VECTOR_NORM (Transact-SQL)

Article • 09/11/2024

Applies to: Azure SQL Database Azure SQL Managed Instance

> **Note**
>
> This function is in preview and is subject to change. Preview features are not meant for production use and are subject to additional terms of use.

The function VECTOR_NORM takes a vector as an input and returns the norm of the vector (which is a measure of its length or magnitude) in a given norm type

Syntax

Calculates the norm of a vector using a specified norm type

```
syntaxsql
VECTOR_NORM ( vector_column, norm_type )
```

For example, if you want to calculate the Euclidean norm (which is the most common norm type), you can use:

```
syntaxsql
VECTOR_NORM ( vector_column, 'norm2' )
```

Arguments

vector_column

An expression that evaluates to a vector. This column must be of the new vector data type

norm_type

A string with the name of the norm type to use to calculate the norm of the given vector. The following norm types are supported:

- `norm1` - The 1-norm, which is the sum of the absolute values of the vector components.
- `norm2` - The 2-norm, also known as the Euclidean Norm which is the square root of the sum of the squares of the vector components.
- `norminf` - The infinity norm, which is the maximum of the absolute values of the vector components.

Return value

The function returns a `FLOAT` value that represents the norm of the vector using the specified norm type.

An error is returned if *norm_type* isn't a valid norm type and if the *vector_column* is not of the vector type.

Examples

Example 1

The following example creates a vector with three dimensions from a string with a JSON array.

SQL

```
DECLARE @v VECTOR(3) = CAST(N'[1, 2, 3]' AS VECTOR(3));

SELECT
    vector_norm(@v, 'norm2') AS norm2,
    vector_norm(@v, 'norm1') AS norm1,
    vector_norm(@v, 'norminf') AS norminf;
```

The expected return values would be:

Expand table

norm2	norm1	norminf
3.7416573867739413	6.0	3.0

Example 2

The following example calculates the norm of each vector in a table.

SQL

```
CREATE TABLE dbo.vectors
(
  id INT PRIMARY KEY,
  v VECTOR(3) NOT NULL
);

INSERT INTO dbo.vectors (id, v) VALUES (1, CAST(N'[0.1, 2, 30]' AS VECTOR(3)));
INSERT INTO dbo.vectors (id, v) VALUES (2, CONVERT(VECTOR(3), '[0.1, 2, 30]'));

SELECT
  id,
  vector_norm(v, 'norm2') AS norm
FROM
  dbo.vectors;
```

The expected return values would be:

Expand table

id	norm
1	30.066592756745816
2	30.066592756745816

See also

Vector Functions (Transact SQL)

Vector Data Type

Intelligent applications with Azure SQL Database

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