Data[1] (Inventory and Location)

The additional material in this file is provided by Prof Boashash to assist the reader in using the supplementary materials (SM)[2], provided with the TFSAP book. The provided data are listed according to their order of appearance and grouped chapter by chapter and section by section.

Data from The Supplementary material			
Data File/Folder	**Type**	**Chapter(s)**	**Description**
e_flat.txt	Text	1	Data file for Fig. 1.1.3, comprising the first two seconds of Beethoven's Third Symphony, which begins with two short E-flat-major chords.
toolbox_sparsity	Toolbox	4.11	It contains the Sparsity toolbox.
sig.mat (*)	MATLAB	4.11	Data used to produce Figure 4.11.1 on page 220.
short_long_sig.mat	MATLAB	4.11	Data used to produce Figure 4.11.5 on page 223.
dolphin_click.wav	Sound	5.2, 6.4	It holds 3.4 seconds of a Risso' Dolphin clicks and whistles sampled at 44.1 KHz [1].
sig.mat (*)	MATLAB	5.9	Data used to produce Figure 5.9.7 on page 298.
sig.mat (*)	MATLAB	5.10	Data used to produce Figure 5.10.5 on page 306.
SM_Movie_L_variations.m4v	Video	6.2, 7.3	This video clip shows the concentration measure and the time-frequency representation of a real-valued multicomponent signal by changing the parameter L.
SM_Movie_Q_variations.m4v	Video	6.2, 7.3	This video clip shows the concentration measure and the time-frequency representation of a real-valued multicomponent signal by changing the parameter Q.
TFSAP_SUP_MAT_CHAP_7_6_figure_3_errorsignal.mat	MATLAB	7.6	It holds 500 realizations of pre-calculated IF estimations for the signal used in Figure 7.6.3 on page 430.
Avg_Results.mat	MATLAB	8.1	Pre-computed data used to produce Figure

[1] B. Boashash (ed.), *Time-Frequency Signal Analysis and Processing*, 2nd Edition (London: Elsevier / Academic Press, pages 351-358, December 2015); ISBN 978-0-12-398499-9.
[2] All of the book supplementary materials can be found here.

Data from The Supplementary material			
Data File/Folder	**Type**	**Chapter(s)**	**Description**
			8.1.10(a) on page 465.
Avg_Error.mat	MATLAB	8.1	Pre-computed data used to produce Figure 8.1.10(b) on page 465.
bird.wav	Sound	8.4	It holds a bird song sampled at 11025 Hz [2]-[5].
bird_chirp.wav	Sound	8.4	It holds a bird chirping sampled at 11025 Hz [2]-[5].
car_x.wav	Sound	8.4	It holds a car startup sound sampled at 11025 Hz [2]-[5].
dolphin.wav (*)	Sound	8.4	It holds a dolphin whistle sampled at 11025 Hz [2]-[5].
jet_doppler2.wav	Sound	8.4	It holds a flying jet aircraft sound sampled at 11025 Hz [2]-[5].
seagull2.wav	Sound	8.4	It holds a seagull sound with ocean noises in the background sampled at 11025 Hz [2]-[5].
TFSAP_SUP_MAT_CHAP_8.6_Data_S1.wav	Sound	8.6	It holds a real speech signal sampled at 8 KHz.
TFSAP_SUP_MAT_CHAP_8.6_Data_S2.wav	Sound	8.6	It holds a real speech signal sampled at 8 KHz.
TFSAP_SUP_MAT_CHAP_8.6_Data_S3.wav	Sound	8.6	It holds a real speech signal sampled at 8 KHz.
TFSAP_SUP_MAT_CHAP_8.6_Data_S4.wav	Sound	8.6	It holds a real speech signal sampled at 8 KHz.
channel_IR.mat	MATLAB	8.6	It holds the impulse response of the convolutive mixing system which is saved in an $m\ (L{+}1) \times n$ matrix, where m is the number of sensors n is the number of sources and L is the length of the channel impulse response.
TFD_avg.mat	MATLAB	9.1	It holds five averaged TFDs from 1000 noisy realizations corresponding to: exponential distribution, pseudo-Wigner distribution, S-method, Spectrogram, smoothed Spectrogram.
Results_Signal_1.mat	MATLAB	10.1	It holds the full error analysis for the sinusoidal FM signal.
Results_Signal_2.mat	MATLAB	10.1	It holds the full error analysis for the quadratic FM signal.

Data from The Supplementary material			
Data File/Folder	**Type**	**Chapter(s)**	**Description**
Results_Signal_3.mat	MATLAB	10.1	It holds the full error analysis for the linear FM signal.
TFSAP_SUP_MAT_CHAP_10_6_csk_tfd.mat	MATLAB	10.6	It holds the CKD representation.
TFSAP_SUP_MAT_CHAP_10_6_embd.mat	MATLAB	10.6	It holds the EMBD representation.
TFSAP_SUP_MAT_CHAP_10_6_kernels.mat	MATLAB	10.6	It holds the kernels.
MSE_CPF_HAF_5_red_SNR_-10_do_24_TRIAL_300.mat	MATLAB	10.7	It contains the estimated parameters of the 5th order PPS using the QML and the PD-based estimation methods for different SNR values.
MSE_CPF_HAF_6_red_SNR_-10_do_24_TRIAL_200.mat	MATLAB	10.7	It contains the estimated parameters of the 6th order PPS using the QML and the PD-based estimation methods for different SNR values.
QML_3SNR.mat	MATLAB	10.7	It holds spectrograms of a signal under analysis with different SNR values.
clean_speech.wav	Sound	11.1	It contains approximately 2.6 seconds of speech.
pink_noise.wav	Sound	11.1	It contains approximately 2.6 seconds of pink noise.
Mask.mat	MATLAB	11.1	It contains a pre-calculated mask to be used in filtering the corrupted speech signal.
NoisySpeech_CarNoise.wav	Sound	11.2	It holds a noisy speech signal of a male speaker counting from 1 to 11 in a car.
GainFunction_CarNoise.mat	MATLAB	11.2	A gain function, computed by the Wiener attenuation rule, used for filtering.
mann_1.mat	MATLAB	11.3	It contains a clean voice sample of an English male speaker.
benz_autobahn_1.mat	MATLAB	11.3	It contains a noise signal comprised of a running Benz diesel with city traffic noises.
LFM_snr1.mat	MATLAB	11.5	It contains a noisy LFM signal with an SNR of 1 dB.
LFM_snr5.mat	MATLAB	11.5	It contains a noisy LFM signal with an SNR of 5 dB.
EEG1.mat	MATLAB	11.5	It holds a mono-channel neonate EEG signal.
EEG2.mat	MATLAB	11.5	It holds a mono-channel neonate EEG signal.
EEG3.mat	MATLAB	11.5	It holds a mono-channel neonate EEG signal.

Data from The Supplementary material			
Data File/Folder	**Type**	**Chapter(s)**	**Description**
Database[CLEAN]	Folder	11.6	This folder contains 30 different clean speech signals that can be used by the reader.
Database[NOISE]	Folder	11.6	This folder contains 5 different noise signals, collected from the NOIZEUS database that can be used by the reader.
Database[TEST]	Folder	11.6	This folder contains 3 different noisy speech signals that can be used by the reader.
dictionary.mat	MATLAB	12.2	It holds a dictionary to be used in calculating signal atoms.
NonSeizure_20CH_BrainZ_ArtifactFree.mat	MATLAB	12.5	It holds 26 minutes of multichannel EEG recordings of non-seizure events for five neonates, recorded at Royal Children's Hospital, Brisbane, Australia. Note that the provided database is only a portion of the full database used in Section 12.5.
Seizure_20CH_BrainZ_ArtifactFree.mat	MATLAB	12.5	It holds 11 minutes of multichannel EEG recordings of seizure events for five neonates, recorded at Royal Children's Hospital, Brisbane, Australia. Note that, the provided database is only a portion of the full database used in Section 12.5.
background.mat	MATLAB	12.6	It holds 2000 single-channel EEG segments of non-seizure events, recorded at the NICU of the Royal Brisbane and Women's Hospital, Brisbane, Australia.
seizure.mat	MATLAB	12.6	It holds 200 single-channel EEG segments of seizure events, recorded at the NICU of the Royal Brisbane and Women's Hospital, Brisbane, Australia.
FSK_captured.wav	Sound	13.5	It holds a real Frequency Shift-Keying signal sampled at 8000 Hz.
TFSAP_14.1_afosr05.ppt	PowerPoint	14.1	It holds PowerPoint slides of a lecture titled "Sharpening Techniques for Sensor Feature Enhancement". The offered slides extend and elaborate the material covered in Section 14.1 and illustrate its applicability for different radar signals [6].
click01.wav	Sound	14.5	It holds Dolphin communications comprised of clicks [7].
sea_noise.wav	Sound	14.5	Ten seconds of underwater noise used to corrupt the Dolphin communications.

Data from The Supplementary material			
Data File/Folder	**Type**	**Chapter(s)**	**Description**
whistle_n_clicks02.wav	Sound	14.5	It holds Dolphin communications comprised of whistles and clicks [7].
whistle01.wav	Sound	14.5	It holds Dolphin communications comprised of whistles [7].
whistle02.wav	Sound	14.5	It holds Dolphin communications comprised of whistles [7].
ar_filter	Toolbox	14.5	It contains the Adaptive Optimal Kernel (AOK) toolbox [8].
2.mat	MATLAB	14.5	It holds the AOK representation of *whistle01.wav*.
3.mat	MATLAB	14.5	It holds the AOK representation of *whistle02.wav*.
4.mat	MATLAB	14.5	It holds the AOK representation of *click01.wav*.
5.mat	MATLAB	14.5	It holds the AOK representation of *whistle_n_clicks02.wav*.
SpaRSA_2.0	Toolbox	14.6	It contains the Sparse Reconstruction by Separable Approximation (SRSA) toolbox [9].
dolphin.wav (*)	Sound	14.7	It holds approximately 4.5 seconds of dolphin communications.
signal_Beluga.mat	MATLAB	14.7	It contains 5000 samples of a beluga whale song along with its Spectrogram, and its time and frequency arrays.
signal_humpback.mat	MATLAB	14.7	It contains 2561 samples of a humpback whale song.
harmonic.mat	MATLAB	15.1	It holds a harmonic power disturbance signal [10].
interharmonic.mat	MATLAB	15.1	It holds an inter-harmonic power disturbance signal [10].
interruption.mat	MATLAB	15.1	It holds an interruption power disturbance signal [10].
sag.mat	MATLAB	15.1	It holds a sag power disturbance signal [10].
Swell.mat	MATLAB	15.1	It holds a swell power disturbance signal [10].
Transient.mat	MATLAB	15.1	It holds a transient power signal [10].
Pressure_1_sig.mat	MATLAB	15.2	It holds a pressure signal of a BMW engine measured by a sensor mounted in the spark plug.
Pressure_2_sig.mat	MATLAB	15.2	It holds a pressure signal of a BMW measured by a sensor mounted in the cylinder head.

Data from The Supplementary material			
Data File/Folder	**Type**	**Chapter(s)**	**Description**
Structure_borne_sound.mat	MATLAB	15.2	It holds a structure-borne sound of a BMW engine measured by acceleration sensors mounted on the engine housing.
Image_Original.png	Image	15.4	A 256×256 image of a parrot
Image_WGN.png	Image	15.4	A distorted version of *Image_Original.png*, obtained by adding white Gaussian noise to the original image.
Image_JPEG.jpeg	Image	15.4	A distorted version of *Image_Original.png*, obtained by JPEG compression of the original image.
Image_GRID.png	Image	15.4	A distorted version of *Image_Original.png*, obtained by adding a grid-like interference pattern to the original image.
Sec_15_5data.mat	MATLAB	15.5	It holds four different data files sampled at 1 kHz. The data files are comprised of averaged and time-adjusted systole phases of normal, systole10001, and abnormal PCG signals, systole10019, systole10078 and systole20008. These signals were selected from the LGB-IRCM Cardiac Valve database.
signal_15_6.mat	MATLAB	15.6	It holds 256 samples (≈ 8 seconds) of seizure and non-seizure EEG patterns [11][12].
ecg_example.mat	MATLAB	16.1	It contains ECG signals sampled at different frequency rates.
eeg_example.mat	MATLAB	16.1	It holds EEG signals that contain epileptic and normal EEG events sampled at 16 Hz.
Sig_a.mat	MATLAB	16.1, 16.2	It holds a newborn EEG pattern that is depicted in Figures 16.1.1(a) and 16.2.2(b) on pages 919 and 929 of the book.
Sig_b.mat	MATLAB	16.1, 16.2	It holds a newborn EEG pattern that is depicted in Figures 16.1.1(b) and 16.2.2(b) on pages 919 and 929 of the book.
Sig_c.mat	MATLAB	16.1	It holds a newborn EEG pattern that is depicted in Figure 16.1.1(c) on page 919.
Sig_d.mat	MATLAB	16.1	It holds a newborn EEG pattern that is depicted in Figure 16.1.1(d) on page 919.
Sig_e.mat	MATLAB	16.1	It holds a newborn EEG pattern that is depicted in Figure 16.1.1(e) on page 919.
Sig_f.mat	MATLAB	16.1	It holds a newborn EEG pattern that is depicted in Figure 16.1.1(f) on page 919.
Sig_c1.mat	MATLAB	16.2	It holds a newborn EEG pattern that is

Data from The Supplementary material			
Data File/Folder	**Type**	**Chapter(s)**	**Description**
			depicted in Figure 16.2.2 (c) on page 929.
Sig_c2.mat	MATLAB	16.2	It holds a newborn EEG pattern that is depicted in Figure 16.2.2(c) on page 929.
bursts.mat	MATLAB	16.3	It holds short epochs of newborn EEG burst events, recorded at the Royal Brisbane and Women's Hospital, Brisbane, Australia.
suppressions.mat	MATLAB	16.3	It holds short epochs of newborn EEG suppression events, recorded at the Royal Brisbane and Women's Hospital, Brisbane, Australia.
nmfv1_4	Toolbox	16.3	It contains the Non-negative Matrix Factorization (NMF) toolbox that was developed for biological data mining [13].
BS_ECG_PLV.mat	MATLAB	16.4	It holds pre-computed causality matrices of body-surface ECGs.
PD_PLV_abnormal.mat	MATLAB	16.4	It holds pre-computed causality matrices of Parkinson's disease patients.
PD_PLV_normal.mat	MATLAB	16.4	It holds pre-computed causality matrices of healthy patients.
case0001_dat.mat	MATLAB	16.4	It holds 352 channels body-surface ECGs recorded at 120 anatomical locations [14][15].
GaCo10_01.txt	Text	16.4	It holds 16-channel gait measures of patients with Parkinson's disease [14][16].
GaPt20_01.txt	Text	16.4	It holds 16-channel gait measures of healthy patients [14][16].
EEG_data.mat	MATLAB	16.5	It holds epileptic and normal EEG signals sampled at 200 Hz [17].
eyeblink-256.mat	MATLAB	16.5	It holds multi-channel EEG signals corrupted with EOG artifacts [18].
EEG_bonn.mat	MATLAB	16.5	It holds subsets of epileptic and normal EEG signals from a larger database [19].
matlab.mat	MATLAB	16.6	It holds 6 different data files comprised of, a newborn HR signal with its short extracted segment, the LF component, the HR mean value, the base line of the LF power, and the time at which the elevated LF power reduces to the baseline level.

(*) The name of this signal is reused for a different signal utilized somewhere else in the SM.

Data Used from the TFSAP toolbox (**)			
Data File/Folder	**Type**	**Chapter(s)**	**Description**
bat1	MATLAB	5.3, 6.6, 10.3, 10.6, 14.5, 17	It holds bat echolocation signal that is sampled at 142 KHz [20].
eeg1	MATLAB	12.5, 17	It holds a healthy EEG pattern that is sampled at 50 Hz [20].
hrv1	MATLAB	17	It holds an HRV signal sampled at 2 Hz [20].
hrv2	MATLAB	12.2, 17	It holds a second HRV signal that is sampled at 2 Hz [20].
hrv-spm2013	MATLAB	6.6, 17	It holds a second HRV signal that is sampled at 4 Hz [20].
newborn-eeg-background-spm2013	MATLAB	6.6	It holds healthy newborn EEG patterns that are sampled at 256 Hz [20].
newborn-eeg-seizure-spm2013	MATLAB	6.6, 11.4	It holds abnormal newborn EEG patterns that are sampled at 256 Hz [20].
signal1	MATLAB	11.5, 17	It holds an arbitrary test signal that is sampled at 1 Hz [20].
speechSignal	MATLAB	14.7, 17	It holds a speech signal that is sampled at 8000 Hz [20].
whale1	MATLAB	4.6, 7.4, 17	It holds a whale signal sampled at 8000 Hz [20].
bird	MATLAB	6.6, 17	It holds a bird song sampled at 24417 Hz [20].

(**) These are demo signals provided by the TFSAP toolbox and utilized in multiple sections of the book [20].

Data Sources and References:

[1] Original Risso' Dolphin clicks and whistles can be downloaded from: http://neptune.atlantis-intl.com/dolphins/sounds.html.

[2] This signal was utilized in the Multi-Sensor Time-Frequency Signal Processing (MTFSP) toolbox that can be downloaded from: https://github.com/Prof-Boualem-Boashash/MTFSP_Software_package.

[3] B. Boashash, A. Aissa-El-Bey, "*Multisensor Time-Frequency Signal Processing: A tutorial review with illustrations in selected application areas*", Digital Signal Processing, In Press (2017).

[4] B. Boashash, A. Aissa-El-Bey, M. F. Al-Sa'd, "*Multisensor time-frequency signal processing software Matlab package: An analysis tool for multichannel non-stationary data*", SoftwareX, In Press (2017).

[5] Original full length soundtracks can be obtained from: http://www.wavsource.com.

[6] The original lecture PowerPoint slides can be downloaded from: http://web.cecs.pdx.edu/~mperkows/CLASS_573/573_2007/Marple_afosr05.ppt.

[7] Dolphin communications from Sarasota Dolphin Research Program (SDRP) can be downloaded from: http://www.sarasotadolphin.org/intro-to-dolphin-conservation/dolphin-life/communication-acoustics/dolphin-sounds/.

[8] The Adaptive Optimal Kernel (AOK) toolbox can be downloaded from: https://www.mathworks.com/matlabcentral/fileexchange/13869-adaptive-optimal-kernel

[9] The Sparse Reconstruction by Separable Approximation (SRSA) toolbox can be downloaded from: http://www.lx.it.pt/~mtf/SpaRSA/

[10] Power disturbance data were utilized in: A. R. B. Abdullah, A. Z. B. Sha'ameri and A. B. Jidin, "*Classification of power quality signals using smooth-windowed Wigner-Ville distribution*," 2010 International Conference on Electrical Machines and Systems, Incheon, 2010, pp. 1981-1985. http://ieeexplore.ieee.org/document/5664039/

[11] B. Boashash, S. Ouelha, "*Designing high-resolution time-frequency and time-scale distributions for the analysis and classification of non-stationary signals: a tutorial review with features performance comparison*", Digital Signal Processing, 2017.

[12] B. Boashash, S. Ouelha, "*Efficient Software Platform TFSAP 7.1 and Matlab Package to compute Time-Frequency Distributions and related Time-Scale methods with extraction of signal characteristics*", SoftwareX, In Press (2017).

[13] The Non-Negative Matrix Factorization (NMF) MATLAB toolbox can be downloaded from: https://sites.google.com/site/nmftool/home.

[14] Body surface ECG and gait measurements original and full databases can be downloaded from: https://physionet.org/physiobank/database/.

[15] Frenkel-Toledo, S., Giladi, N., Peretz, C., Herman, T., Gruendlinger, L. & Hausdorff, J. M., "*Effect of gait speed on gait rhythmicity in Parkinson's disease: variability of stride time and swing time respond differently*", Journal of NeuroEngineering and Rehabilitation (2005). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1188069/.

[16] Fady Dawoud, Galen S. Wagner, George Moody, B. Milan Horáček, "*Using inverse electrocardiography to image myocardial infarction—reflecting on the 2007 PhysioNet/Computers in Cardiology Challenge*", Journal of Electrocardiology, (2008). http://www.sciencedirect.com/science/article/pii/S0022073608002720?via%3Dihub.

[17] The original EEG data (normal and epileptic) can be downloaded from: http://eeganalysis.web.auth.gr/dataen.htm#EpilepticEEG.

[18] The multi-channel EEG signals contaminated with EOG artifacts can be downloaded from: http://www.commsp.ee.ic.ac.uk/~mandic/research/memd/MEMD_Supplement.zip.

[19] The complete EEG database (normal and epileptic) can be obtained from: http://epileptologie-bonn.de/cms/front_content.php?idcat=193&lang=3.

[20] This signal is part of the TFSAP toolbox that can be downloaded from: http://booksite.elsevier.com/9780123984999/toolbox.php.

https://github.com/Prof-Boualem-Boashash/TFSAP-7.1-software-package.