LAGraph table test

GRAPHBLAS

Test site

Table

operation/method	description	notation
`mxm`	matrix-matrix multiplication	$\mathbf{C}\langle\mathbf{M}\rangle \odot= \mathbf{A} \oplus.\otimes \mathbf{B}$
`vxm`	vector-matrix multiplication	$\mathbf{w}^\mathsf{T}\langle\mathbf{m}^\mathsf{T}\rangle \odot= \mathbf{u}^\mathsf{T} \oplus.\otimes \mathbf{A}$
`mxv`	matrix-vector multiplication	$\mathbf{w}\langle\mathbf{m}\rangle \odot= \mathbf{A} \oplus.\otimes \mathbf{u}$
`eWiseAdd`	element-wise addition using operator op	$\mathbf{C}\langle\mathbf{M}\rangle \odot= \mathbf{A} \cup[\text{op}]\ \mathbf{B}$
	on elements in the set union of structures of $\mathbf{A}/\mathbf{B}$ and $\mathbf{u}/\mathbf{v}$	$\mathbf{w}\langle\mathbf{m}\rangle \odot= \mathbf{u} \cup[\text{op}]\ \mathbf{v}$
`eWiseMult`	element-wise multiplication using operator op	$\mathbf{C}\langle\mathbf{M}\rangle \odot= \mathbf{A} \cap[\text{op}]\ \mathbf{B}$
	on elements in the set intersection of structures of $\mathbf{A}/\mathbf{B}$ and $\mathbf{u}/\mathbf{v}$	$\mathbf{w}\langle\mathbf{m}\rangle \odot= \mathbf{u} \cap[\text{op}]\ \mathbf{v}$
`extract`	extract submatrix from matrix $\mathbf{A}$ using indices $\boldsymbol{i}$ and indices $\boldsymbol{j}$	$\mathbf{C}\langle\mathbf{M}\rangle \odot= \mathbf{A}(\boldsymbol{i},\boldsymbol{j})$
	extract the ith row vector from matrix $\mathbf{A}$	$\mathbf{w}\langle\mathbf{m}\rangle \odot= \mathbf{A}(i,:)$
	extract the jth column vector from matrix $\mathbf{A}$	$\mathbf{w}\langle\mathbf{m}\rangle \odot= \mathbf{A}(:,j)$
	extract subvector from $\mathbf{u}$ using indices $\boldsymbol{i}$	$\mathbf{w}\langle\mathbf{m}\rangle \odot= \mathbf{u}(\boldsymbol{i})$
`assign`	assign matrix to submatrix with mask for $\mathbf{C}$	$\mathbf{C}\langle\mathbf{M}\rangle(\boldsymbol{i},\boldsymbol{j}) \odot= \mathbf{A}$
	assign scalar to submatrix with mask for $\mathbf{C}$	$\mathbf{C}\langle\mathbf{M}\rangle(\boldsymbol{i},\boldsymbol{j}) \odot= s$
	assign vector to subvector with mask for $\mathbf{w}$	$\mathbf{w}\langle\mathbf{m}\rangle(\boldsymbol{i}) \odot= \mathbf{u}$
	assign scalar to subvector with mask for $\mathbf{w}$	$\mathbf{w}\langle\mathbf{m}\rangle(\boldsymbol{i}) \odot= s$

operation/method	description	notation
`apply`	apply unary operator f with optional thunk k	$\mathbf{C}\langle\mathbf{M}\rangle \odot= \mathrm{f}(\mathbf{A}, k)$
		$\mathbf{w}\langle\mathbf{m}\rangle \odot= \mathrm{f}(\mathbf{u}, k)$
`select`	apply select operator f with optional thunk k	$\mathbf{C}\langle\mathbf{M}\rangle \odot= \mathbf{A}\langle\mathrm{f}(\mathbf{A}, k)\rangle$
		$\mathbf{w}\langle\mathbf{m}\rangle \odot= \mathbf{u}\langle\mathrm{f}(\mathbf{u}, k)\rangle$
`reduce`	row-wise reduce matrix to column vector	$\mathbf{w}\langle\mathbf{m}\rangle \odot= [\oplus_j \mathbf{A}(:, j)]$
	reduce matrix to scalar	$s \odot= [\oplus_{i,j} \mathbf{A}(i, j)]$
	reduce vector to scalar	$s \odot= [\oplus_i \mathbf{u}(i)]$
`transpose`	transpose	$\mathbf{C}\langle\mathbf{M}\rangle \odot= \mathbf{A}^{\mathsf{T}}$
`kronecker`	Kronecker multiplication using operator op	$\mathbf{C}\langle\mathbf{M}\rangle \odot= \mathrm{kron}(\mathbf{A}, \mathsf{op}, \mathbf{B})$

GraphBLAS operations and methods. Notation: Matrices and vectors are typeset in bold, starting with uppercase ($\mathbf{A}$) and lowercase ($\mathbf{u}$) letters, respectively. Scalars including indices are lowercase italic (k, i, j) while arrays are lowercase bold italic (***x***, ***i***, ***j***). $\oplus$ and $\otimes$ are the addition and multiplication operators forming a semiring and default to conventional arithmetic $+$ and $\times$ operators. $\odot$ is the accumulator operator. Operations can be modified via a descriptor; matrices can be transposed ($\mathbf{B}^{\mathsf{T}}$), the mask can be complemented ($\mathbf{C}\langle\neg\mathbf{M}\rangle$), and the mask can be valued (shown above) or structural ($\mathbf{C}\langle s(\mathbf{M})\rangle$). A structural mask can also be complemented ($\mathbf{C}\langle\neg s(\mathbf{M})\rangle$). The result can be cleared (replaced) after using it as input to the mask/accumulator step ($\mathbf{C}\langle\mathbf{M}, \mathrm{r}\rangle$). Not all methods are listed (creating new operators, monoids, and semirings, clearing a matrix/vector, etc.).