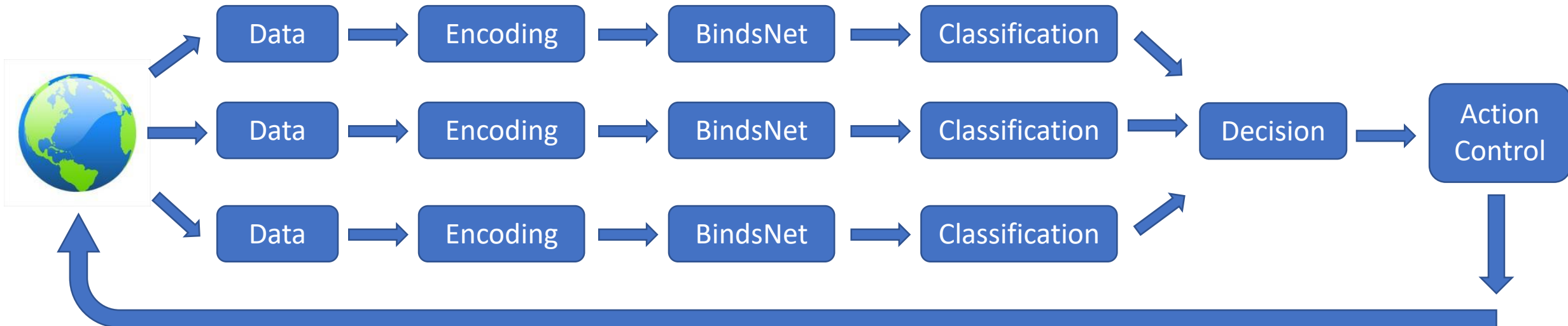
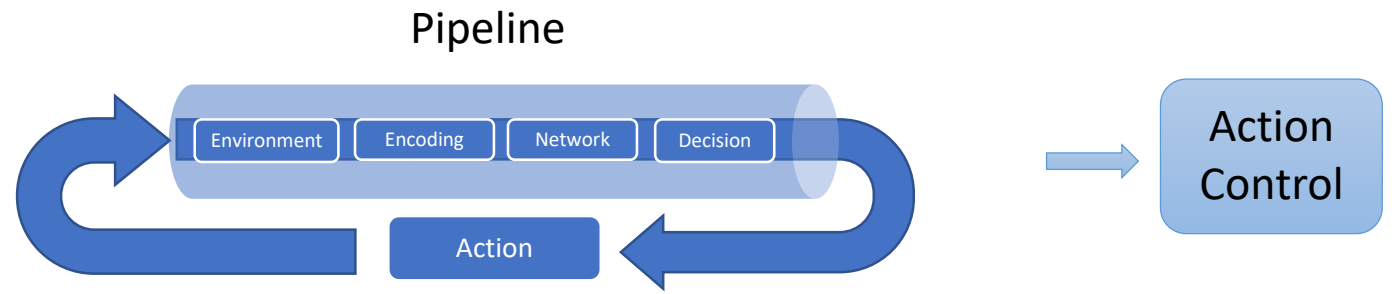
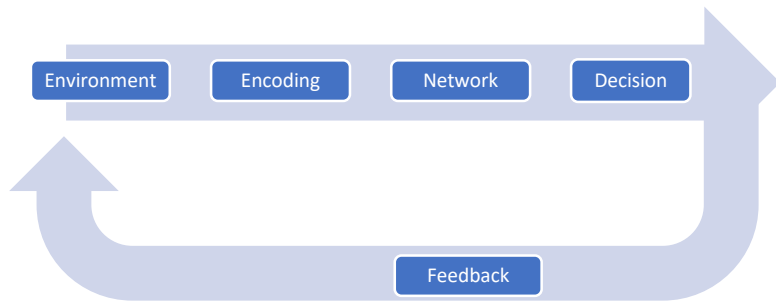


BindsNet	
• <b>Interface</b>	Collection of functions that transmit commands and retrieve information from the platform below:
• <b>SEGA</b>	SEGA
• <b>ATARI</b>	ATARI
• <b>Datasets</b>	Collection of function that can interface to various of datasets
• <b>MNIST</b>	Interface to a MNIST dataset
• <b>Other dynamic time driven data</b>	Interface to other dynamic time driven data
• <b>Encoding</b>	Function related to encode given data in different time domain distribuends
• <b>Poisson</b>	Encode data in a Poisson distribution
• <b>Bernoulli</b>	Encode data in a Bernoulli distribution
• <b>Network</b>	Contain the objects that require to create a spiking neuronal network
• <b>Nodes</b>	Basic unit object
• <b>Input</b>	Input unit
• <b>Mcculloch pitts</b>	Mcculloch pitts unit that summarize the input and spike according to a threshold
• <b>IF and LIF</b>	(Leaky and fire) and (Leaky integrate and fire) units
• <b>Izhikevich</b>	Izhikevich style neuron
• <b>Izhikevich + Metabolism</b>	Izhikevich style + Metabolism equation for energy consumption.
• <b>Connection</b>	Connection between the basic units
• <b>Simple</b>	Group of simple connections type
• <b>One to one</b>	Simple one to one
• <b>Adaptive Learning</b>	Group of adaptive learning connections type
• <b>STDP</b>	Adaptive connection using STDP rule
• <b>Hebbian</b>	Adaptive connection using Hebbian rule
• <b>Gradient Descent</b>	Adaptive connection using Gradient Decent rule
• <b>Monitor</b>	Object that monitor any requested parameters and variable that under the network object
• <b>Analysis</b>	Contains functions that analysis the results statistically and display the activity of the network
• <b>Plots</b>	Function related to plot activity of the network
• <b>Statistical function</b>	Statistical function that can be apply on every object
• <b>Evaluation</b>	Contains functions that evaluate the spikes train and classified the activity of the network
• <b>Confidence level</b>	Decision based on history of voting for each cell
• <b>N gram</b>	Decision based on the N order of spikes in the spike train





BindsNET		
network	Network	contains the Network object and submodules for network components
	nodes	spiking neural network; responsible for coordination of neurons and connections
	Input	groups of neurons of arbitrary size and dimensionality
	McCullochPittsNodes	neurons with user-specified spiking activity
	IFNodes	implements the McCulloch-Pitts neuron model
	LIFNodes	implements the integrate-and-fire (IF) neuron model
	IzhikevichNodes	implements the leaky integrate-and-fire (LIF) neuron model
	IzhikevichNodes	implements the Izhikevich neuron model
	topology	connectivity between groups of neurons
	Connection	all-to-all connectivity between neurons (dense weight matrix)
	SparseConnection	sparse connectivity between neurons (sparse weight matrix)
	Conv2dConnection	two-dimensional convolution of presynaptic neurons (convolutional weight kernels)
	monitors	record time-varying state variables of arbitrary objects.
	Monitor	record state variable(s) from a single BindsNET object
	NetworkMonitor	record state variable(s) from all components of a Network
environment	GymEnvironment	reinforcement learning environments
	DatasetEnvironment	thin wrapper of the gym RL environments library
datasets		thin wrapper around arbitrary dataset for use in pipeline
	MNIST	downloading, pre-processing, and iteration over popular ML datasets
	CIFAR-10	handwritten digits dataset (28x28, 60K train, 10K test)
	CIFAR-100	10-class natural image dataset (32x32x3, 50K train, 10K test)
encoding		100-class natural image dataset (32x32x3, 50K train, 10K test)
	bernoulli	conversion of numerical data into binary spikes
	poisson	conversion of non-negative data into Bernoulli-distributed spikes
	rank_order_coding	conversion of non-negative data into spikes with exponentially-distributed inter-arrival times
learning		conversion of non-negative data into one spike per neuron with times inversely proportional to intensity
	hebbian	methods for updating connection parameters of topology objects
	post_pre	methods for updating connection parameters of topology objects
	m_stdp	simple STDP rule based on pre- and post-synaptic neural activity
	m_stdp_et	reward-modulated STDP rule
pipeline		reward-modulated STDP rule with eligibility trace
	Pipeline	contains Pipeline object and feedback functions
	action	smoothly integrates a network, environment, and encoding and feedback functions
	select_random	functions for mapping network activity to actions in an environment
evaluation	select_multinomial	selects random action in action space
	assign_labels	samples an action from a probability distribution parametrized by a vector of spikes
	all_activity	quantification of SNNs as machine learning models
analysis	proportion_weighting	assign data labels to neurons based on their spiking activity on trainin data
	plotting	classify data using spikes and labels from all neurons
	visualization	weigh spikes from neurons by the proportion of spiking activity per data label
models		tools for assessing state and evolution of network components
	DiehlAndCook2015	online (during simulation) plotting functions
		offline (after simulation) plotting functions
		network architectures from the spiking neural networks literature
		SNN trained to classify data using STDP and a competitive mechanism

BindsNET	Description
network	Network object + network components + saving / loading functions
nodes	Groups of neurons of arbitrary size and dimensionality
topology	Different types of connectivity between groups of neurons
monitors	Record time-varying state variables of network components (spikes, voltage, ...)
environment	Reinforcement learning environments (OpenAI gym and dataset wrappers)
datasets	Downloading, pre-processing, and iteration over popular machine learning datasets
encoding	Conversion of arbitrary data into binary spikes for SNN input
learning	Methods for learning the parameters of connection (topology) objects
pipeline	Contains Pipeline object for coord. of network + environment + action + encoding
action	Functions for mapping network activity to actions in an environment
evaluation	Evaluation of spiking neural networks as machine learning models
analysis	Tools for assessing state and evolution of network component variables
plotting	Online (during simulation) plotting functions (spikes, voltages, weights, ...)
visualization	Offline (after simulation) plotting functions (spikes, voltages, weights, ...)
models	Network architectures from the spiking neural networks literature

