Ticket #3510 (new Feature Requests)

Introduce new diag function for creating diagonal matrices and for returning the diagonal of a matrix

Opened 3 years ago

Reported by:	marco.guazzone@...	Owned by:	guwi17
Milestone:	~~Boost 1.41.0~~	Component:	uBLAS
Version:	Boost 1.40.0	Severity:	Not Applicable
Keywords:		Cc:	

Description

Introduce a new **diag** free function in the spirit of the MATLAB's *diag* function and Mathematica's *DiagonalMatrix? function*.

Basically it allows both the creation of a *generalized* diagonal matrix and the creation of a *diagonal* view of an existing matrix.

A *generalized* k-th diagonal matrix is a special kind of matrix which has all elements set to zero but the ones on its k-th diagonal. The integer k is the offset from the main diagonal, that is:

- k = 0: the elements on the main diagonal can be different from zero.
- k > 0: only the elements on the k-th upper diagonal can be different from zero.
- k < 0: only the elements on the k-th lower diagonal can be different from zero.

A generalized diagonal matrix can be a rectangular matrix.

Here below is a list of the requested cases:

- Create a square diagonal matrix M with vector V

being the k-th diagonal

```
M = diag(v,k)
```

- Like the above, but M has layout l (e.g., column major) `M = diag(v,k,l)`
- Create a rectangular diagonal matrix M of size mXn with vector V being the k-th diagonal `M = diag(v,m,n,k)`
- Like the above, but M has layout l (e.g., column major) `M = diag(v,m,n,k,l)`
- Create a diagonal view of the k-th diagonal of matrix M `v = diag(M,k)`

Attachments

- ublas_diag.zip (38.2 KB) - added by *marco.guazzone@...* 3 years ago.
  *I've included a possible implementation. In addition to the **diag** operation, two new types are provided: (1) **generalized_diagonal_matrix**: a new matrix container representing a generalized diagonal matrix. (2) **matrix_diagonal**: a new matrix proxy representing the k-th diagonal of a given matrix.*

Change History

Changed 3 years ago by marco.guazzone@...

- **attachment** *ublas_diag.zip* added

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