**HopfieldAssiggnment -CSC831**

**Namespaces**

HopfieldAssiggnmentCSC831

**HopfieldAssiggnmentCSC831 Namespace**

**Classes**

EnergyEventArgs

, NeuralNetwork

, Neuron

, NeuronStates

**EnergyEventArgs Class**

Provides data for the *EnergyChanged* event

[System.Object](http://msdn.microsoft.com/en-us/library/system.object.aspx)

[System.EventArgs](http://msdn.microsoft.com/en-us/library/system.eventargs.aspx)

**HopfieldAssiggnmentCSC831.EnergyEventArgs**

|  |  |
| --- | --- |
| **C#** |  |
| public class EnergyEventArgs : [EventArgs](http://msdn.microsoft.com/en-us/library/system.eventargs.aspx) | |

**Requirements**

**Namespace:**HopfieldAssiggnmentCSC831

**Assembly:** HopfieldNeuralNetwork (in HopfieldNeuralNetwork.dll)

**Constructors**

EnergyEventArgs

**Methods**

[Equals](http://msdn.microsoft.com/en-us/library/bsc2ak47.aspx) (inherited from [Object](http://msdn.microsoft.com/en-us/library/system.object.aspx)), [GetHashCode](http://msdn.microsoft.com/en-us/library/system.object.gethashcode.aspx) (inherited from [Object](http://msdn.microsoft.com/en-us/library/system.object.aspx)), [GetType](http://msdn.microsoft.com/en-us/library/system.object.gettype.aspx) (inherited from [Object](http://msdn.microsoft.com/en-us/library/system.object.aspx)), [ToString](http://msdn.microsoft.com/en-us/library/system.object.tostring.aspx) (inherited from [Object](http://msdn.microsoft.com/en-us/library/system.object.aspx))

**Fields**

energy

, neuronIndex

**EnergyEventArgs Constructor**

Initializes a new instance of the *EnergyEventArgs* class with the specified value of Energy

|  |  |
| --- | --- |
| **C#** |  |
| public EnergyEventArgs(  [double](http://msdn.microsoft.com/en-us/library/system.double.aspx) *Energy*,  [int](http://msdn.microsoft.com/en-us/library/system.int32.aspx) *NeuronIndex* ) | |

**Parameters**

*Energy*

|  |
| --- |
| The double that represents the value of neural network energy |

*NeuronIndex*

|  |
| --- |
| The index f neuron caused energy cahnge |

**See Also**

Applies to: EnergyEventArgs

**energy Field**

|  |  |
| --- | --- |
| **C#** |  |
| private [double](http://msdn.microsoft.com/en-us/library/system.double.aspx) energy | |

**See Also**

Applies to: EnergyEventArgs

**neuronIndex Field**

|  |  |
| --- | --- |
| **C#** |  |
| private [int](http://msdn.microsoft.com/en-us/library/system.int32.aspx) neuronIndex | |

**See Also**

Applies to: EnergyEventArgs

**NeuralNetwork Class**

Defines the class for Hopfield Neural Network

[System.Object](http://msdn.microsoft.com/en-us/library/system.object.aspx)

**HopfieldAssiggnmentCSC831.NeuralNetwork**

|  |  |
| --- | --- |
| **C#** |  |
| public class NeuralNetwork | |

**Requirements**

**Namespace:**HopfieldAssiggnmentCSC831

**Assembly:** HopfieldNeuralNetwork (in HopfieldNeuralNetwork.dll)

**Constructors**

NeuralNetwork

**Methods**

AddPattern

, AddRandomPattern

, CalculateEnergy

, [Equals](http://msdn.microsoft.com/en-us/library/bsc2ak47.aspx) (inherited from [Object](http://msdn.microsoft.com/en-us/library/system.object.aspx)), FreeMatrix

, [GetHashCode](http://msdn.microsoft.com/en-us/library/system.object.gethashcode.aspx) (inherited from [Object](http://msdn.microsoft.com/en-us/library/system.object.aspx)), [GetType](http://msdn.microsoft.com/en-us/library/system.object.gettype.aspx) (inherited from [Object](http://msdn.microsoft.com/en-us/library/system.object.aspx)), Run

, [ToString](http://msdn.microsoft.com/en-us/library/system.object.tostring.aspx) (inherited from [Object](http://msdn.microsoft.com/en-us/library/system.object.aspx))

**Fields**

T

, e

, m

, n

, neurons

**See Also**

Neuron

**NeuralNetwork Constructor**

Initializes a new instance of the <seealso cref="NeuralNetwork" /> class

|  |  |
| --- | --- |
| **C#** |  |
| public NeuralNetwork(  [int](http://msdn.microsoft.com/en-us/library/system.int32.aspx) *n* ) | |

**Parameters**

*n*

|  |
| --- |
| Number of neurons |

**See Also**

Applies to: NeuralNetwork

NeuralNetwork

**NeuralNetwork.AddPattern Method**

Adds specified pattern to intercconnection matrix

|  |  |
| --- | --- |
| **C#** |  |
| public [void](http://msdn.microsoft.com/en-us/library/system.void.aspx) AddPattern(  [List](http://msdn.microsoft.com/en-us/library/6sh2ey19.aspx)<Neuron> *Pattern* ) | |

**Parameters**

*Pattern*

|  |
| --- |
| A list of neurons |

**See Also**

Applies to: NeuralNetwork

**NeuralNetwork.AddRandomPattern Method**

Adds a random pattern to interconnection matrix

|  |  |
| --- | --- |
| **C#** |  |
| public [void](http://msdn.microsoft.com/en-us/library/system.void.aspx) AddRandomPattern() | |

**See Also**

Applies to: NeuralNetwork

**NeuralNetwork.CalculateEnergy Method**

|  |  |
| --- | --- |
| **C#** |  |
| private [void](http://msdn.microsoft.com/en-us/library/system.void.aspx) CalculateEnergy() | |

**See Also**

Applies to: NeuralNetwork

**NeuralNetwork.FreeMatrix Method**

Clears values of interconnection matrix.

|  |  |
| --- | --- |
| **C#** |  |
| public [void](http://msdn.microsoft.com/en-us/library/system.void.aspx) FreeMatrix() | |

**See Also**

Applies to: NeuralNetwork

**NeuralNetwork.Run Method**

Sets specified initial state and runs networks dynamics

|  |  |
| --- | --- |
| **C#** |  |
| public [void](http://msdn.microsoft.com/en-us/library/system.void.aspx) Run(  [List](http://msdn.microsoft.com/en-us/library/6sh2ey19.aspx)<Neuron> *initialState* ) | |

**Parameters**

*initialState*

|  |
| --- |
| A list of neurons which determines an initional state |

**See Also**

Applies to: NeuralNetwork

**T Field**

|  |  |
| --- | --- |
| **C#** |  |
| private [int](http://msdn.microsoft.com/en-us/library/system.int32.aspx)[,] T | |

**See Also**

Applies to: NeuralNetwork

**e Field**

|  |  |
| --- | --- |
| **C#** |  |
| private [double](http://msdn.microsoft.com/en-us/library/system.double.aspx) e | |

**See Also**

Applies to: NeuralNetwork

**m Field**

|  |  |
| --- | --- |
| **C#** |  |
| private [int](http://msdn.microsoft.com/en-us/library/system.int32.aspx) m | |

**See Also**

Applies to: NeuralNetwork

**n Field**

|  |  |
| --- | --- |
| **C#** |  |
| private [int](http://msdn.microsoft.com/en-us/library/system.int32.aspx) n | |

**See Also**

Applies to: NeuralNetwork

**neurons Field**

|  |  |
| --- | --- |
| **C#** |  |
| private [List](http://msdn.microsoft.com/en-us/library/6sh2ey19.aspx)<Neuron> neurons | |

**See Also**

Applies to: NeuralNetwork

**Neuron Class**

Defines the base class of neuron.

[System.Object](http://msdn.microsoft.com/en-us/library/system.object.aspx)

**HopfieldAssiggnmentCSC831.Neuron**

|  |  |
| --- | --- |
| **C#** |  |
| public class Neuron | |

**Requirements**

**Namespace:**HopfieldAssiggnmentCSC831

**Assembly:** HopfieldNeuralNetwork (in HopfieldNeuralNetwork.dll)

**Constructors**

Neuron

**Methods**

ChangeState

, [Equals](http://msdn.microsoft.com/en-us/library/bsc2ak47.aspx) (inherited from [Object](http://msdn.microsoft.com/en-us/library/system.object.aspx)), [GetHashCode](http://msdn.microsoft.com/en-us/library/system.object.gethashcode.aspx) (inherited from [Object](http://msdn.microsoft.com/en-us/library/system.object.aspx)), [GetType](http://msdn.microsoft.com/en-us/library/system.object.gettype.aspx) (inherited from [Object](http://msdn.microsoft.com/en-us/library/system.object.aspx)), [ToString](http://msdn.microsoft.com/en-us/library/system.object.tostring.aspx) (inherited from [Object](http://msdn.microsoft.com/en-us/library/system.object.aspx))

**Fields**

state

**Neuron Constructor**

Initializes a new instance Neuron class

|  |  |
| --- | --- |
| **C#** |  |
| public Neuron() | |

**See Also**

Applies to: Neuron

**Neuron.ChangeState Method**

Calculates necessity, and if so, changes state of neuron

|  |  |
| --- | --- |
| **C#** |  |
| public [bool](http://msdn.microsoft.com/en-us/library/system.boolean.aspx) ChangeState(  [double](http://msdn.microsoft.com/en-us/library/system.double.aspx) *field* ) | |

**Parameters**

*field*

|  |
| --- |
| Local field actiong on neuron from all other neurons of network |

**Returns**

True if during calculations neuron chages its state, false otherwise

**See Also**

Applies to: Neuron

**state Field**

|  |  |
| --- | --- |
| **C#** |  |
| private [int](http://msdn.microsoft.com/en-us/library/system.int32.aspx) state | |

**See Also**

Applies to: Neuron

**NeuronStates Class**

Static class, which describes neuron states.

[System.Object](http://msdn.microsoft.com/en-us/library/system.object.aspx)

**HopfieldAssiggnmentCSC831.NeuronStates**

|  |  |
| --- | --- |
| **C#** |  |
| public static class NeuronStates | |

**Requirements**

**Namespace:**HopfieldAssiggnmentCSC831

**Assembly:** HopfieldNeuralNetwork (in HopfieldNeuralNetwork.dll)

**Methods**

[Equals](http://msdn.microsoft.com/en-us/library/bsc2ak47.aspx) (inherited from [Object](http://msdn.microsoft.com/en-us/library/system.object.aspx)), [GetHashCode](http://msdn.microsoft.com/en-us/library/system.object.gethashcode.aspx) (inherited from [Object](http://msdn.microsoft.com/en-us/library/system.object.aspx)), [GetType](http://msdn.microsoft.com/en-us/library/system.object.gettype.aspx) (inherited from [Object](http://msdn.microsoft.com/en-us/library/system.object.aspx)), [ToString](http://msdn.microsoft.com/en-us/library/system.object.tostring.aspx) (inherited from [Object](http://msdn.microsoft.com/en-us/library/system.object.aspx))

**Fields**

AgainstField

, AlongField

**AgainstField Field**

If neuron orienatated against local field, then it's state is equal to -1

|  |  |
| --- | --- |
| **C#** |  |
| public static [int](http://msdn.microsoft.com/en-us/library/system.int32.aspx) AgainstField | |

**See Also**

Applies to: NeuronStates

**AlongField Field**

If neuron orienatated along local field, then it's state is equal to 1

|  |  |
| --- | --- |
| **C#** |  |
| public static [int](http://msdn.microsoft.com/en-us/library/system.int32.aspx) AlongField | |

**See Also**

Applies to: NeuronStates