**Exercise 10 – Image interpolation (8.January.2017 16h-17h)**

1. Let’s interpolate an image (e.g. V=phantom(256) or load from our previous classes):

1. Vq = interp2(V,1)
2. What is the size of the new image?
3. Vq=interp2(V,2)
4. What is the size of the new image?
5. Default method is linear, try other methods.

Vq = interp2(...,METHOD) specifies alternate methods. The default

is linear interpolation. Available methods are:

'nearest' - nearest neighbor interpolation

'linear' - bilinear interpolation

'spline' - spline interpolation

'cubic' - bicubic interpolation as long as the data is

uniformly spaced, otherwise the same as 'spline'

1. Now consider this image:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 |  |
| 2 | 3 | 4 | 3 |  |
| 3 | 4 | 3 | 2 |  |
| 4 | 3 | 2 | 1 |  |

To interpolate to sizes which are not the double and so on, grids have to be defined:

[X,Y]=meshgrid(0.5:1:4,0.5:1:4)

[Xq,Yq]=meshgrid(4/3/2:4/3:4,4/3/2:4/3:4)

[Xm,Ym]=meshgrid(4/5/2:4/5:4,4/5/2:4/5:4)

>> Vq=interp2(X,Y,V,Xq,Yq)

>> Vm=interp2(X,Y,V,Xm,Ym)

1. perform the nearest neighbour interpolation algorithm to a 3x3 image.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1 | 3 | 4 |  |  |
| 3 | 3 | 2 |  |  |
| 4 | 2 | 1 |  |  |
|  |  |  |  |  |

1. perform the nearest neighbour interpolation algorithm to a 5x5 image.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 3 | 4 |  |
| 2 | 3 | 4 | 4 | 3 |  |
| 3 | 4 | 3 | 3 | 2 |  |
| 3 | 4 | 3 | 3 | 2 |  |
| 4 | 3 | 2 | 2 | 1 |  |

1. perform the bilinear interpolation algorithm for a 3x3 image.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1.3 | 2.7 | 3.72 |  |  |
| 2.7 | 3.5 | 2.7 |  |  |
| 3.72 | 2.7 | 1.3 |  |  |
|  |  |  |  |  |

1. perform the bilinear interpolation algorithm for a 5x5 image.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | 1.7 | 2.5 | 3.3 | 4 |  |
| 1.7 | 2.4 | 3.2 | 3.58 | 3.3 |  |
| 2.5 | 3.2 | 3.5 | 3.2 | 2.5 |  |
| 3.3 | 3.58 | 3.2 | 2.4 | 1.7 |  |
| 4 | 3.3 | 3.5 | 1.7 | 1 |  |

* + - 1. What if we would have a 3D image to interpolate with bilinear method?

