HNeT2005 Application Programming Interface (API)

The HNeT2005 API provides a holographic model of cell function and cell assembly structure based upon underlying principles of phase coherence / de-coherence. Over 100 functions are provided for allocating and configuring neuromorphic assemblies, controlling related properties and integrating real-time assembly operation within application layers.

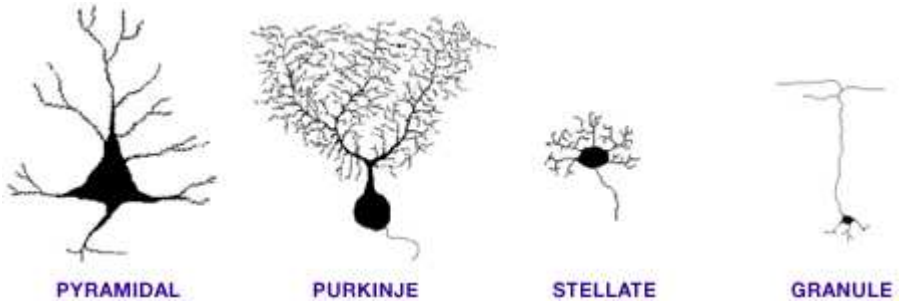
The HNeT API applies the concept of objects (individual neuron cells and assemblies) and use of handles in referencing these objects. Cell / assembly handles are applied in setting cell properties, controlling execution, modifying synaptic interconnections, etc. Properties of each cell within the neuromorphic assembly (i.e. learning rate, neural plasticity, synaptic interconnections, memory decay, etc) may be adjusted individually.

The HNeT library facilitates the integration of neuron cells into both simple and highly elaborate neuromorphic assembly structures. The HNeT library permits allocation of up to 64K assemblies per program instance. The HNeT library provides integration of the seven primary neuron cell types listed below:

Principle Cell Types

- Receptor
- Granule
- Pyramidal
- Stellate
- Purkinje
- Hippocampal (temporal)
- Axonal and collateral signal routing

Cell Morphology

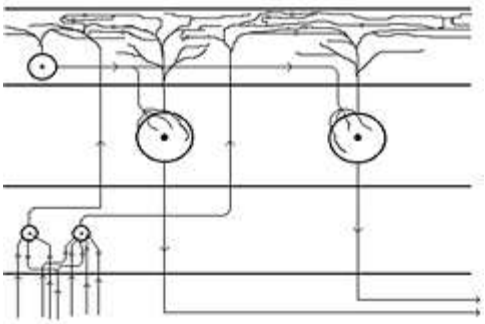


The primary assembly structures provided within the HNeT system are illustrated below for the cerebellar and neo-cortical models. The HNeT library provides an array of functions for customization of individual cell architectures, cell assembly architectures, synaptic interconnectivity, neural plasticity (synaptic pruning and regrowth), customization of supervised, unsupervised, spatial-temporal and hyper-incursive neural models, data conversion and preprocessing. A function reference sheet for the HNeT API language is available upon request.

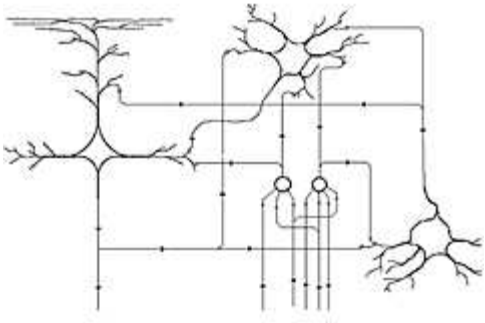
Principle Assembly Structures

- Cerebellar
- Neo-cortical
- Spatial-tem
- Recursive
- Hyper incursive
- Composite (mixed)

Cerebellar Model



Neo-Cortical Model



Additional Features

HNeT technology provides an exceptionally high "connection per second" or CPS rating; in excess of 200 Million CPS on Pentium IV processors. This allows the system to learn and/or respond to several millions of input patterns per second.

Advanced features of *neural plasticity* are provided. Neural plasticity allows the HNeT system to optimize and reconfigure cell assembly structures and synaptic interconnections in an automated manner.

An extensive library of conversion formats are provided for orthogonalization of input data streams, including histogram normalization, Fourier, Gabor and wavelet transforms. Custom algorithms may be integrated as post-processing transforms within HNeT cells.

Permits dynamic (on line) modification of virtually all cell properties such as synaptic and axonal interconnection, neural plasticity, cortical memory, learning rate, execution sequence, etc.