Assignment 9

1. Generate 10 random signals (S) and filter them in the range of [10–20] Hz using a bandpass filter. Create a symmetric mixing matrix (A) with random values using np.random.rand() and mix the signals. Apply ICA to the signal mixture. Visualize the original mixing matrix (A) and the mixing matrix estimated by ICA (np.linalg.pinv(W)) using plt.imshow() function.

2. Generate 10 random signals (S) and filter them in the range of [10–20] Hz using a bandpass filter. Create a symmetric mixing matrix (A) with random values using np.random.rand() and mix the signals. Apply ICA with dimensionality reduction to 5 strongest components (i.e., do eigen-decomposition –> remove 5 components with smallest variance –> do whitening –> do ICA; see, “codes/L10_pca_dim_reduction.py”, “codes/L10_pca_whitening.py”, “codes/L10_fpica_2_sources.py”). Plot the original signals (S) and time series of the independent components.

3. Write a report about the tasks (4 pages max) including figures.

Save the report to a file (A09_your_surname.pdf) and upload it together with your Python script (A09_your_surname.py) to the assignment webpage. The *.pdf and *.py files can be zipped and uploaded as a single zip file (A09_your_surname.zip).