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Noise Utilities (mathutils.noise)

The Blender noise module

mathutils.noise.**cell(position)**

Returns cell noise value at the specified position.

PARAMETERS:

position (`mathutils.Vector`) – The position to evaluate the selected noise function.

RETURNS:

The cell noise value.

RETURN TYPE:

float

mathutils.noise.**cell_vector(position)**

Returns cell noise vector at the specified position.

PARAMETERS:

position (`mathutils.Vector`) – The position to evaluate the selected noise function.

RETURNS:

The cell noise vector.

RETURN TYPE:

`mathutils.Vector`

mathutils.noise.**fractal(position, H, lacunarity, octaves, noise_basis='PERLIN_ORIGINAL')**

Returns the fractal Brownian motion (fBm) noise value from the noise basis at the specified position.

PARAMETERS:

- **position** (`mathutils.Vector`) – The position to evaluate the selected noise function.
- **H** (*float*) – The fractal increment factor.
- **lacunarity** (*float*) – The gap between successive frequencies.
- **octaves** (*int*) – The number of different noise frequencies used.
- **noise_basis** (*str*) – Enumerator in [‘BLENDER’, ‘PERLIN_ORIGINAL’, ‘PERLIN_NEW’, ‘VORONOI_F1’, ‘VORONOI_F2’, ‘VORONOI_F3’, ‘VORONOI_F4’, ‘VORONOI_F2F1’, ‘VORONOI_CRACKLE’, ‘CELLNOISE’].

RETURNS:

The fractal Brownian motion noise value.

RETURN TYPE:

float

mathutils.noise.**hetero_terrain(position, H, lacunarity, octaves, offset, noise_basis='PERLIN_ORIGINAL')**

Returns the heterogeneous terrain value from the noise basis at the specified position.

PARAMETERS:

- **position** (`mathutils.Vector`) – The position to evaluate the selected noise function.
- **H** (*float*) – The fractal dimension of the roughest areas.
- **lacunarity** (*float*) – The gap between successive frequencies.
- **octaves** (*int*) – The number of different noise frequencies used.
- **offset** (*float*) – The height of the terrain above ‘sea level’.
- **noise_basis** (*str*) – Enumerator in [‘BLENDER’, ‘PERLIN_ORIGINAL’, ‘PERLIN_NEW’, ‘VORONOI_F1’, ‘VORONOI_F2’, ‘VORONOI_F3’, ‘VORONOI_F4’, ‘VORONOI_F2F1’, ‘VORONOI_CRACKLE’, ‘CELLNOISE’].

RETURNS:

The heterogeneous terrain value.

RETURN TYPE:

float

mathutils.noise.**hybrid_multi_fractal(position, H, lacunarity, octaves, offset, gain, noise_basis='PERLIN_ORIGINAL')**

Returns hybrid multifractal value from the noise basis at the specified position.

PARAMETERS:

- **position** (`mathutils.Vector`) – The position to evaluate the selected noise function.
- **H** (*float*) – The fractal dimension of the roughest areas.
- **lacunarity** (*float*) – The gap between successive frequencies.
- **octaves** (*int*) – The number of different noise frequencies used.
- **offset** (*float*) – The height of the terrain above 'sea level'.
- **gain** (*float*) – Scaling applied to the values.
- **noise_basis** (*str*) – Enumerator in ['BLENDER', 'PERLIN_ORIGINAL', 'PERLIN_NEW', 'VORONOI_F1', 'VORONOI_F2', 'VORONOI_F3', 'VORONOI_F4', 'VORONOI_F2F1', 'VORONOI_CRACKLE', 'CELLNOISE'].

RETURNS:

The hybrid multifractal value.

RETURN TYPE:

float

mathutils.noise.**multi_fractal(position, H, lacunarity, octaves, noise_basis='PERLIN_ORIGINAL')**

Returns multifractal noise value from the noise basis at the specified position.

PARAMETERS:

- **position** (`mathutils.Vector`) – The position to evaluate the selected noise function.
- **H** (*float*) – The fractal increment factor.
- **lacunarity** (*float*) – The gap between successive frequencies.
- **octaves** (*int*) – The number of different noise frequencies used.
- **noise_basis** (*str*) – Enumerator in ['BLENDER', 'PERLIN_ORIGINAL', 'PERLIN_NEW', 'VORONOI_F1', 'VORONOI_F2', 'VORONOI_F3', 'VORONOI_F4', 'VORONOI_F2F1', 'VORONOI_CRACKLE', 'CELLNOISE'].

RETURNS:

The multifractal noise value.

RETURN TYPE:

float

mathutils.noise.**noise(position, noise_basis='PERLIN_ORIGINAL')**

Returns noise value from the noise basis at the position specified.

PARAMETERS:

- **position** (`mathutils.Vector`) – The position to evaluate the selected noise function.
- **noise_basis** (*str*) – Enumerator in ['BLENDER', 'PERLIN_ORIGINAL', 'PERLIN_NEW', 'VORONOI_F1', 'VORONOI_F2', 'VORONOI_F3', 'VORONOI_F4', 'VORONOI_F2F1', 'VORONOI_CRACKLE', 'CELLNOISE'].

RETURNS:

The noise value.

RETURN TYPE:

float

mathutils.noise.**noise_vector(position, noise_basis='PERLIN_ORIGINAL')**

Returns the noise vector from the noise basis at the specified position.

Returns the noise vector from the noise basis at the specified position.

PARAMETERS:

- **position** (`mathutils.Vector`) – The position to evaluate the selected noise function.
- **noise_basis** (*str*) – Enumerator in [‘BLENDER’, ‘PERLIN_ORIGINAL’, ‘PERLIN_NEW’, ‘VORONOI_F1’, ‘VORONOI_F2’, ‘VORONOI_F3’, ‘VORONOI_F4’, ‘VORONOI_F2F1’, ‘VORONOI_CRACKLE’, ‘CELLNOISE’].

RETURNS:

The noise vector.

RETURN TYPE:

`mathutils.Vector`

mathutils.noise.**random()**

Returns a random number in the range [0, 1).

RETURNS:

The random number.

RETURN TYPE:

float

mathutils.noise.**random_unit_vector(size=3)**

Returns a unit vector with random entries.

PARAMETERS:

size (*int*) – The size of the vector to be produced, in the range [2, 4].

RETURNS:

The random unit vector.

RETURN TYPE:

`mathutils.Vector`

mathutils.noise.**random_vector(size=3)**

Returns a vector with random entries in the range (-1, 1).

PARAMETERS:

size (*int*) – The size of the vector to be produced.

RETURNS:

The random vector.

RETURN TYPE:

`mathutils.Vector`

mathutils.noise.**ridged_multi_fractal(position, H, lacunarity, octaves, offset, gain, noise_basis='PERLIN_ORIGINAL')**

Returns ridged multifractal value from the noise basis at the specified position.

PARAMETERS:

- **position** (`mathutils.Vector`) – The position to evaluate the selected noise function.
- **H** (*float*) – The fractal dimension of the roughest areas.
- **lacunarity** (*float*) – The gap between successive frequencies.
- **octaves** (*int*) – The number of different noise frequencies used.
- **offset** (*float*) – The height of the terrain above ‘sea level’.
- **gain** (*float*) – Scaling applied to the values.
- **noise_basis** (*str*) – Enumerator in [‘BLENDER’, ‘PERLIN_ORIGINAL’, ‘PERLIN_NEW’, ‘VORONOI_F1’, ‘VORONOI_F2’, ‘VORONOI_F3’, ‘VORONOI_F4’, ‘VORONOI_F2F1’, ‘VORONOI_CRACKLE’, ‘CELLNOISE’].

RETURNS:

The ridged multifractal value.

RETURN TYPE:

float

mathutils.noise.**seed_set(seed)**

Sets the random seed used for random_unit_vector, and random.

PARAMETERS:

seed (*int*) – Seed used for the random generator. When seed is zero, the current time will be used instead.

mathutils.noise.**turbulence(position, octaves, hard, noise_basis='PERLIN_ORIGINAL', amplitude_scale=0.5, frequency_scale=2.0)**

Returns the turbulence value from the noise basis at the specified position.

PARAMETERS:

- **position** (`mathutils.Vector`) – The position to evaluate the selected noise function.
- **octaves** (*int*) – The number of different noise frequencies used.
- **hard** (*bool*) – Specifies whether returned turbulence is hard (sharp transitions) or soft (smooth transitions).
- **noise_basis** (*str*) – Enumerator in ['BLENDER', 'PERLIN_ORIGINAL', 'PERLIN_NEW', 'VORONOI_F1', 'VORONOI_F2', 'VORONOI_F3', 'VORONOI_F4', 'VORONOI_F2F1', 'VORONOI_CRACKLE', 'CELLNOISE'].
- **amplitude_scale** (*float*) – The amplitude scaling factor.
- **frequency_scale** (*float*) – The frequency scaling factor

RETURNS:

The turbulence value.

RETURN TYPE:

float

mathutils.noise.**turbulence_vector(position, octaves, hard, noise_basis='PERLIN_ORIGINAL', amplitude_scale=0.5, frequency_scale=2.0)**

Returns the turbulence vector from the noise basis at the specified position.

PARAMETERS:

- **position** (`mathutils.Vector`) – The position to evaluate the selected noise function.
- **octaves** (*int*) – The number of different noise frequencies used.
- **hard** (*bool*) – Specifies whether returned turbulence is hard (sharp transitions) or soft (smooth transitions).
- **noise_basis** (*str*) – Enumerator in ['BLENDER', 'PERLIN_ORIGINAL', 'PERLIN_NEW', 'VORONOI_F1', 'VORONOI_F2', 'VORONOI_F3', 'VORONOI_F4', 'VORONOI_F2F1', 'VORONOI_CRACKLE', 'CELLNOISE'].
- **amplitude_scale** (*float*) – The amplitude scaling factor.
- **frequency_scale** (*float*) – The frequency scaling factor

RETURNS:

The turbulence vector.

RETURN TYPE:

`mathutils.Vector`

mathutils.noise.**variable_lacunarity(position, distortion, noise_type1='PERLIN_ORIGINAL', noise_type2='PERLIN_ORIGINAL')**

Returns variable lacunarity noise value, a distorted variety of noise, from noise type 1 distorted by noise type 2 at the specified position.

PARAMETERS:

- **position** (`mathutils.Vector`) – The position to evaluate the selected noise function.
- **distortion** (*float*) – The amount of distortion.
- **noise_type1** (*str*) – Enumerator in ['BLENDER', 'PERLIN_ORIGINAL', 'PERLIN_NEW', 'VORONOI_F1', 'VORONOI_F2', 'VORONOI_F3', 'VORONOI_F4', 'VORONOI_F2F1', 'VORONOI_CRACKLE', 'CELLNOISE'].
- **noise_type2** (*str*) – Enumerator in ['BLENDER', 'PERLIN_ORIGINAL', 'PERLIN_NEW', 'VORONOI_F1', 'VORONOI_F2',

‘VORONOI_F3’, ‘VORONOI_F4’, ‘VORONOI_F2F1’, ‘VORONOI_CRACKLE’, ‘CELLNOISE’].

RETURNS:

The variable lacunarity noise value.

RETURN TYPE:

float

mathutils.noise.**voronoi(position, distance_metric='DISTANCE', exponent=2.5)**

Returns a list of distances to the four closest features and their locations.

PARAMETERS:

- **position** (`mathutils.Vector`) – The position to evaluate the selected noise function.
- **distance_metric** (*str*) – Enumerator in [‘DISTANCE’, ‘DISTANCE_SQUARED’, ‘MANHATTAN’, ‘CHEBYCHEV’, ‘MINKOVSKY ‘MINKOVSKY_HALF’, ‘MINKOVSKY_FOUR’].
- **exponent** (*float*) – The exponent for Minkowski distance metric.

RETURNS:

A list of distances to the four closest features and their locations.

RETURN TYPE:

list[list[float] | list[`mathutils.Vector`]]

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