	73.101
20	20.112	99.205
25	28.036	118.577
30	38.735	153.429
35	34.952	169.775
40	49.991	190.719
45	54.221	215.539
50	64.593	244.777

Initial velocity: ve = 1.29 m/s, vn = 4.83 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
- filtered coordinates, velocities and their standard errors
- plot of the measured and filtered trajectory.

Stockholm 2010-01-21 Milan Horemuž

AH2923 Global Navigation Satellite Systems

Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.01\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.2 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	28.432	6.758
10	48.120	2.542
15	75.421	7.029
20	95.292	10.675
25	121.287	9.271
30	149.363	19.478
35	166.578	15.806
40	197.909	15.581
45	221.134	18.264
50	248.965	24.260

Initial velocity: ve = 4.98 m/s, vn = 0.44 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
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- plot of the measured and filtered trajectory.

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AH2923 Global Navigation Satellite Systems

Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	28.148	8.920
10	47.550	6.867
15	74.567	13.516
20	94.153	19.324
25	119.863	20.083
30	147.655	32.452
35	164.586	30.942
40	195.632	32.880
45	218.572	37.725
50	246.118	45.884

Initial velocity: ve = 4.92 m/s, vn = 0.87 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
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- plot of the measured and filtered trajectory.

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AH2923 Global Navigation Satellite Systems

Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	27.676	11.049
10	46.606	11.126
15	73.151	19.904
20	92.265	27.841
25	117.503	30.729
30	144.823	45.228
35	161.281	45.847
40	191.855	49.914
45	214.323	56.888
50	241.398	67.176

Initial velocity: ve = 4.83 m/s, vn = 1.29 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
- filtered coordinates, velocities and their standard errors
- plot of the measured and filtered trajectory.

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Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	27.020	13.129
10	45.295	15.286
15	71.183	26.144
20	89.642	36.161
25	114.224	41.129
30	140.888	57.708
35	156.690	60.407
40	186.609	66.554
45	208.421	75.608
50	234.840	87.977

Initial velocity: ve = 4.70 m/s, vn = 1.71 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
- filtered coordinates, velocities and their standard errors
- plot of the measured and filtered trajectory.

Stockholm 2010-01-21 Milan Horemuž

AH2923 Global Navigation Satellite Systems

Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	26.185	15.144
10	43.625	19.316
15	68.679	32.188
20	86.303	44.221
25	110.051	51.204
30	135.880	69.798
35	150.848	74.511
40	179.932	82.674
45	200.909	93.743
50	226.493	108.126

Initial velocity: ve = 4.53 m/s, vn = 2.11 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
- filtered coordinates, velocities and their standard errors
- plot of the measured and filtered trajectory.

Stockholm 2010-01-21 Milan Horemuž

AH2923 Global Navigation Satellite Systems

Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	25.178	17.079
10	41.611	23.185
15	65.658	37.992
20	82.275	51.959
25	105.016	60.877
30	129.838	81.405
35	143.799	88.053
40	171.875	98.150
45	191.846	111.154
50	216.423	127.471

Initial velocity: ve = 4.33 m/s, vn = 2.50 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
- filtered coordinates, velocities and their standard errors
- plot of the measured and filtered trajectory.

Stockholm 2010-01-21 Milan Horemuž

AH2923 Global Navigation Satellite Systems

Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	24.006	18.918
10	39.268	26.863
15	62.143	43.510
20	77.588	59.317
25	99.156	70.074
30	122.807	92.442
35	135.596	100.929
40	162.501	112.865
45	181.299	127.709
50	204.704	145.866

Initial velocity: ve = 4.10 m/s, vn = 2.87 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
- filtered coordinates, velocities and their standard errors
- plot of the measured and filtered trajectory.

Stockholm 2010-01-21 Milan Horemuž

AH2923 Global Navigation Satellite Systems

Kalman Filtering

Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	23.854	22.175
10	36.049	29.719
15	58.395	48.865
20	70.834	66.891
25	91.439	78.184
30	114.819	104.958
35	123.717	113.226
40	151.436	126.091
45	168.347	142.832
50	191.400	163.992

Initial velocity: ve = 3.83 m/s, vn = 3.21 m/s.
Measured velocity: 5 m/s (all the time)

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- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	22.381	23.783
10	33.102	32.935
15	53.975	53.689
20	64.940	73.323
25	84.072	86.224
30	105.978	114.606
35	113.403	124.481
40	139.648	138.955
45	155.086	157.304
50	176.665	180.072

Initial velocity: ve = 3.54 m/s, vn = 3.54 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

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- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	20.773	25.256
10	29.886	35.882
15	49.151	58.109
20	58.509	79.217
25	76.032	93.591
30	96.330	123.447
35	102.147	134.795
40	126.784	150.742
45	140.614	170.565
50	160.585	194.806

Initial velocity: ve = 3.21 m/s, vn = 3.83 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

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- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	19.043	26.584
10	26.425	38.537
15	43.960	62.093
20	51.587	84.527
25	67.380	100.230
30	85.948	131.413
35	90.035	144.089
40	112.942	161.364
45	125.042	182.514
50	143.283	208.083

Initial velocity: ve = 2.87 m/s, vn = 4.10 m/s.
Measured velocity: 5 m/s (all the time)

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Use Kalman filter to compute 2D position and velocity of a moving vehicle. Use constant velocity (PV) model. The position and absolute value of velocity of the vehicle is measured in 5 s intervals.

A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	17.203	27.756
10	22.747	40.881
15	38.442	65.608
20	44.230	89.215
25	58.183	106.089
30	74.912	138.444
35	77.159	152.292
40	98.227	170.739
45	108.487	193.061
50	124.889	219.802

Initial velocity: ve = 2.50 m/s, vn = 4.33 m/s.
Measured velocity: 5 m/s (all the time)

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A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	15.269	28.763
10	18.877	42.895
15	32.638	68.629
20	36.492	93.243
25	48.510	111.124
30	63.305	144.486
35	63.617	159.342
40	82.751	178.795
45	91.076	202.124
50	105.543	229.872

Initial velocity: ve = 2.11 m/s, vn = 4.53 m/s.
Measured velocity: 5 m/s (all the time)

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A priori statistics:

- PSD (power spectral density) of the random acceleration: $0.1\ m^2s^{-3}$
- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	13.254	29.597
10	14.848	44.564
15	26.593	71.133
20	28.432	96.581
25	38.436	115.297
30	51.215	149.494
35	49.512	165.184
40	66.631	185.472
45	72.941	209.636
50	85.394	238.218

Initial velocity: ve = 1.71 m/s, vn = 4.70 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

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- Standard error of measured coordinates: 3 m
- Standard error of measured abs. velocity: 0.5 m/s
- Standard error of initial velocity: 0.01 m/s
- Standard error of initial coordinates: 0.1 m

Measured coordinates:

Time [s]	e [m]	n [m]
0	0	0
5	11.174	30.253
10	10.687	45.876
15	20.353	73.101
20	20.112	99.205
25	28.036	118.577
30	38.735	153.429
35	34.952	169.775
40	49.991	190.719
45	54.221	215.539
50	64.593	244.777

Initial velocity: ve = 1.29 m/s, vn = 4.83 m/s.
Measured velocity: 5 m/s (all the time)

The report should include

- code
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- plot of the measured and filtered trajectory.

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