

mubu.knn

K-nearest neighbor search

Description

K-nearest neighbor search on matrix data of a MuBu container's track using a kD-tree. The search can include matrix data of a given track over multiple buffers of a referred MuBu container. The buffers of the referred container that are included into kD-tree can be selected by the `include` and `exclude` messages. The object internally constructs a kD-tree from the included data.

The selection data is given as a float or list representing a scalar, vector or matrix corresponding to the matrix dimensions of the referred track. The kd-Tree search uses an Euklidian distance between the given selection data and the matrix data normalized by its standard deviation. Additionally, a weight can be defined for each matrix element (message `weights`) in order to scale their importance in the search.

As an option, the object can scale incoming selection data to the mean and standard deviation or to the minimum and maximum of the data included into the KNN search using the `scaling` attribute (typically applied to normalized input data).

The *minimum*, *maximum*, *mean* and *standard deviation* calculated over the included data at the construction of the kD-tree can be output using the messages `getmin`, `getmax`, `getmean`, and `getstddev`.

By default, the kD-tree is not updated automatically when the track content changes, but can be updated using the `update` message.

Initializing and changing the referred a MuBu container and/or track (messages and attributes `mubuname`, `trackid`, and `refer`) as well as setting the buffers included into the KNN search (messages `include` and `exclude`) automatically will cause the (re-)construction of the kD-tree.

Since the constructing the kD-tree may represent a considerable amount of calculation, it is recommend to carefully choose the moment when the kD-tree is constructed.

Arguments

<i>Name</i>	<i>Type</i>	<i>Opt</i>	<i>Description</i>
mubu name	symbol		Name of the referred MuBu container.
track id	atom		Identifier (index or name) of the referred track.

Messages

list	data [list]	(see <code>select</code>)
exclude	excluded buffers [list]	Sets buffers (by index) that are excluded from the KNN search and reconstructs the kD-tree. All other buffers of the referred MuBu container are included.
getexcluded		Outputs list of indices of buffers that are excluded from the KNN search.
getincluded		Outputs list of indices of buffers that are included in the KNN search.
getmax		Outputs the maxima of the matrix data included in the KNN search.
getmean		Outputs the mean values of the matrix data included in the KNN search.
getmin		Outputs the minima of the matrix data included in the KNN search.
getstddev		Outputs the standard deviation of the matrix data included in the KNN search.
include	included buffers [list]	Sets buffers (by index) that are excluded from the KNN search and reconstructs the kD-tree. All other buffers of the referred MuBu container are excluded.

refer	mubu name [symbol] track id [atom]	Sets referred MuBu container and track, and reconstructs kD-tree.
select	selection data [list]	Sets selection data and searches for k-nearest neighbors. Lists of track element indices, buffer indices, and distances corresponding to the found neighbors are output from the first three outlets.
update		Builds the kD-tree from the referred tracks of the included buffers and calculates the minimum, maximum, mean, and standard deviation.

Attributes

<i>Name</i>	<i>Type</i>	<i>g/s</i>	<i>Description</i>
k	int		Sets the maximum number of returned neighbors.
mubuname	symbol		Name of the referred MuBu container.
radius	float		Sets the maximum distance of the returned neighbors (0 sets radius to infinite). The distance is normalized by the standard deviation of the data and additional weights.
scaling	int		Sets scaling mode for selection data [symbol: 'off' 'minmax' 'meanstddev'].
trackid	atom		Identifier of the referred track.
weights	atom		Sets weights (for each matrix element) in KNN search.

[Information for box attributes common to all objects](#)

Examples

See Also

<i>Name</i>	<i>Description</i>
mubu	MuBu, multi-buffer container for sound description and motion capture data
mubu.track	MuBu track reference