

InvertIntensityImageFilter

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Abstract: InvertIntensityImageFilter is a convenient filter to invert the intensity of an image.

Keywords: *UnaryFunctorImageFilter*

1 Description

InvertIntensityImageFilter is a convenient filter to invert the intensity of an image. An image can already be inverted with ITK, but it requires to use a more complex filter (ShiftScaleImageFilter or IntensityWindowingImageFilter).

2 Implementation

InvertIntensityImageFilter is base on UnaryFunctorImageFilter. and simply subtract the maximum value to all pixels before casting the result to the output pixel type.

```
TOutput result = static_cast<TOutput>( m.Maximum - x );
```

The maximum value is not computed by the filter to avoid iterating over the input image twice. It may be given by the user, but the default value should be good in most cases.

3 Performance

The performances of the different solutions have been measured, even if they are not a problem with the current filters able to invert an image.

Measures have been done on a linux box with an Athlon64 2800+ and repeated 100 fold. The inverted image is an 8 bits 3D image of size 371x371x34*. Results are shown in Table 1.

* Image of ES cells from mima2 (<http://mima2.jouy.inra.fr/>)

filter	Execution time
InvertIntensityImageFilter	0.0367s
ShiftScaleImageFilter	0.0842s
IntensityWindowingImageFilter	0.0876s

Table 1 Execution time.

4 Usage

As usual, user has to include the header:

```
#include "itkInvertIntensityImageFilter.h"
```

and declare the type, instantiate the filter, and set the input image

```
typedef itk::InvertIntensityImageFilter< InputType, OutputType >
    InvertType;
InvertType::Pointer invert = InvertType::New();
invert->SetInput( filter->GetOutput() );
```

The maximum value can be set with the `SetMaximum()` method, and read with `GetMaximum()`.

```
invert->SetMaximum( 80 );
```

The default is `itk::NumericTraits< PType >::max()`.

5 Example

This filter can be use to invert a binary image, a distance map, etc.

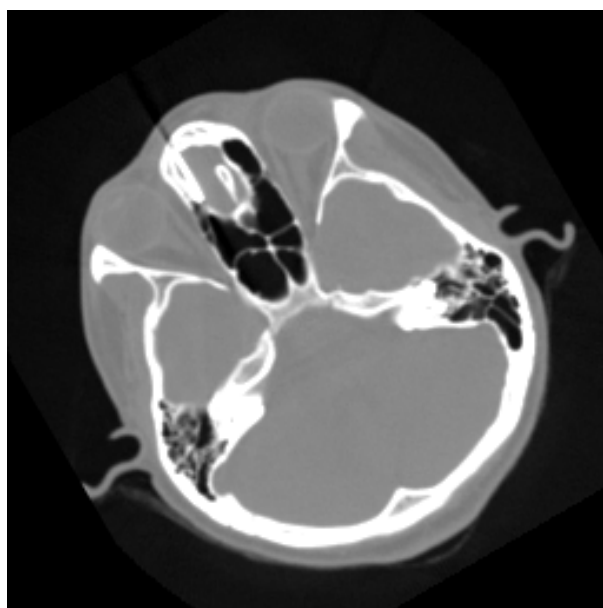


Fig. 1 The input image.

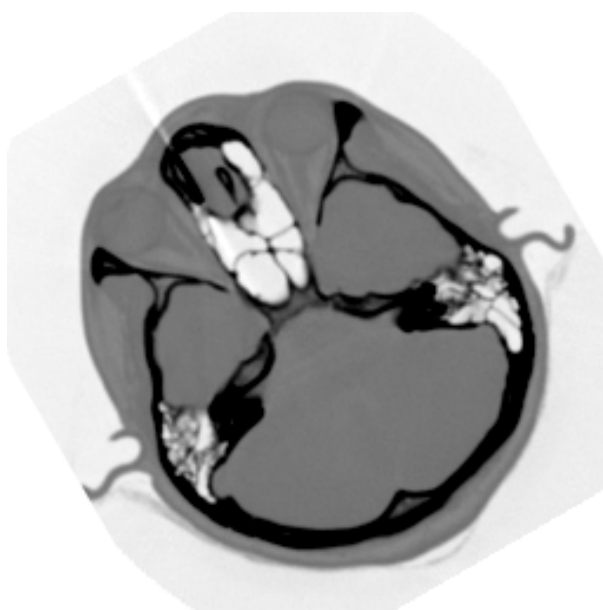


Fig. 2 The inverted image.