Exercise 1: Gaussian conditioning computed with covariance or precision matrices

• Modify demo_Gaussian_conditioning01.m so that it can be used with a problem of higher dimension. You can select your own dataset, or generate random datapoints of any desired dimensions.

• Implement a version of the program computing the conditional distribution by using precision matrices instead of covariance matrices.

• Test the computation speed for different types of problems, with inputs and outputs of different dimensions. What do you observe?

Exercise 2: Differences between product of Gaussians, weighted sum of Gaussians and Gaussian approximation of a GMM

The script demo_Gaussian_product01.m displays the Gaussian that results from the computation of a product of three Gaussians.

• Modify the script so that it also displays the Gaussian resulting from a weighted sum of Gaussians (with equal weights summing to one), and an approximation of a GMM with a single Gaussian by exploiting the law of total mean and total covariance. What do you observe?

Exercise 3: Locally weighted regression Vs Gaussian mixture regression

• Modify demo_LWR01.m and demo_GMR_polyFit01.m so that it loads the dataset contained in data/1.mat, corresponding to 2D movement recordings to draw the digit “1”.

• Set the parameters nbStates=2 and nbVarIn=1 in demo_LWR01.m and demo_GMR_polyFit01.m.

• Run the two examples and observe the results. What do you observe?

Exercise 4: What is the difference between demo_DMP01.m and demo_DMP_GMR01.m?