

MaxSelectorModel

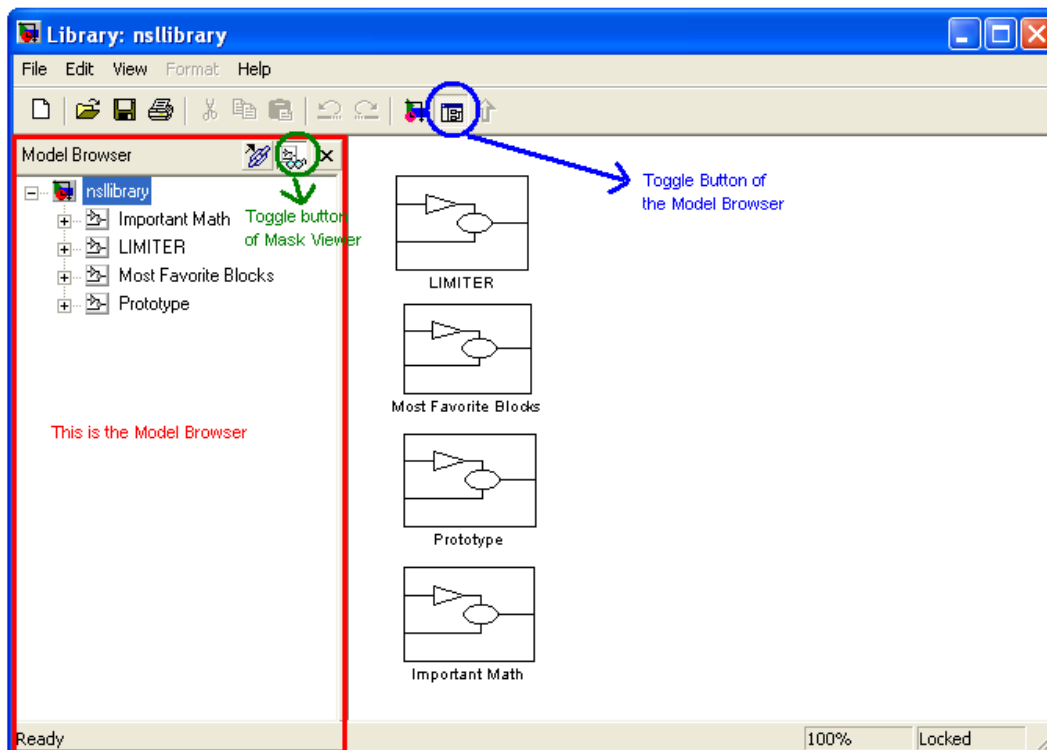
Cheol Han

University of Southern California

A supplement to Prof. Arbib's CS 564, Brain Theory and Artificial Intelligence

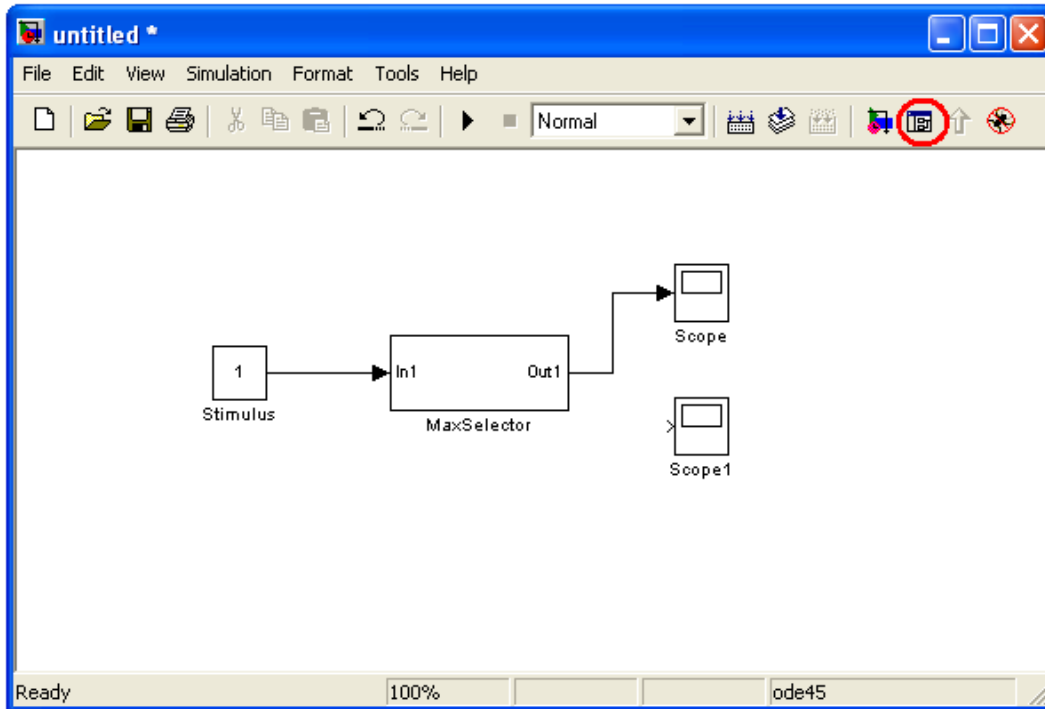
University of Southern California, Fall 2005.

This tutorial is to make a simple neural model: MaxSelectorModel using NSL-Library. To do this, we should know the "Model Browser." Let me start with open the NSL-library first. Click [File->Open], then find and open NSL-Library. You can meet the below window. As using this model browser, you don't have to be irritated with too many windows about MatLab diagram. This tree-like browsing system represents also the hierachical structure of our Nsl-Library; in case of a model, it shows the overall structure of a model, of course. Another important concept is "mask." Because the inner-side of module may be complex and it is not so important for everyone to understand the inner-side, we hide the complicated part. That's the mask. Of course, you can explorer inside as clicking "Toggle button of Mask Viewer." As you can see, our library includes two major sections to make user easy to construct a new model.



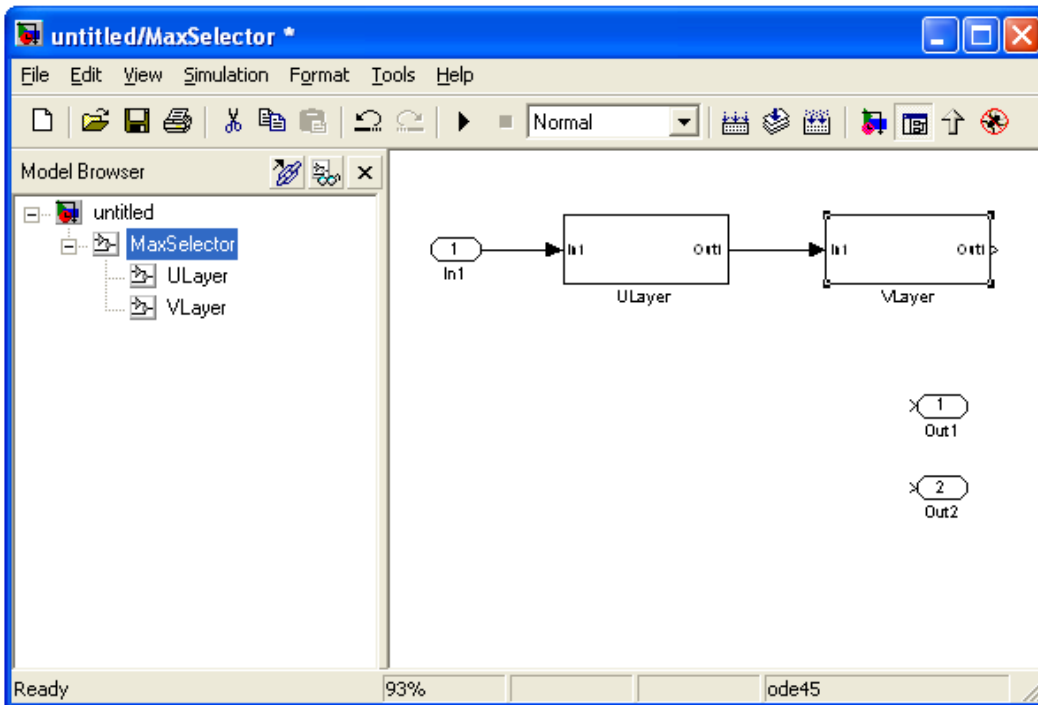
Let's start to make a MaxSelectorModel. First, we need a new blank canvas(File-

>New->model). Then, fetch below items from Nsl-library. For convenience, most frequently-used basic block is also available in our library; you can close the simulink library browser. The blocks we need are [Most Favorite Block->Constant], 2 X [Most Favorite Block->Scope], and [Prototype->Non-leaf Block]. You can change the name of each block as just clicking the name. Then, connect them like below. Don't worry about the # of ports in this time; while making lower level modules, # of port will be matched naturally.

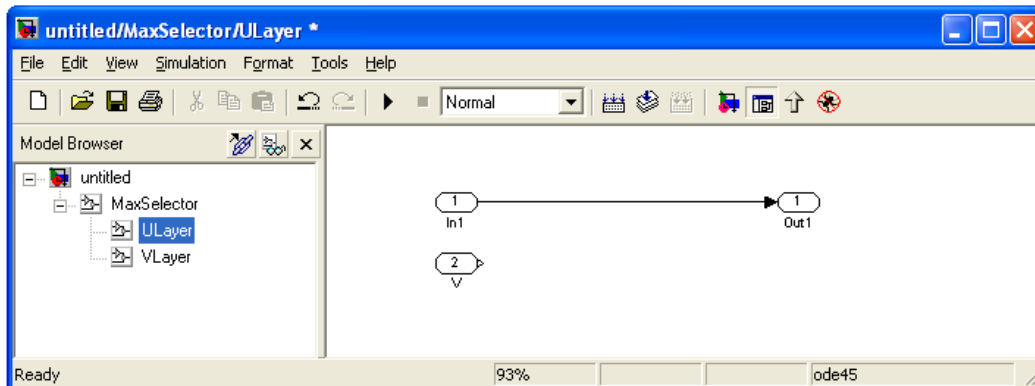


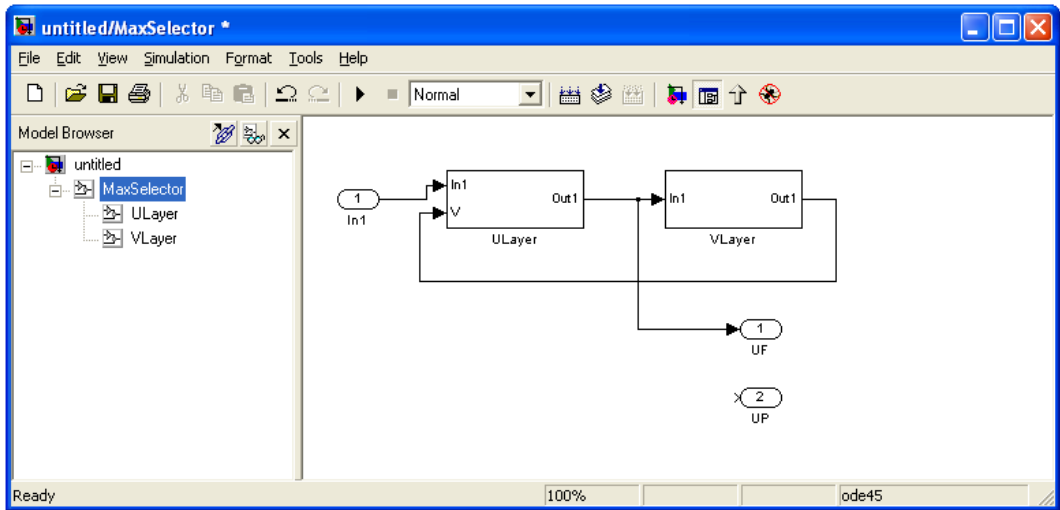
The next step is filling in MaxSelector. So, open the model browser. Hm? We cannot see inside of MaxSelector even though toggling mask? That's not strange. That's because the block fetched from library is locked not to modify for safety. As you know, we are experts. Let's unlock this. Click MaxSelector with the right mouse button, then [link option->disable link]. So, model browser shows MaxSelector and you can modify it.

Inside of MaxSelector, there is only one line between in1 to out1. As the lecture notes said, there should be two layers: U-layer and V-Layer. Thus, delete that boring line and add 2 X [prototype->leaf submodule] as shown below. We are going to watch up besides uf. Thus, add one [Favorite Block->outport]. Connect them and rename like below. Using the same way, click "disable link" for both ulayer and vlayer. Compare yours with below.

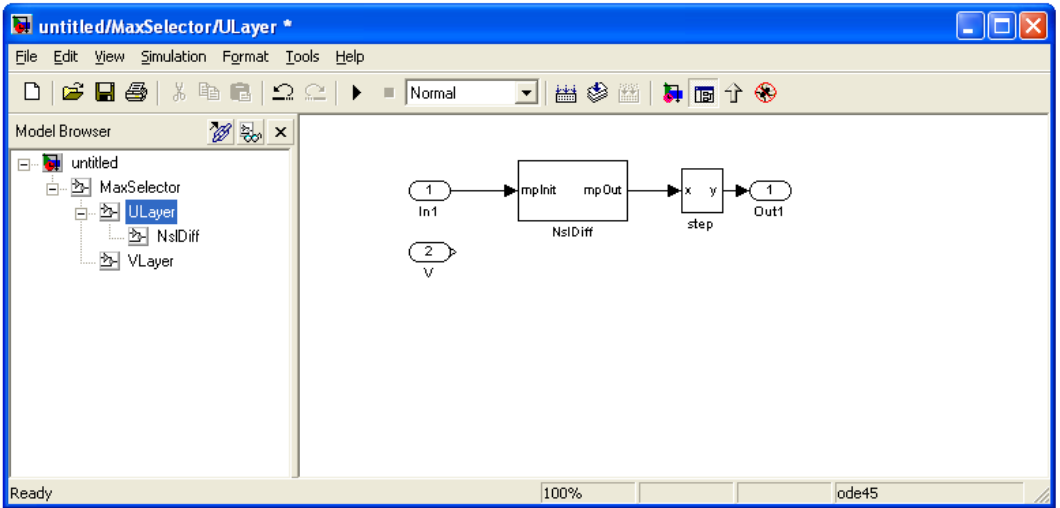


In our imagination, the output of VLayer should be feed to ULayer; however there's just one in-port. Select ULayer in the model browser. Then add one [Favorite Block->in=port]. Being back to MaxSelector, Ulayer has two in-port. Connect it.



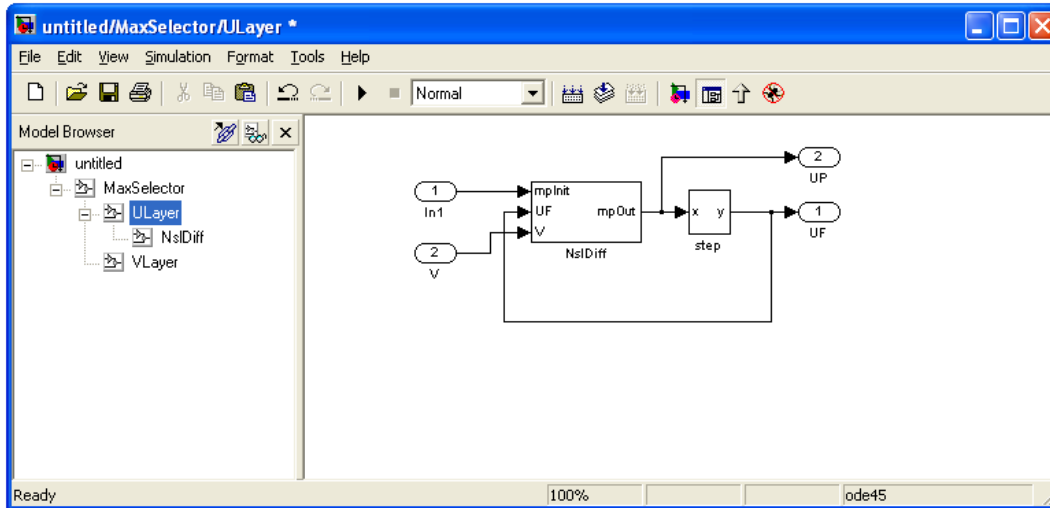
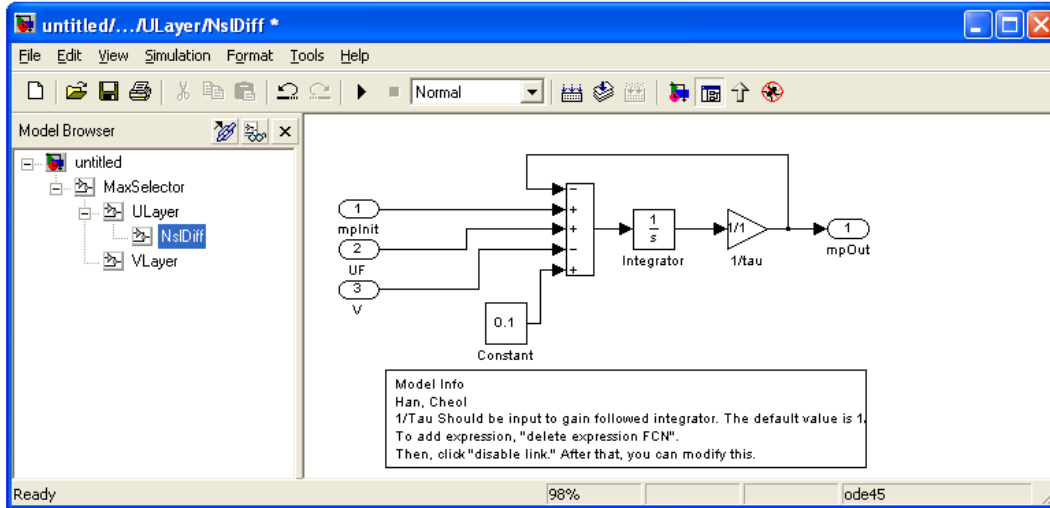


The next step is important part; adding computational part. As click ULayer in the model browser, activate the Ulayer's canvas. Surely, delete that plain line and add two things: [Limiter->Step] and [Most Important math->NsIDiff]. Disable the link of NsIDiff to modify it. You don't have to do so for limiters. Then, modify inside of NsIDiff same with the given equation. Currently, I ignored weights for Uf and V. Add items as shown below and connect them.

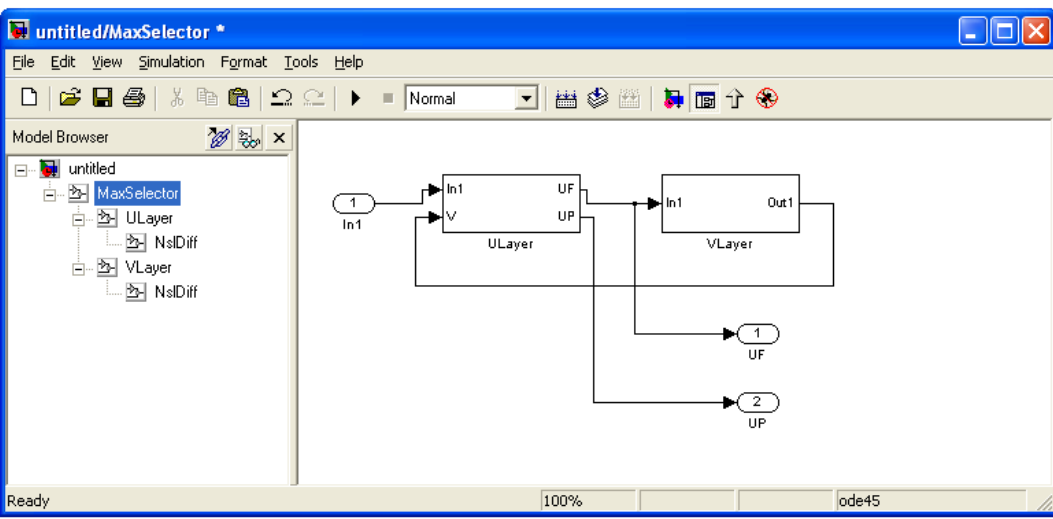
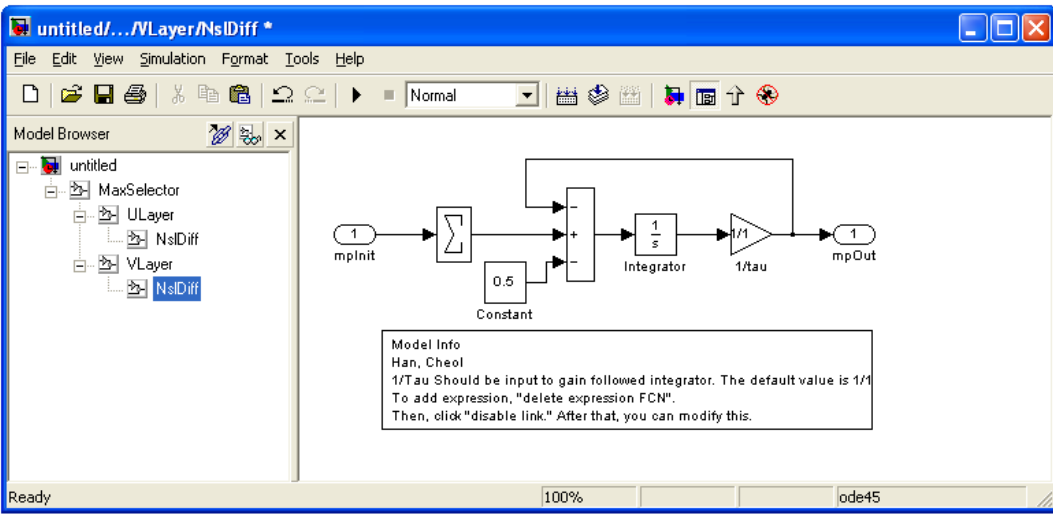
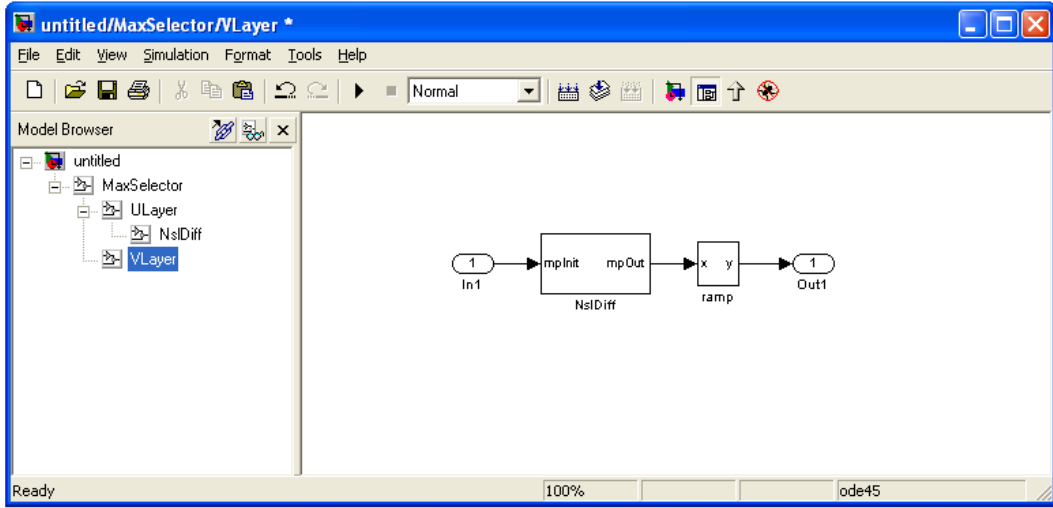


One tricky thing is modify the size of "sum" block. As typing the signs within parameter window of "sum" block, the size varied as have mentioned before. If you are not sure, just test some. I think this is time to let you have time to exercise it.

If you module is almost same with mine, all right. You've done! It's time to implement Vlayer which is simpler than Ulayer.

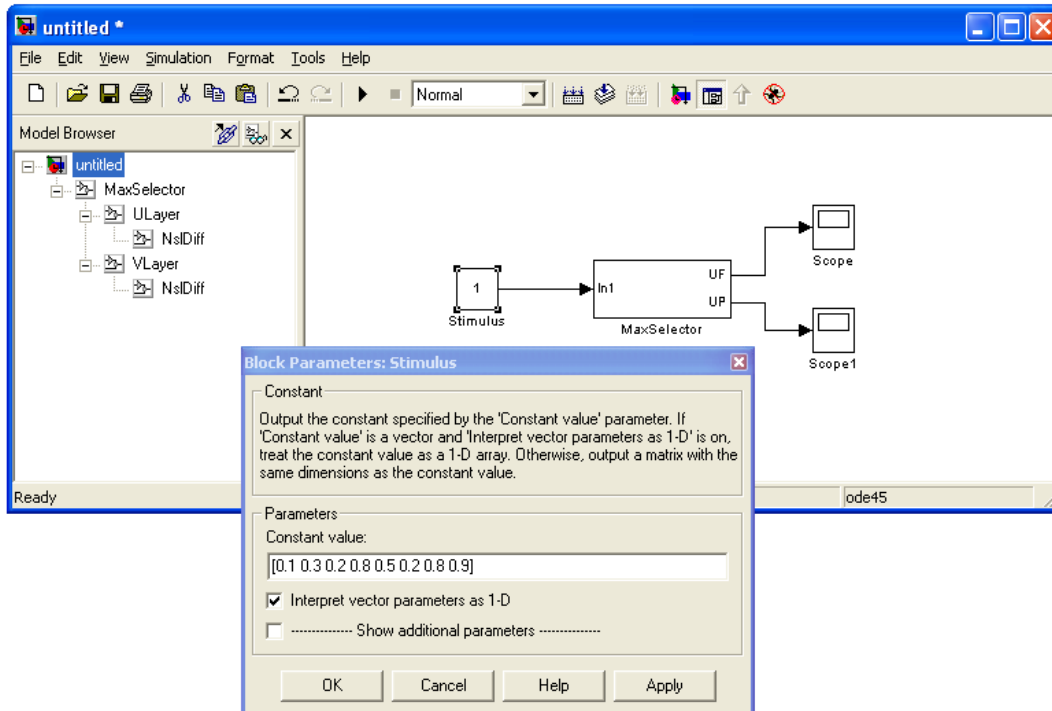


The same process is recommended to initialize the Vlayer canvas. I believe you are enough good at drawing a diagram with Simulink. So, my implementation is provided.



You've finished constructing MaxSelectorModel. Save it to anywhere.

Before starting simulation of MaxSelector, two things left. The one is to set the stimulus. Click the stimulus of the root and set the value as you wish with a vector form, as an example, [0.1 0.3 0.2 0.8 0.5 0.2 0.8 0.9]. Another thing is typing "NslInit" in command window. As we introduced previous, This is required to do so in order to enable NSL system.



Let's simulate the model. Click the simulation start and double-click each scope. Here's my result.

