
Subject: Re: CT number calculation in IDL
Posted by [David Fanning](#) on Fri, 02 Dec 2005 01:45:18 GMT
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Nikki Bloms writes:

- > This might be a remedial question, but I have tried to search for
- > something related with no luck.
- >
- > A little background, I'm mainly using IDL for medical imaging, quality
- > assurance of MRI/CT/etc images. My current project is to develop a
- > program to automate measurements of ROI's on a water phantom imaged in
- > CT. The resulting data needs to be expressed in CT numbers.
- >
- > My question: Is there a conversion or an easy way to convert between
- > pixel value and CT number? Or, are the numbers the same?
- >
- > Any input is appreciated, Thank you in advance,

From Wikipedia:

Pixels in an image obtained by CT scanning are displayed in terms of relative radiodensity. The pixel itself is displayed according to the mean attenuation of the tissue that it corresponds to on a scale from -1024 to +3071 on the Hounsfield scale. Water has an attenuation of 0 Hounsfield units (HU) while air is -1000 HU, bone is typically +400 HU or greater and metallic implants are usually +1000 HU.

Most CT data has pixel values in the 0 to 3000 range. Usually, you can find a Rescale Slope (usually 1) and a Rescale Intercept (usually -1024) in the Dicom header. These are used to convert the image pixel value to Hounsfield units:

```
image_hu = (pixel_value) * slope + intercept
```

Once in these units, you typically window/level to see the features of interest (see my WINDOWIMAGE program, for example). To see bone, for example:

```
TV, Bytscl(image_hu, Min=300, Max=500)
```

To see fat (-100 to 200):

```
TV, BytScl(image_hu, Min=-100, Max=200)
```

Cheers,

David

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Coyote's Guide to IDL Programming: <http://www.dfanning.com/>
