

MACHINE LEARNING DOCUMENTATION



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Name	TextVectors
Version	1.0.0
Description	Text Vectorization for words and sentences
License	http://www.apache.org/licenses/LICENSE-2.0
Copyright	Copyright (C) 2019 HPCC Systems
Authors	HPCCSystems
DependsOn	ML_Core 3.2.0
Platform	7.0.0

OVERVIEW

TextVectors

Text vector bundle

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DESCRIPTIONS

TYPES

Types

Common Type definitions for TextVectors bundle

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2. [t_SentId](#) : Type definition for a Sentence Id attribute
3. [t_TextId](#) : Type definition for an attribute that can hold either a Word Id
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T_WORDID

Types /

	t_WordId
--	-----------------

Type definition for a Word Id attribute

RETURN UNSIGNED4 —

T_SENTID

Types /

	t_SentId
--	-----------------

Type definition for a Sentence Id attribute.

RETURN UNSIGNED8 —

T_TEXTID

Types /

	t_TextId
--	-----------------

Type definition for an attribute that can hold either a Word Id. or a Sentence Id.

RETURN UNSIGNED8 —

T_VECTOR

Types /

	t_Vector
--	-----------------

Type definition for a vector attribute (used for Word or Sentence Vectors).

RETURN SET (REAL8) —

T_WORD

Types /

t_Word

Type definition for the text of a Word.

RETURN STRING —

T_SENTENCE

Types /

t_Sentence

Type definition for the text of a Sentence.

RETURN STRING —

T_MODRECTYPE

Types /

t_ModRecType

Enumeration of the record type for a Text Model.

RETURN UNSIGNED1 —

SENTENCE

Types /

	Sentence
--	-----------------

Dataset Record to hold a Sentence.

FIELD **sentId** ||| UNSIGNED8 — The numeric record id for this sentence.

FIELD **text** ||| STRING — The text content of the sentence.

SENTINFO

Types /

	SentInfo
--	-----------------

Sentence Information record, including the sentence vector.

FIELD **sentId** ||| UNSIGNED8 — The numeric record id for this sentence.

FIELD **text** ||| STRING — The text content of the sentence.

FIELD **vec** ||| SET (REAL8) — The Text Vector for the sentence.

WORD

Types /

	Word
--	-------------

Dataset Record to hold a Word.

FIELD **id** ||| UNSIGNED4 — The numeric record id for this word.

FIELD **text** ||| STRING — The text content of the word.

WORDINFO

Types /

WordInfo

Dataset record to hold information about a word, including its vector, number of occurrences in the corpus, and discard probability.

FIELD wordId ||| UNSIGNED4 — The numeric record id for this word.

FIELD text ||| STRING — The text content of the sentence.

FIELD occurs ||| UNSIGNED4 — The number of times this word occurs in the Corpus.

FIELD pdisc ||| REAL8 — The computed probability of discard, based on the frequency of the word in the corpus.

FIELD vec ||| SET (REAL8) — The Text Vector for the word.

VECTOR

Types /

Vector

Dataset record to hold a sentence or word vector.

FIELD id ||| UNSIGNED4 — The record id for this vector.

FIELD vec ||| SET (REAL8) — The contents of the vector.

TEXTMOD

Types /

TextMod

Record definition for the TextVectors Model. Text Model contains both the word and sentence vectors for the trained corpus.

FIELD typ ||| UNSIGNED1 — The type of the record – Word or Sentence (see t_ModRecType above).

FIELD id ||| UNSIGNED8 — The id of the word or sentence.

FIELD text ||| STRING — The textual content of the item (word or sentence).

FIELD vec ||| SET (REAL8) — The vector for the word or sentence.

CLOSEST

Types /

Closest

Used to return a set of closest items (words or sentences) for each of a given set of items to match. Closest contains the set of closest items, while Similarity is the cosine similarity between the text sentence and each of the closest items. For example, Similarity[1] is the Cosine similarity between Text and Closest[1]. Likewise for each of the K items in Closest and Similarity.

FIELD id ||| UNSIGNED8 — The id of the word or sentence.

FIELD text ||| STRING — The text of the word or sentence

FIELD closest ||| SET (STRING) — The text of the K closest words or sentence.

FIELD similarity ||| SET (REAL8) — The cosine similarity between this word / sentence and each of the K closest words or sentences. This set corresponds 1:1 to the contents of the 'closest' field.

TRAINSTATS

Types /

TrainStats

Record to hold the return values from GetTrainStats function. This records describes the set of parameters used for the current training session.

FIELD vecLen ||| UNSIGNED4 — The dimensionality of the word and sentence vectors.

FIELD nWeights ||| UNSIGNED4 — The number of weights needed to train the word vectors.

FIELD nSlices ||| UNSIGNED4 — The number of slices used to hold the weights.

- FIELD** **sliceSize** ||| UNSIGNED4 — The number of weights in each weight Slice.
- FIELD** **nWords** ||| UNSIGNED4 — The number of words in the vocabulary including N-Grams.
- FIELD** **nSentences** ||| UNSIGNED8 — The number of sentences in the Corpus.
- FIELD** **maxNGramSize** ||| UNSIGNED4 — The maximum N-Gram size to consider.
- FIELD** **nEpochs** ||| UNSIGNED4 — The maximum number of epochs for which to train. Zero (default) means auto-compute.
- FIELD** **negSamples** ||| UNSIGNED4 — The number of negative samples used in training for each training sample.
- FIELD** **batchSize** ||| UNSIGNED4 — The batch size used to train the vectors. Zero (default) indicates auto-compute.
- FIELD** **minOccurs** ||| UNSIGNED4 — The minimum number of occurrences in the Corpus in order for a word to be considered part of the vocabulary.
- FIELD** **maxTextDist** ||| UNSIGNED4 — The maximum number of edits (in edit distance) to make in matching a previously unseen word to a word in the vocabulary.
- FIELD** **maxNumDist** ||| UNSIGNED4 — The maximum numeric distance to consider one previously unseen number a match for a number in the vocabulary.
- FIELD** **discardThreshold** ||| REAL4 — Words with frequency below this number are never discarded from training data. Words with frequency above this number are stochastically sampled, based on their frequency.
- FIELD** **learningRate** ||| REAL4 — The learning rate used to train the Neural Network.
- FIELD** **upb** ||| UNSIGNED4 — Updates per batch. The approximate number of weights that are updated across all nodes during a single batch.
- FIELD** **upbPerNode** ||| UNSIGNED4 — Updates per batch per node. The number of weights updated by each node during a single batch.
- FIELD** **updateDensity** ||| REAL4 — The proportion of weights updated across all nodes during a single batch.
- FIELD** **udPerNode** ||| REAL4 — The proportion of weights updated by a single node during a single batch.
-

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Internal/ Corpus

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IMPORTS

Types | `std.Str` | `std.system.Thorlib` |

DESCRIPTIONS

CORPUS

Corpus
<pre>(DATASET(Sentence) sentences_in=DATASET([], Sentence), UNSIGNED4 wordNGrams = 1, REAL4 discThreshold = .0001, UNSIGNED4 minOccurs = 5, UNSIGNED4 dropoutK = 3)</pre>

Analyze a corpus of sentences to support vectorization activities.

Tokenizes sentences into words, provides a Vocabulary of unique words, and supports conversion of sentences into training data.

PARAMETER **wordNGrams** ||| UNSIGNED4 — The maximum sized NGram to generate. 1 indicates unigrams only. 2 indicates unigrams and bigrams. 3 indicates uni, bi, and trigrams. Defaults to 1 (unigrams only).

PARAMETER **discThreshold** ||| REAL4 — Discard threshold. Words with frequency greater than or equal to this number are probabilistically discarded based on their frequency. Words with frequencies below this threshold are never discarded (Default .0001).

PARAMETER **minOccurs** ||| UNSIGNED4 — Words that occur less than this number of times in the corpus are eliminated (Default 5). Words with very few occurrences in the corpus may not get properly trained due to lack of context.

PARAMETER **dropoutK** ||| UNSIGNED4 — The number of NGrams to drop from a sentence (per Sent2Vec paper). Default 3.

PARAMETER **sentences_in** ||| TABLE (Sentence) — No Doc

Children

1. [sentences](#) : Return a dataset of Sentences, distributed evenly
 2. [getNGrams](#) : Produce a series of nGrams from the set of words in a sentence
 3. [sent2wordList](#) : Convert a sentence to a list of words (including n-grams if requested)
 4. [tokenizedSent](#) : Each sentence transformed to a word list
 5. [VocabSize](#) : The size of the vocabulary
 6. [wordCount](#) : No Documentation Found
 7. [Vocabulary](#) : The set of all the unique words in the corpus
 8. [wordIdList](#) : No Documentation Found
 9. [WordList2WorldIds](#) : Convert a list of textual words making up a sentence to a set of ids representing each word's world in the vocabulary
 10. [GetTraining](#) : Generate training data based on the corpus
 11. [NegativesTable](#) : Negatives Table is a record containing the discard probability of each word in the vocabulary as a single SET, indexed by the worldId
-

SENTENCES

[Corpus](#) /

	sentences
--	---------------------------

Return a dataset of Sentences, distributed evenly.

RETURN **TABLE (Sentence)** —

GETNGRAMS

[Corpus](#) /

SET OF VARSTRING	getNGrams
(SET OF VARSTRING words, UNSIGNED4 ngrams, UNSIGNED4 dropoutk = 0)	

Produce a series of nGrams from the set of words in a sentence. For example, if the parameter ngrams is three, it will produce the set of Bigrams (i.e. 2grams) as well as the set of Trigrams (i.e. 3grams). Ngrams are formatted as _Word1_Word2_Word3. Given the sentence ['the', 'quick', 'brown', 'fox'] and ngrams set to 3, it will return: ['_the_quick', '_quick_brown', '_brown_fox', '_the_quick_brown', '_quick_brown_fox'].

PARAMETER words ||| SET (VARSTRING) — No Doc

PARAMETER ngrams ||| UNSIGNED4 — No Doc

PARAMETER dropoutk ||| UNSIGNED4 — No Doc

RETURN SET (VARSTRING) —

SENT2WORDLIST

Corpus /

DATASET(WordList)	sent2wordList
(DATASET(Sentence) sent)	

Convert a sentence to a list of words (including n-grams if requested). Strip out punctuation, cleanup whitespace, and split the words.

PARAMETER sent ||| TABLE (Sentence) — No Doc

RETURN TABLE ({ UNSIGNED4 sentId , SET (STRING) words }) —

TOKENIZEDSENT

Corpus /

DATASET(WordList)	tokenizedSent
-------------------	---------------

Each sentence transformed to a word list.

VOCABSIZE

[Corpus](#) /

VocabSize

The size of the vocabulary

RETURN **INTEGER8** —

WORDCOUNT

[Corpus](#) /

wordCount

No Documentation Found

RETURN **INTEGER8** —

VOCABULARY

[Corpus](#) /

Vocabulary

The set of all the unique words in the corpus. Note: returned vocabulary is distributed by HASH32(text), and sorted by text.

RETURN **TABLE** ({ **UNSIGNED4** wordId , **STRING** text , **UNSIGNED4** occurs , **REAL8** pdisc , **SET** (**REAL8**) **vec** }) —

WORDIDLIST

[Corpus](#) /

wordIdList

No Documentation Found

FIELD sentid ||| UNSIGNED4 — No Doc

FIELD ord ||| UNSIGNED2 — No Doc

FIELD wordids ||| SET (UNSIGNED4) — No Doc

FIELD pdisc ||| REAL4 — No Doc

WORDLIST2WORDIDS

Corpus /

DATASET(wordIdList)	WordList2WordIds
(DATASET(WordList) sent)	

Convert a list of textual words making up a sentence to a set of ids representing each word's wordId in the vocabulary.

PARAMETER sent ||| TABLE (WordList) — No Doc

RETURN TABLE ({ UNSIGNED4 sentId , UNSIGNED2 ord , SET (UNSIGNED4) wordIds , REAL4 pdisc }) —

GETTRAINING

Corpus /

DATASET(TrainingDat)	GetTraining
----------------------	--------------------

Generate training data based on the corpus. Each record is a main word and a set of context words (words that occur with that word in a sentence).

NEGATIVESTABLE

[Corpus](#) /

NegativesTable

Negatives Table is a record containing the discard probability of each word in the vocabulary as a single SET, indexed by the wordId. It is not currently used but is left here for possible future use.

Internal/ svTrainNN

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IMPORTS

Types |

DESCRIPTIONS

SVTRAINNN

STREAMED DATASET(SliceExt)	svTrainNN
<pre>(STREAMED DATASET(SliceExt) wts, STREAMED DATASET(trainingDat) train, UNSIGNED4 slicesize, UNSIGNED4 nWeights, UNSIGNED4 numwords, UNSIGNED4 dim, UNSIGNED4 mbsize, REAL lr, UNSIGNED4 negsamp)</pre>	

Neural Network Training for SentenceVectors.

Train specialized SentenceVector neural network given a batch of training data. Takes in weights as a set of weights slices (SliceExt), and returns a set of weight adjustments, also formatted as slices.

PARAMETER wts ||| TABLE (SliceExt) — The weights slices.

PARAMETER train ||| TABLE (TrainingDat) — The batch of training data formatted as a main word and set of context words.

PARAMETER slicesize ||| UNSIGNED4 — The maximum number of weights in a slice.

PARAMETER nWeights ||| UNSIGNED4 — The total number of weights across all slices.

PARAMETER numwords ||| UNSIGNED4 — The number of words in the vocabulary.

PARAMETER dim ||| UNSIGNED4 — The dimensionality of the vectors being trained

PARAMETER mbsize ||| UNSIGNED4 — The number of training records in the mini-batch.

PARAMETER lr ||| REAL8 — The learning rate to use for this batch.

PARAMETER negsamp ||| UNSIGNED4 — The number of negative samples to choose for each main word.

RETURN **TABLE (SliceExt)** — weight updates as DATASET(SliceExt). Note that these are additive changes to the weights, not the final weight values.

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IMPORTS

Types |

DESCRIPTIONS

SVUTILS

	svUtils
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Various utility functions used by TextVectors

Children

1. [normalizeVector](#) : Normalize a vector by dividing by the its length to create a unit vector
 2. [calcSentVector](#) : Calculate a Sentence Vector by taking the average of the word vectors for all words in the sentence
 3. [cosineSim](#) : Cosine similarity a and b are unit vectors
 4. [isNumeric](#) : Returns TRUE if a string represents a number (integer)
 5. [numDistance](#) : Calculates the numeric distance between two numeric strings as ABS(n1 - n2)
 6. [addVecs](#) : Implements $\text{vec1} + (\text{vec2} * \text{multiplier})$ Allows (potentially) scaled addition of vectors as well as subtraction (using a negative multiplier)
-

NORMALIZEVECTOR

svUtils /

t_Vector	normalizeVector
(t_Vector vec)	

Normalize a vector by dividing by the its length to create a unit vector

PARAMETER vec ||| SET (REAL8) — No Doc

RETURN SET (REAL8) —

CALCSENTVECTOR

svUtils /

t_Vector	calcSentVector
(t_Vector wordvecs, UNSIGNED2 vecLen)	

Calculate a Sentence Vector by taking the average of the word vectors for all words in the sentence.

PARAMETER wordvecs ||| SET (REAL8) — A concatenated set of vectors for all the words in the sentence.

PARAMETER vecLen ||| UNSIGNED2 — The length of each word vector and the resulting sentence vector.

RETURN SET (REAL8) —

COSINESIM

svUtils /

REAL8	cosineSim
(t_Vector a_in, t_Vector b_in, UNSIGNED4 vecLen)	

Cosine similarity a and b are unit vectors. Theta is the angle between vectors. Cosine similarity is $\text{Cos}(\theta)$. $\text{Cos}(\theta) = (a \cdot b) / (\text{L2Norm}(a) * \text{L2Norm}(b))$ Note: $a \cdot b = \text{L2Norm}(a) * \text{L2Norm}(b) * \text{Cos}(\theta)$ Since we assume the inputs to be unit vectors, the norms will be 1. We therefore simplify the calculation to $a \cdot b$.

PARAMETER a_in ||| SET (REAL8) — No Doc

PARAMETER b_in ||| SET (REAL8) — No Doc

PARAMETER veclen ||| UNSIGNED4 — No Doc

RETURN REAL8 —

ISNUMERIC

[svUtils](#) /

BOOLEAN	isNumeric
(STRING instr)	

Returns TRUE if a string represents a number (integer). Otherwise FALSE.

PARAMETER instr ||| STRING — No Doc

RETURN BOOLEAN —

NUMDISTANCE

[svUtils](#) /

UNSIGNED4	numDistance
(VARSTRING str1, VARSTRING str2)	

Calculates the numeric distance between two numeric strings as ABS(n1 - n2).

PARAMETER str1 ||| VARSTRING — No Doc

PARAMETER str2 ||| VARSTRING — No Doc

RETURN UNSIGNED4 —

ADDVECS

svUtils /

t_Vector	addVecs
(t_Vector vec1, t_Vector vec2, UNSIGNED4 multiplier = 1)	

Implements $\text{vec1} + (\text{vec2} * \text{multiplier})$ Allows (potentially) scaled addition of vectors as well as subtraction (using a negative multiplier).

PARAMETER vec1 ||| SET (REAL8) — No Doc

PARAMETER vec2 ||| SET (REAL8) — No Doc

PARAMETER multiplier ||| UNSIGNED4 — No Doc

RETURN SET (REAL8) —

Internal/ Weights

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IMPORTS

Types | `std.system.Thorlib` |

DESCRIPTIONS

WEIGHTS

weights
(SET OF INTEGER4 shape)

Module to perform calculations to manage the weights, and their storage as slices.

Weights are stored in fixed size slices for ease of distribution and management. Currently only supports 3 layer Neural Network weights as used in word vectorization. Will need to be extended to handle a general Neural Network shape.

PARAMETER **shape** ||| SET (INTEGER4) — The number of neurons in each layer of the Neural Network. For example, [100, 10, 200] describes a neural network with 100 neurons in the input layer, 10 in the hidden layer, and 200 in the output layer.

Children

1. [nWeights](#) : The total number of weights in the network
2. [toFlatIndex](#) : Convert the compound index: (layer, j, i) to a contiguous flat index into a set of weights
3. [fromFlatIndex](#) : Convert a flat index into a list of weights into a compound index into the weights of the neural network: (layer, j, i)
4. [slicesPerNode](#) : The number of slices needed for each node

5. **nSlices** : The total number of slices used to hold the weights
6. **sliceSize** : The number of weights in each slice
7. **nWeightSlots** : The number of slots to hold weights across all slices
8. **initWeights** : Return an initial set of weight slices with weights set to random values
9. **distributeAllSlices** : Copy weights to all nodes and assign the node id to the copy on each node
10. **toSliceExt** : Make Extended Weights
11. **fromSliceExt** : Take a set of Extended Weight slices (i.e
12. **slices2Linear** : Convert a dataset of replicated slices (SliceExt) into a single SliceExt replicated on each node and containing one linear array (i.e
13. **compressOne** : Compress a set of weights (assumed to be sparse) by converting to a sparse representation [...] packed into a DATA field
14. **decompressOne** : Decompress a set of compressed weights in sparse format (i.e
15. **compressWeights** : Compress a set of extended slices (e.g
16. **decompressWeights** : Decompress a set of compressed slices into the native extended slice format

NWEIGHTS

weights /

nWeights

The total number of weights in the network

RETURN **INTEGER8** —

TOFLATINDEX

weights /

UNSIGNED4	toFlatIndex
------------------	--------------------

(UNSIGNED2 l, UNSIGNED4 j, UNSIGNED4 i)

Convert the compound index: (layer, j, i) to a contiguous flat index into a set of weights.

PARAMETER l ||| UNSIGNED2 — No Doc

PARAMETER j ||| UNSIGNED4 — No Doc

PARAMETER i ||| UNSIGNED4 — No Doc

RETURN **UNSIGNED4** —

FROMFLATINDEX

weights /

wIndex	fromFlatIndex
(UNSIGNED4 indx)	

Convert a flat index into a list of weights into a compound index into the weights of the neural network: (layer, j, i).

PARAMETER indx ||| UNSIGNED4 — No Doc

RETURN **ROW (wIndex)** —

SLICESPERNODE

weights /

slicesPerNode

The number of slices needed for each node

RETURN **INTEGER8** —

NSLICES

[weights](#) /

nSlices

The total number of slices used to hold the weights.

RETURN **INTEGER8** —

SLICESIZE

[weights](#) /

sliceSize

The number of weights in each slice.

RETURN **INTEGER8** —

NWEIGHTSLOTS

[weights](#) /

nWeightSlots

The number of slots to hold weights across all slices. This may be different from nWeights because nWeights does not always divide exactly into nSlices.

RETURN **INTEGER8** —

INITWEIGHTS

[weights](#) /

<code>DATASET(slice)</code>	<code>initWeights</code>
-----------------------------	--------------------------

Return an initial set of weight slices with weights set to random values.

DISTRIBUTEALLSLICES

`weights /`

<code>DATASET(SliceExt)</code>	<code>distributeAllSlices</code>
<code>(DATASET(SliceExt) slices)</code>	

Copy weights to all nodes and assign the node id to the copy on each node.

If running on 7.2 or greater, use the `DISTRIBUTE(.., ALL)` facility. Otherwise, use `NORMALIZE` to make copies of each and assign `nodeId`, then `DISTRIBUTE` by `nodeId`.

PARAMETER `slices` ||| TABLE (SliceExt) — No Doc

RETURN TABLE ({ UNSIGNED2 nodeId , UNSIGNED2 sliceId , REAL4 loss , REAL4 minLoss , UNSIGNED4 minEpoch , UNSIGNED4 maxNoProg , UNSIGNED8 batchPos , SET (REAL8) weights }) —

TOSLICEEXT

`weights /`

<code>DATASET(SliceExt)</code>	<code>toSliceExt</code>
<code>(DATASET(Slice) weights)</code>	

Make Extended Weights. Return a dataset of weight slices that have been replicated to all nodes and converted to SliceExt record type that includes a node id.

PARAMETER `weights` ||| TABLE (Slice) — No Doc

RETURN TABLE ({ UNSIGNED2 nodeId , UNSIGNED2 sliceId , REAL4 loss , REAL4 minLoss , UNSIGNED4 minEpoch , UNSIGNED4 maxNoProg , UNSIGNED8 batchPos , SET (REAL8) weights }) —

FROMSLICEEXT

weights /

DATASET(Slice)	fromSliceExt
(DATASET(SliceExt) extWeights)	

Take a set of Extended Weight slices (i.e. replicated to all nodes) and return a dataset of Weight slices that are distributed by sliceId. The duplicated copies are filtered out except on the node that owns each slice.

PARAMETER extweights ||| TABLE (SliceExt) — No Doc

RETURN TABLE ({ UNSIGNED2 sliceId , SET (REAL8) weights }) —

SLICES2LINEAR

weights /

SliceExt	slices2Linear
(DATASET(SliceExt) slices)	

Convert a dataset of replicated slices (SliceExt) into a single SliceExt replicated on each node and containing one linear array (i.e. SET) of weights.

PARAMETER slices ||| TABLE (SliceExt) — No Doc

RETURN ROW ({ UNSIGNED2 nodeId , UNSIGNED2 sliceId , REAL4 loss , REAL4 minLoss , UNSIGNED4 minEpoch , UNSIGNED4 maxNoProg , UNSIGNED8 batchPos , SET (REAL8) weights }) —

COMPRESSONE

weights /

DATA	compressOne
(t_Vector wts, UNSIGNED4 slicesize)	

Compress a set of weights (assumed to be sparse) by converting to a sparse representation [...] packed into a DATA field.

PARAMETER wts ||| SET (REAL8) — No Doc

PARAMETER slicesize ||| UNSIGNED4 — No Doc

RETURN DATA —

DECOMPRESSONE

weights /

t_Vector	decompressOne
(DATA cwts, UNSIGNED4 slicesize)	

Decompress a set of compressed weights in sparse format (i.e. [...]) into a dense set of weights.

PARAMETER cwts ||| DATA — No Doc

PARAMETER slicesize ||| UNSIGNED4 — No Doc

RETURN SET (REAL8) —

COMPRESSWEIGHTS

weights /

DATASET(CSlice)	compressWeights
(DATASET(SliceExt) slices)	

Compress a set of extended slices (e.g. SliceExt) into CSlice format.

PARAMETER slices ||| TABLE (SliceExt) — No Doc

RETURN TABLE ({ UNSIGNED2 nodeId , UNSIGNED2 sliceId , REAL4 loss , REAL4 minLoss , UNSIGNED4 minEpoch , UNSIGNED4 maxNoProg , UNSIGNED8 batchPos , DATA cweights }) —

DECOMPRESSWEIGHTS

weights /

<code>DATASET(SliceExt)</code>	decompressWeights
<code>(DATASET(CSlice) cslices)</code>	

Decompress a set of compressed slices into the native extended slice format.

PARAMETER cslices ||| TABLE (CSlice) — No Doc

RETURN TABLE ({ UNSIGNED2 nodeId , UNSIGNED2 sliceId , REAL4 loss , REAL4 minLoss , UNSIGNED4 minEpoch , UNSIGNED4 maxNoProg , UNSIGNED8 batchPos , SET (REAL8) weights }) —
