

# MorphologicalGradientImageFilter

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**Abstract:** Morphological gradients enhance the variation of pixel intensity in a given neighborhood.

*Keywords:* mathematical morphology, gradient

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## 1 Description

Morphological gradients enhance the variation of pixel intensity in a given neighborhood. This filter can be used to produce the basic morphological gradient (aka Beucher’s gradient), the thick gradient and the directionnal gradient, depending on the size and the shape of structuring element.

## 2 Implementation

MorphologicalGradientImageFilter is a mini pipeline with a GrayscaleDilateImageFilter, a GrayscaleErodeImageFilter and a SubtractImageFilter. A more efficient implementation should be done by doing the erosion the dilation and the subtraction in the same pass. It should be easy and efficient to do with a moving histogram algorithm (not ready yet).

## 3 Usage

As usual, user has to include the headers:

```
#include "itkMorphologicalGradientImageFilter.h"  
#include "itkBinaryBallStructuringElement.h"
```

Create the structuring element\*.

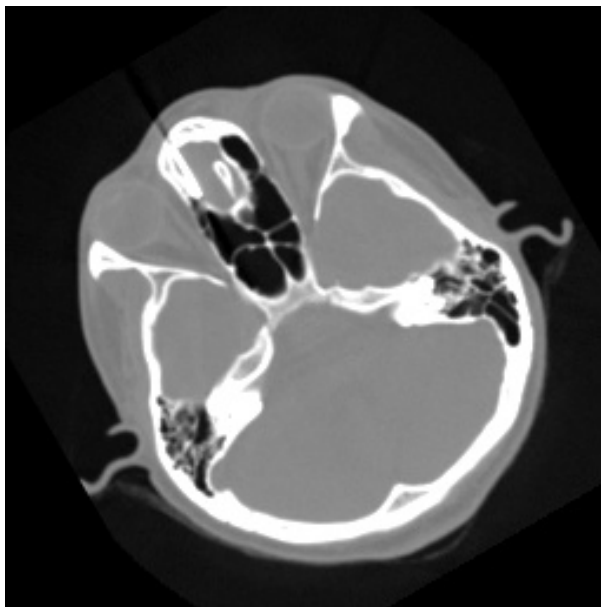
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\* Creating a structuring element has to be done, although it have been better to have a default structuring element of radius one. This problem is related to bug #1877.

```
typedef itk::BinaryBallStructuringElement< PType, dim >  
    StructuringElementType;  
StructuringElementType structuringElement;  
structuringElement.SetRadius( 2 );  
structuringElement.CreateStructuringElement();  
Create the filter
```

```
typedef itk::MorphologicalGradientImageFilter  
    < IType, IType, StructuringElementType > GradientType;  
GradientType::Pointer gradient = GradientType::New();  
gradient->SetInput( filter->GetOutput() );  
gradient->SetKernel( structuringElement );
```

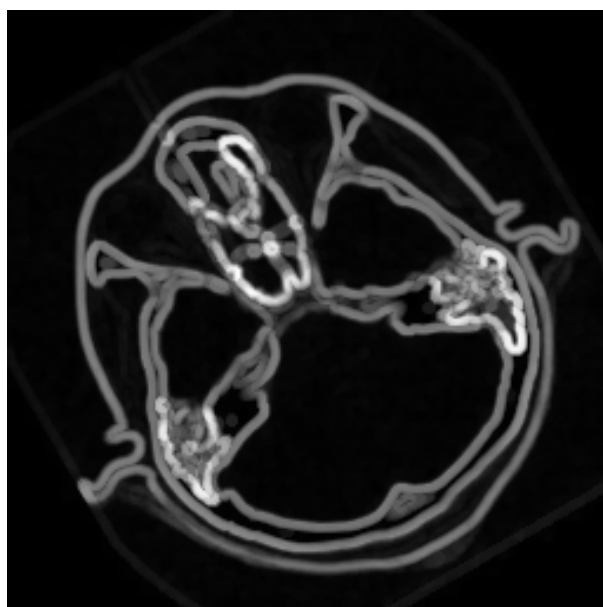
## 4 Example



**Fig. 1** The input image.

## References

- [1] Jean-F. Rivet, Pierre Soille and Serge Beucher: Morphological gradients. *Journal of Electronic Imaging*, 2 (4): 326-336, October 1993.



**Fig. 2** The gradient image.