

# Lab 08

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**Task 1** For the 8<sup>th</sup> homework we had to determine parameters based on recursive bayesian estimation. For this task I have followed the guide in order with the following tasks:

1. I have choosen suitable values for the parameters, them being 0 and -1 respectively as written in the lab guide. Also, for  $y(1)$  and  $y(2)$  I chose to put zero values.
2. I have created a grid for candidates named Theta1 and Theta2.
3. For calculating prior probability for each candidates, I have used the built-in function `mvnpdf()`. For confidence in the chosen initial values I have chosen 0.5 for each.
4. I have iterated over the data series and stored each likelihood in the variable `p_y_Dk_prev`, than I calculated aprior probability than normalized it. For `p_y_Dk_prev` I have used the formula mentioned in the seminar:

$$a. p(y(k)|D^{k-1}, \theta) = c \cdot e^{-\left(\frac{(y(k) - \theta_1 \cdot y(k-1) - \theta_2 \cdot y(k-2))^2}{2 \cdot \sigma^2}\right)}$$

- b. I have chosen  $c$  to be 1.
5. In this aprt I had to plot the obtained 2D posterior probability values over your candidate  $\theta$  meshgrid. The result of this plot can be seen on *Figure 1*.

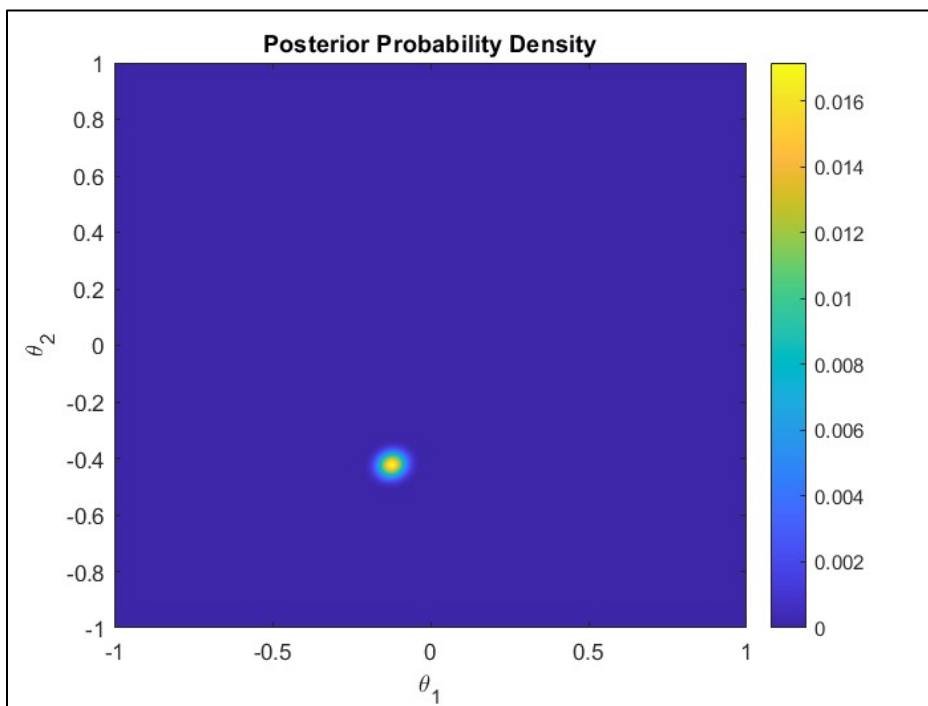


Figure 1 Posterior Probability Density 2D plot.

6. For the estimated parameter values, meaning the candidate thetas with highest probabilities were for example: -0.12 and -0.45. However when I have increased N, the data series's size for example to 5000 the estimations became more precise (-0.13 and -0.42)