April29

April 30, 2020

1 April 29

1.1 Review April 16:

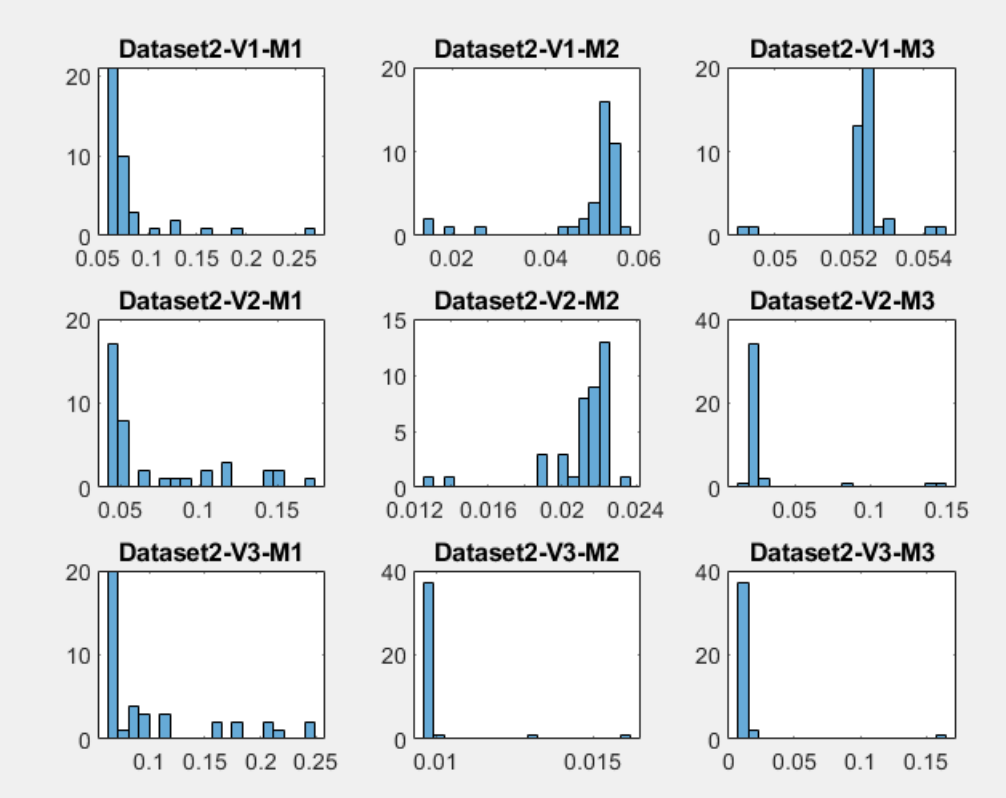
Task:

1. add dataset 5
2. plot loss plot for each fit

Conlcusion:

1. don't need the dataset5
2. Due to the problem of the loss plot, we cannot be confidence with our fit because the algorithm is not likely good at finding the global minima during this fitting. It could be possible that we miss some other minima.

Problem: When we plot the loss (MSE) of the fit, the lowest loss is not always the mode. For exmaple:



Purposed Solution:

1. Parameter recovery: to check if our paramter reach the local minima
2. Muilti-optimizer: use the idea of ensemble study to find the minima.

1.2 What I did

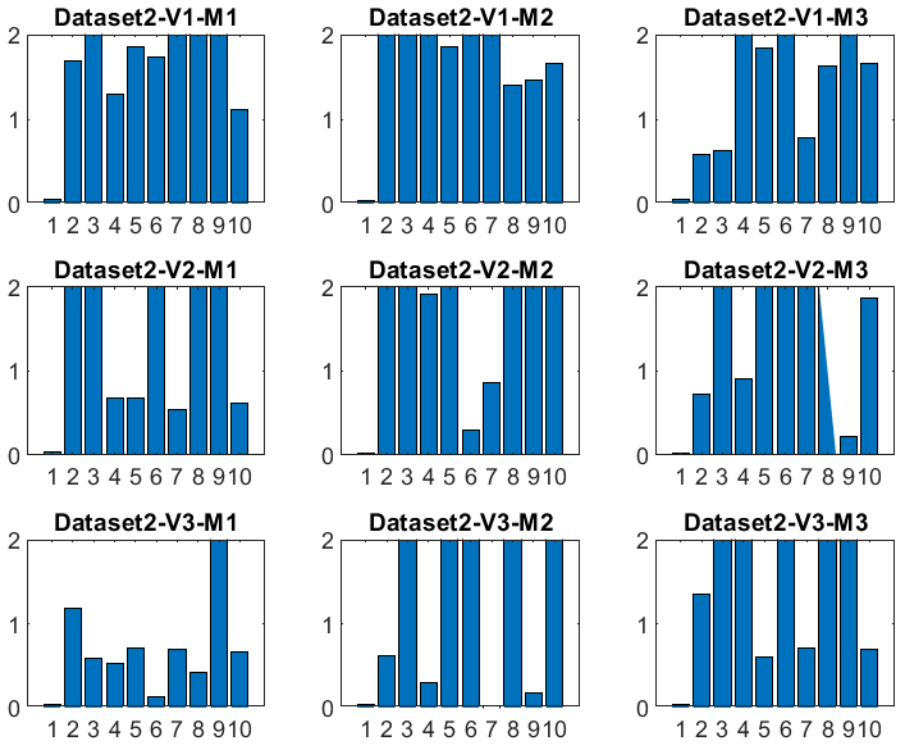
1.2.1 What I think is: Paramter Recovery

I guess, this paramter recovery comes from the no-free-lunch rule. There is no best model for all the situation, the "best" is condition on the circumstance. Here, the assumption is:

The set of paramter we obtain by fitting the data shouldn't have a better fit on the other similar dataset.

What I do:

- Generate some "fake data" using some predefined paramters: random from the bound
- Obtain the BOLD_prediction using what we think is the optimal paramter: paramter*
- Calculate the MSE and R^2 between the prediction (BOLD_prediction with paramter*) and the target BOLD_data (fMRI data and fake data)
- Plot and hope the MSE of (prediction, fMRI data) pair is the lowest, and R^2 the highest.



What I conclude:

It is true, our optimizer does not reach the global minima.

1.2.2 Multi-optimizer?

- bads
- fmincon (even worse than bads)
- ??? any other tool: can we use SGD algorithm?

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