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Subject: Re: IDL EPA Exam Test Question  
Posted by [Craig Markwardt](#) on Wed, 30 Aug 2000 07:00:00 GMT  
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davidf@dfanning.com (David Fanning) writes:  
> This is actually a serious question that I was  
> asked today from one of my e-mail friends. I know  
> it is used to build "frequency images", but what  
> are those and how does a DIST image work in that  
> context?

When you take the FFT of an image the meaning of coordinate axes change. In a transformed image, the coordinates label the \*frequency\* of each pixel. The FFT attempts to decompose the image or signal into oscillating sine waves with various frequencies; the result is the amplitude of each wave.

In a 1D transformed image, pixel 0 is the DC amplitude, pixel 1 is the amplitude of the slowest varying wave, and so on for higher frequency waves. For a 2D transformed image you have both an "X" frequency and a "Y" frequency -- a frequency "image." The fourier transform also keeps track of "negative" frequencies, which for some reason are kept in the second half of the vector.

DIST computes the frequency of each element in such a 2D transformed image --- or at least is proportional to it. This would be useful if you are applying filtering in the frequency domain. For example if you wanted to apply an exponential filter to attenuate the high frequency amplitudes in a 128x128 array, you might do this:

```
freq = dist(128,128)
fim = fft(im)*exp(-freq)
```

Craig

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