

COMO UTILIZAR UMA RNA EM SIMULINK

Este exemplo baseia-se no exemplo de aproximar uma função “seno” utilizando RNA

1. Executar o mfile “principalSeno.m”, que gerará a RNA “net”.
2. Em linhas de comando de MATLAB utilizar o comando “gensim” que é uma função de MATLAB usada para gerar blocos de simulink baseada na “net” que foi criada.
3. Esta função aceita como parâmetro de entrada a taxa de amostragem, a qual pode ser utilizada em sistemas discretos.

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gensim

R2018a

< Neural Network Toolbox ⓘ

Generate Simulink block for neural network simulation

< Time Series and Control Systems

Syntax

< Time Series and Dynamic Systems

```
gensim(net,st)
```

< Modeling and Prediction with NARX and Time-Delay Networks

To Get Help

< Neural Network Toolbox

Type `help network/gensim`.

< Time Series and Control Systems

Description

< Time Series and Dynamic Systems

`gensim(net,st)` creates a Simulink® system containing a block that simulates neural network `net`.

< Creating Simulink Models

`gensim(net,st)` takes these inputs:

< Neural Network Toolbox

net	Neural network
st	Sample time (default = 1)

< Functions

gensim

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To Get Help

Description

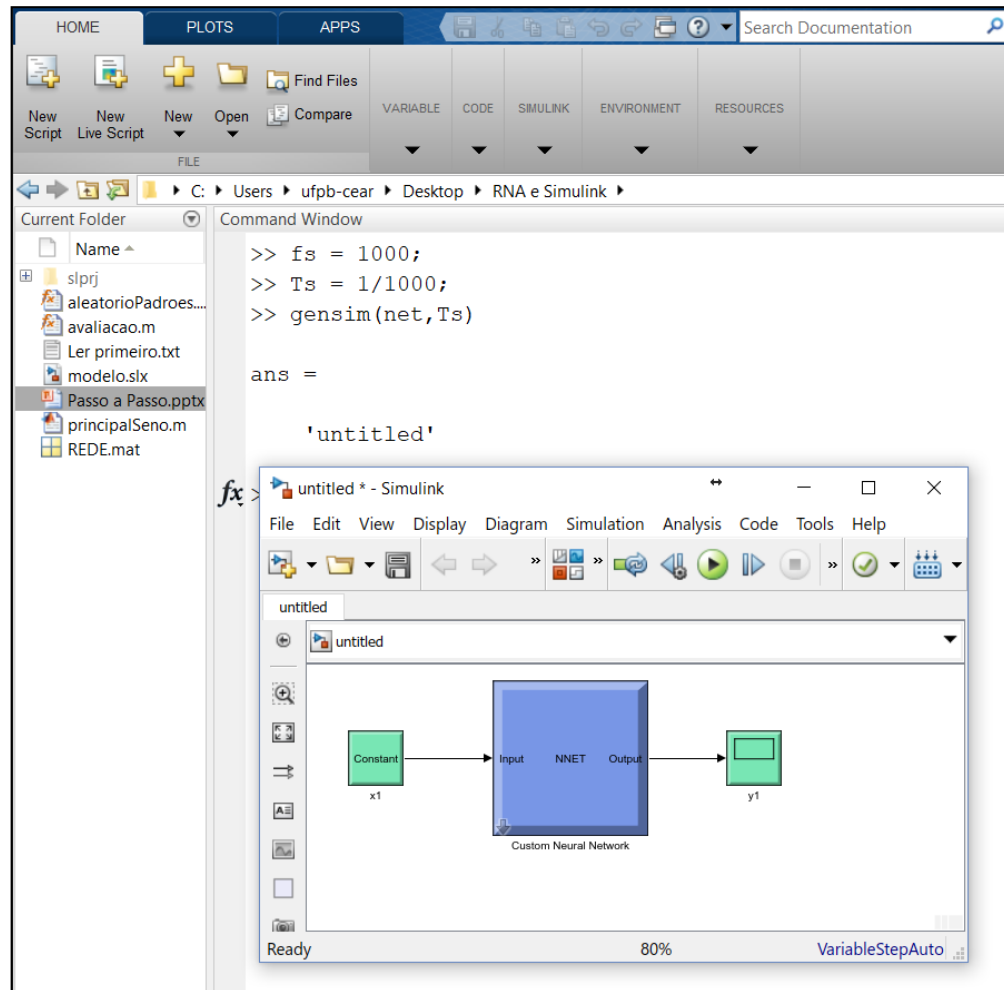
Examples

and creates a Simulink system containing a block that simulates neural network `net` with a sampling time of `st`.

If `net` has no input or layer delays (`net.numInputDelays` and `net.numLayerDelays` are both 0), you can use `-1` for `st` to get a network that samples continuously.

Examples

1. Criar uma RNA
2. Salvar a rede, por exemplo aqui foi chamada de “net”
3. Usar o comando “gensim” para gerar o bloco em simulink
4. Usar o modelo como se fosse uma função de transferência para realizar o mapeamento Entrada/Saída



The screenshot displays the MATLAB environment. The Command Window shows the following code and output:

```
>> fs = 1000;  
>> Ts = 1/1000;  
>> gensim(net,Ts)  
  
ans =  
  
'untitled'
```

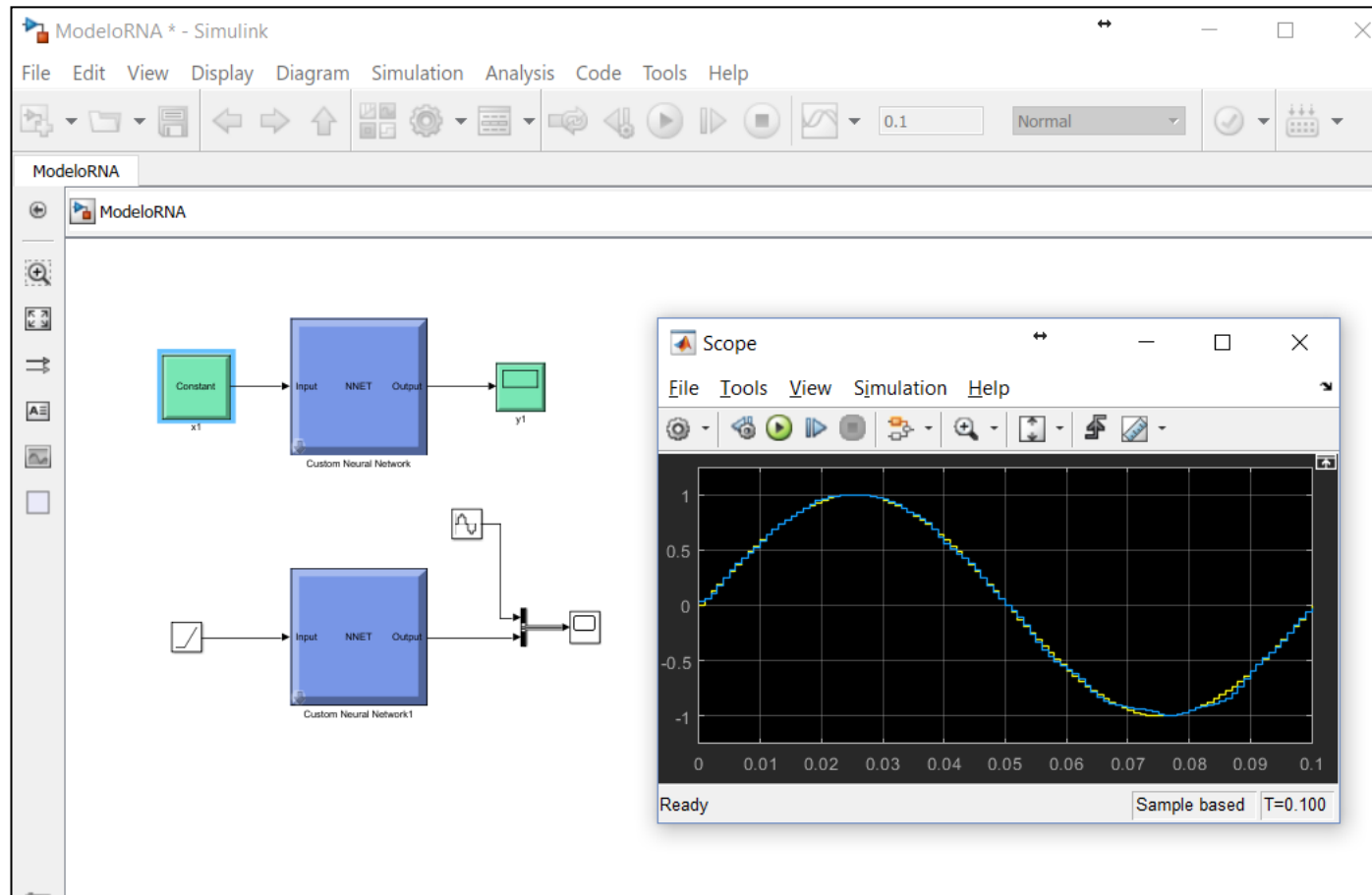
The Simulink model window, titled 'untitled * - Simulink', shows a block diagram with the following components:

- A green 'Constant' block labeled 'x1' on the left.
- A blue 'Custom Neural Network' block with 'Input' and 'Output' ports.
- A green 'Scope' block labeled 'y1' on the right.

The signal flow is from 'x1' to the 'Custom Neural Network' block, and then from the 'Output' port of the neural network to the 'Scope' block 'y1'. The status bar at the bottom indicates 'Ready', '80%', and 'VariableStepAuto'.

Uso da “net” utilizando Simulink.

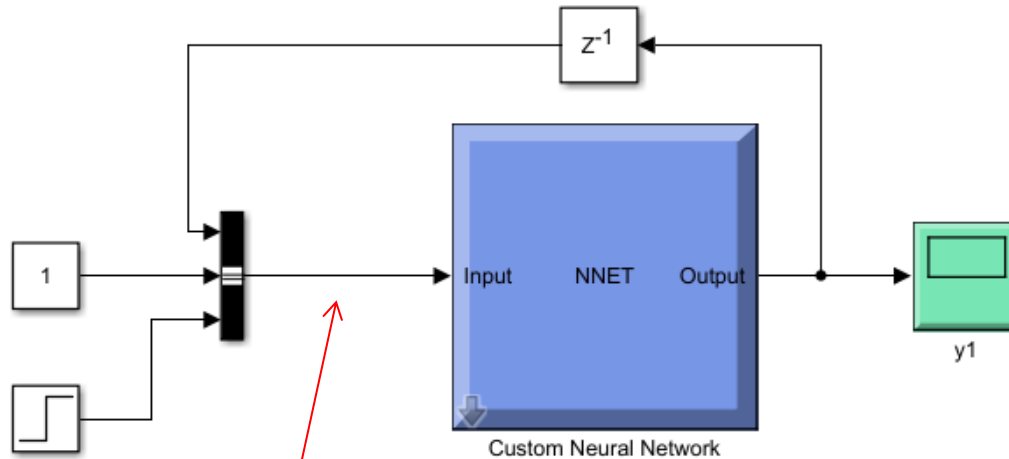
- Foi colocado na entrada uma rampa simulando a variação do tempo
- Na saída da RNA espera-se a a avaliação da onda “seno”
- Foi realizada uma comparação da RNA com um gerador de ondas discreto



Sistemas MIMO

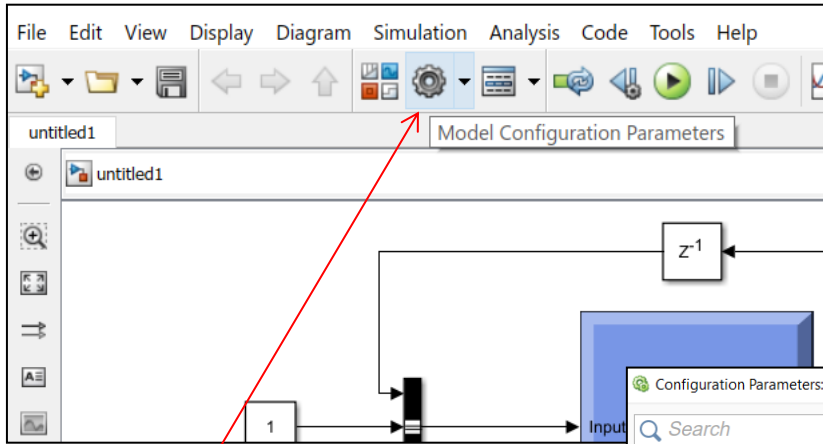
RNA com várias Entradas

- Considere um sistema com frequência de amostragem de 10 amostras/s, isto é, taxa de amostragem de 0.1 s
- O sistema têm 3 entradas e 1 saída
- A saída é realimentada usando um atraso unitário



A entrada é um barramento de dados

Configurações Complementares



Passo Fixo e Tempo de Amostragem

Configuração de Parâmetros

The screenshot shows the 'Configuration Parameters: untitled1/Configuration (Active)' dialog box. The 'Solver' section is expanded, showing 'Fixed-step' selected. The 'Fixed-step size (fundamental sample time)' is set to 0.1. A red arrow points to the 'Fixed-step size' field. The 'Tasking and sample time options' section is also visible, with 'Periodic sample time constraint' set to 'Unconstrained'. The 'OK', 'Cancel', 'Help', and 'Apply' buttons are at the bottom.

Configuration Parameters: untitled1/Configuration (Active)

Search

Solver

Data Import/Export

Math and Data Types

Diagnosics

Hardware Implementation

Model Referencing

Simulation Target

Code Generation

Coverage

HDL Code Generation

Simulation time

Start time: 0.0 Stop time: 10.0

Solver selection

Type: Fixed-step Solver: auto (Automatic solver selection)

Solver details

Fixed-step size (fundamental sample time): 0.1

Tasking and sample time options

Periodic sample time constraint: Unconstrained

Treat each discrete rate as a separate task

Allow tasks to execute concurrently on target

Automatically handle rate transition for data transfer

Higher priority value indicates higher task priority

OK Cancel Help Apply

Configurações Complementares

The image shows a Simulink workspace with a block diagram on the left and a 'Block Parameters: Delay' dialog box on the right. The block diagram includes a 'Custom Neural Network' block, a 'z⁻¹' delay block, and a summing junction. A red arrow points from the 'z⁻¹' block to the dialog box. The dialog box has the following settings:

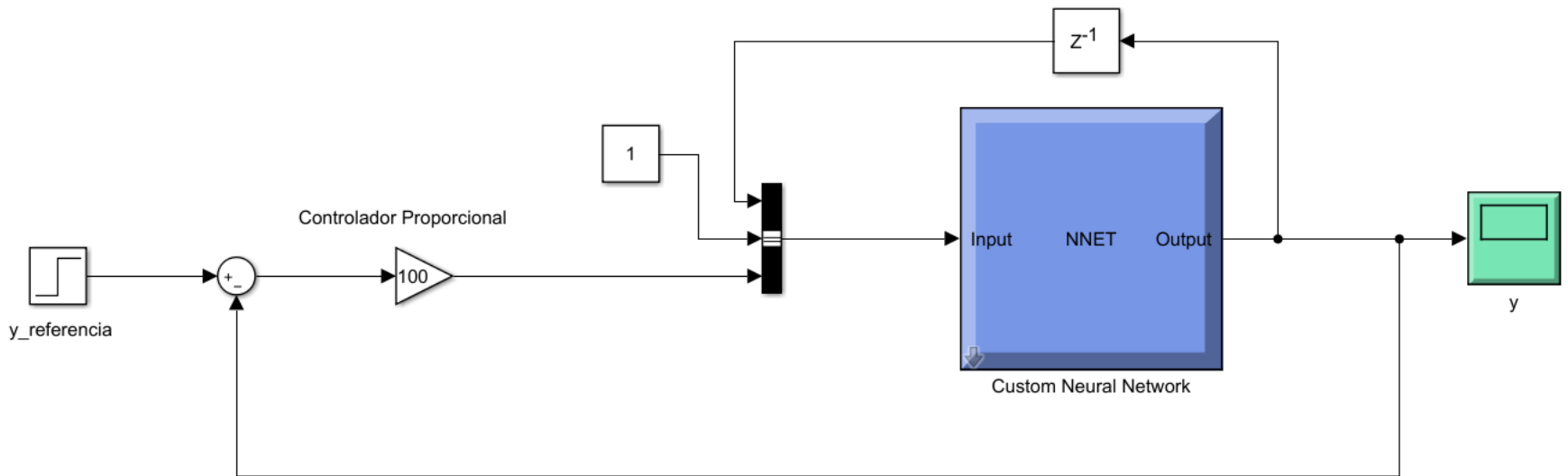
- Delay length: Dialog, Value: 1, Upper Limit: (empty)
- Initial condition: Dialog, Value: 0.0, Upper Limit: (empty)
- Algorithm: Input processing: Elements as channels (sample based)
- Control: External reset: None
- Sample time (-1 for inherited): 0.1

Buttons at the bottom of the dialog: OK, Cancel, Help, Apply.

(* *Todos os elementos discretos devem ser configurados com a mesma taxa de amostragem*)

Estratégias de Controle

Control Proporcional



Control PID

