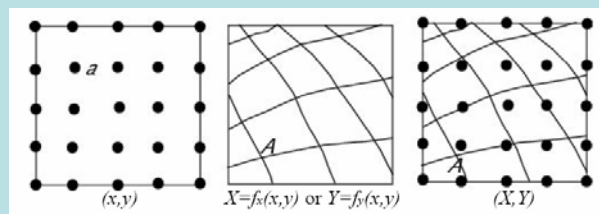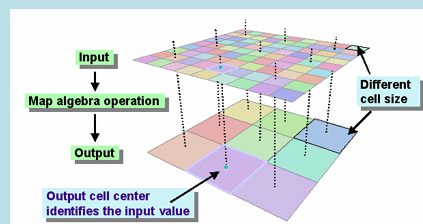# Resampling Methods

Geog581 Satellite Digital Image Analysis
Portland State University
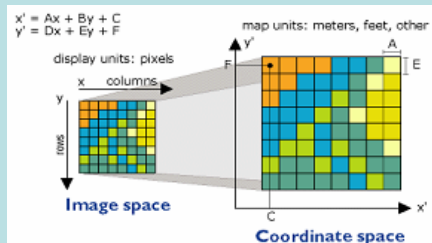Dan Craver
January 23, 2007

Why resample?

Geometric Correction
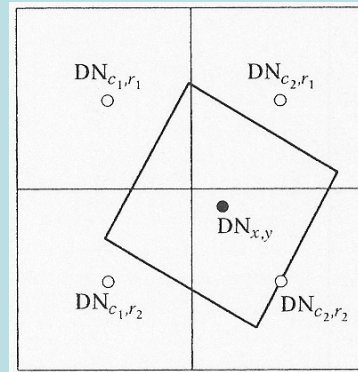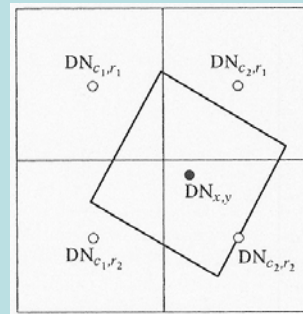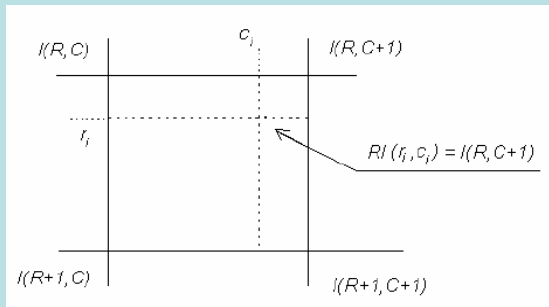

Analysis with GIS

How resample?

- Determine corresponding coordinates
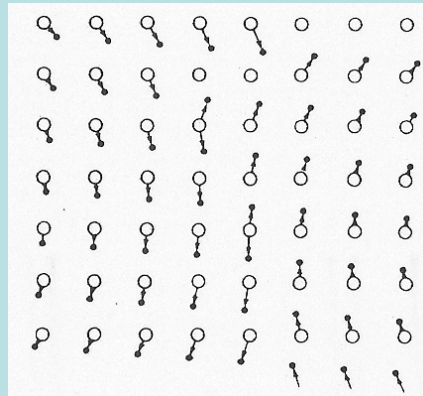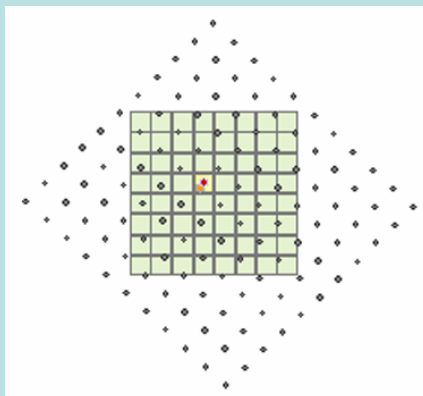- Assign value to pixel in output

Three methods

- Nearest Neighbor

- Bilinear Interpolation
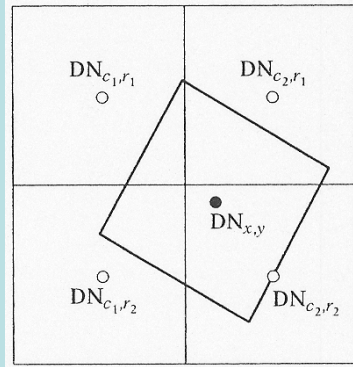
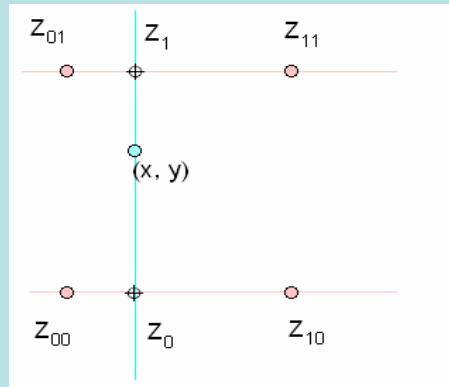- Cubic Convolution (aka "Bicubic" pg. 104)

Nearest Neighbor

Nearest Neighbor

Bilinear Interpolation

Bilinear Interpolation
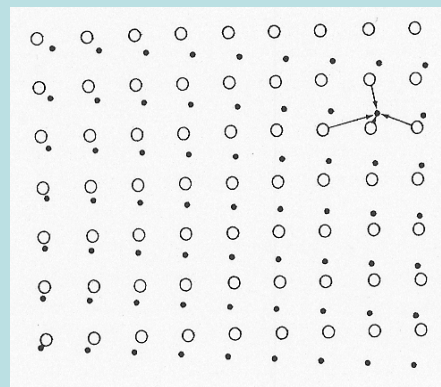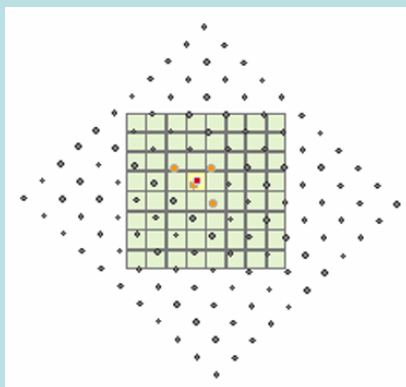
Cubic Convolution (aka "Bicubic")
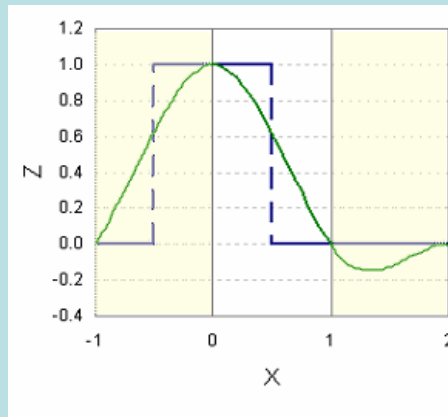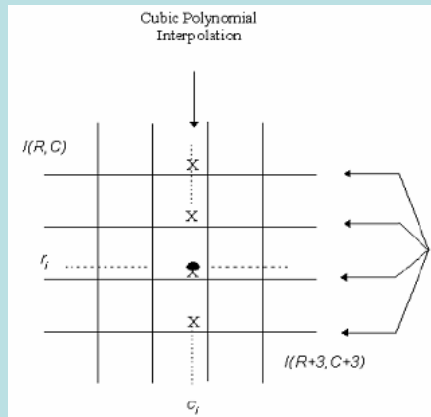
Cubic Convolution (aka "Bicubic")
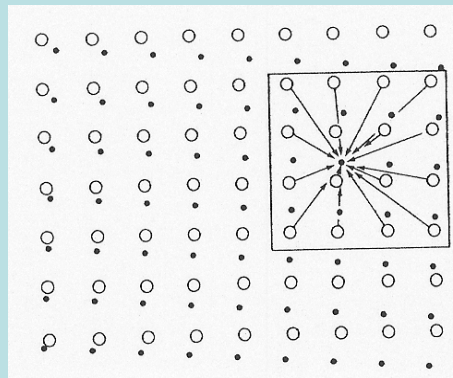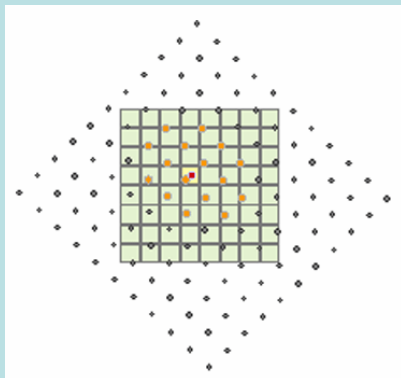
Choices

- Application of corrected image

- Computer facilities available

  Nearest Neighbor » 10 FLOPs per interpolated point

  Bilinear Interpolation » 50 FLOPs per interpolated point

  Cubic Convolution » 350 FLOPs per interpolated point

Applications

- Classification
- Visual Interpretation

- Discrete Data
- Continuous Data
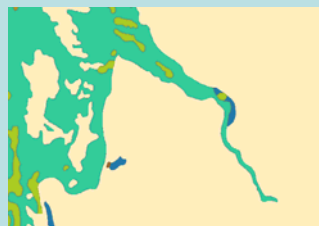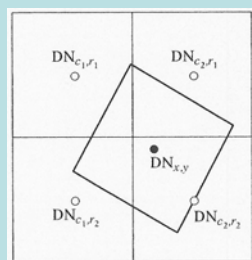
Testing Interpolator Quality
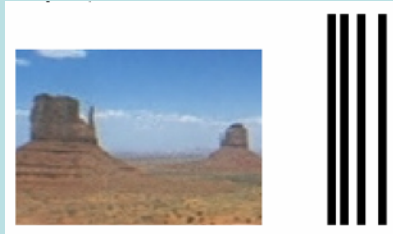
Helmut Dersch
(der@fh-furtwangen.de)
Technical University Furtwangen
Revised June 30, 1999

http://www.path.unimelb.edu.au/%7Edersch/interpolator/interpolator.html

Original

Nearest Neighbor

Bilinear Interpolation

Cubic Convolution

Resources

- ftp://earth1.esrin.esa.it/pub/stb_ftp/asd_26-27.pdf
- http://www.quantdec.com/SYSEN597/GTKAV/section9/map_algebra.htm
- http://en.wikipedia.org/wiki/Linear_interpolation
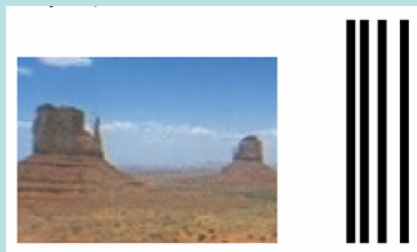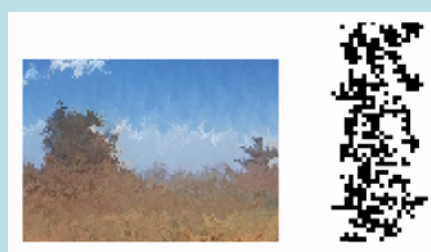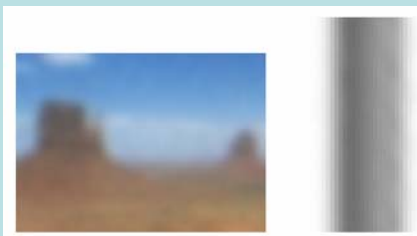- http://www.path.unimelb.edu.au/%7Edersch/interpolator/interpolator.html
- http://www.imgfsr.com/ResamplingCVPR.pdf
- ArcGIS Desktop Help
- Campbell, J. B. 2002. Introduction to Remote Sensing. New York. Guilford Press.
- Lillesand, T. M., Kiefer, R. W. and J. W. Chipman. 2004. Remote Sensing and Image Interpretation. Hoboken. John Wiley & Sons, Inc.
- Mather, P. M. 2004. Computer Processing of Remotely Sensed Images, An Introduction. West Sussex. John Wiley & Sons Ltd.

Questions

- 1. When transforming an image to geographic coordinates, why is it unlikely to directly transfer pixel values from the uncorrected to the corrected image?

- 2. For each of the three common resampling methods, how many pixels from the uncorrected image are used to calculate the single pixel value in the corrected image?

- 3. Which of the three common resampling methods requires the most computational time? Which one the least?

- 4. Should classification be performed before or after resampling and why?

- 5. Which resampling methods are best suited for images used solely for visual interpretation purposes?