

[Acceler...](#) / [...](#) / [vImage.PixelBuffer](#) / `separableConvolve(horizontalKernel:verticalKernel:bias:edgeMode:destinatio`

## Instance Method

# separableConvolve(horizontalKernel:verticalKernel:bias:edgeMode:destination:)

Performs separable convolution on an 8-bit planar pixel buffer.

iOS 16.0+ | iPadOS 16.0+ | Mac Catalyst | macOS 13.0+ | tvOS 16.0+ | visionOS | watchOS 9.0+

```
func separableConvolve(
    horizontalKernel: [Float],
    verticalKernel: [Float],
    bias: Float = 0,
    edgeMode: vImage.EdgeMode<Pixel_16U>,
    destination: vImage.PixelBuffer<Format>
)
```

Available when `Format` is `vImage.Planar8`.

## Parameters

### `horizontalKernel`

The 1D horizontal convolution kernel.

### `verticalKernel`

The 1D vertical convolution kernel.

### `bias`

A value that the operation adds to each element in the convolution result, before performing any clipping.

## edgeMode

The convolution edge mode. The background color must be a single Pixel 16U value.

## destination

The destination pixel buffer.

# Discussion

The following code shows how to apply a Gaussian blur using separable convolution to a planar buffer:

```
let srcImage = imageLiteral(resourceName: " ... ").cgImage(
    forProposedRect: nil,
    context: nil,
    hints: nil)!

var cgImageFormat = vImage_CGImageFormat(
    bitsPerComponent: 8,
    bitsPerPixel: 8 * 1,
    colorSpace: CGColorSpaceCreateDeviceGray(),
    bitmapInfo: CGBitmapInfo(rawValue: CGImageAlphaInfo.none.rawValue))!

let src = try vImage.PixelBuffer(
    cgImage: srcImage,
    cgImageFormat: &cgImageFormat,
    pixelFormat: vImage.Planar8.self)

let dest = vImage.PixelBuffer(
    size: src.size,
    pixelFormat: vImage.Planar8.self)

src.separableConvolve(
    horizontalKernel: vImage.ConvolutionKernel.gaussian1Dx7,
    verticalKernel: vImage.ConvolutionKernel.gaussian1Dx7,
    edgeMode: .truncateKernel,
    destination: dest)

let outputImage = dest.makeCGImage(cgImageFormat: cgImageFormat)
```

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# See Also

## Related Documentation

`{}` [Blurring an image](#)

Filter an image by convolving it with custom and high-speed kernels.

## Separable convolution

```
func separableConvolve(horizontalKernel: [Float], verticalKernel: [Float], bias: Float, edgeMode: vImage.EdgeMode<Pixel_16F>, useFloat16Accumulator: Bool, destination: vImage.PixelBuffer<Format>)
```

Performs separable convolution on a 16-bit planar pixel buffer.

```
func separableConvolve(horizontalKernel: [Float], verticalKernel: [Float], bias: Float, edgeMode: vImage.EdgeMode<Pixel_F>, destination: vImage.PixelBuffer<Format>)
```

Performs separable convolution on a 32-bit planar pixel buffer.

```
func separableConvolve(horizontalKernel: [Float], verticalKernel: [Float], bias: Float, edgeMode: vImage.EdgeMode<Pixel_16U>, destination: vImage.PixelBuffer<Format>)
```

Performs separable convolution on a multiple plane 8-bit pixel buffer.

```
func separableConvolve(horizontalKernel: [Float], verticalKernel: [Float], bias: Float, edgeMode: vImage.EdgeMode<Pixel_F>, destination: vImage.PixelBuffer<Format>)
```

Performs separable convolution on a multiple plane 32-bit pixel buffer.

```
struct ConvolutionKernel
```

Constants that describe 1D convolution kernels.