The Story of IRENE

## The Setup

irene.preprocess(dataset)

This function takes a data frame dataset and scales each element of each column to a number between zero and 1.

irene.library is an object of type list where each element is a learning function available for selection by each node. Learning functions are randomly selected from the library when networks are created.

## The Creature

## The Species

## The Ecosystem

The creature level is the level where the individual model is calculated. The species level is the level at which the parameters of each model are optimized; the best ‘creature’ is the model with the optimal parameters. The Ecosystem in IRENE refers to the level at which the topology of the neural network is optimized.

irene.ecosystem.cycle(dna) – is a function with one input dna which is a vector of length 2. The first element is a number between 0 and 1 that dictates the probability of cross over in the genetic algorithm optimizing the species (network structure); the second element dictates the probability of mutation.

The function uses a genetic algorithm to optimize the function irene.species.cycle . Elitism, population size, maximum iterations, and parallel processing switch, as well as the species level controls are all called from irene.Controls.

The parameters the genetic algorithm seeks to optimize is a vector with the following structure:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *k* | *n1* | … | *nk* | c1-1 | … | c1-n1 | c2-1 | … | ck-nk |

*k-* Layer

*n1* - nodes in the first layer

*nk* – nodes in the *kth* layer

*c1-1* – ‘Call number’ (the index number of the corresponding learning function in the irene.library) of the first node in the first layer.

*c1-n1* – ‘Call number’ of the last node in the first layer.

*c1-2* - ‘Call number’ of the first node of the second layer.

*ck-nk* – ‘Call number’ of the last node of the last layer.

From this vector any neural network structure can be constructed.

**Minimum/Maximum vectors**

Irene.Controls