Contents

initnw

Nguyen-Widrow layer initialization function

Syntax

```
net = initnw(net,i)
```

Description

`initnw` is a layer initialization function that initializes a layer's weights and biases according to the Nguyen-Widrow initialization algorithm. This algorithm chooses values in order to distribute the active region of each neuron in the layer approximately evenly across the layer's input space. The values contain a degree of randomness, so they are not the same each time this function is called.

`initnw` requires that the layer it initializes have a transfer function with a finite active input range. This includes transfer functions such as `tansig` and `satlin`, but not `purelin`, whose active input range is the infinite interval `[-inf, inf]`. Transfer functions, such as `tansig`, will return their active input range as follows:

```
activeInputRange = tansig('active')
activeInputRange =
    -2     2
```

`net = initnw(net,i)` takes two arguments,

`net`	Neural network
`i`	Index of a layer

and returns the network with layer `i`'s weights and biases updated.

There is a random element to Nguyen-Widrow initialization. Unless the default random generator is set to the same seed before each call to `initnw`, it will generate different weight and bias values each time.

Network Use

You can create a standard network that uses `initnw` by calling `feedforwardnet` or `cascadeforwardnet`.

To prepare a custom network to be initialized with `initnw`,

1. Set `net.initFcn` to `'initlay'`. This sets `net.initParam` to the empty matrix `[]`, because `initlay` has no initialization parameters.
2. Set `net.layers{i}.initFcn` to `'initnw'`.

To initialize the network, call `init`.

More About

Algorithms

The Nguyen-Widrow method generates initial weight and bias values for a layer so that the active regions of the layer's neurons are distributed approximately evenly over the input space.

Advantages over purely random weights and biases are

- Few neurons are wasted (because all the neurons are in the input space).
- Training works faster (because each area of the input space has neurons). The Nguyen-Widrow method can only be applied to layers
  - With a bias
  - With weights whose `weightFcn` is `dotprod`
  - With `netInputFcn` set to `netsum`
  - With `transferFcn` whose active region is finite

If these conditions are not met, then `initnw` uses `rands` to initialize the layer's weights and biases.

See Also

cascadeforwardnet | feedforwardnet | init | initlay | initwb

Was this topic helpful? Yes No