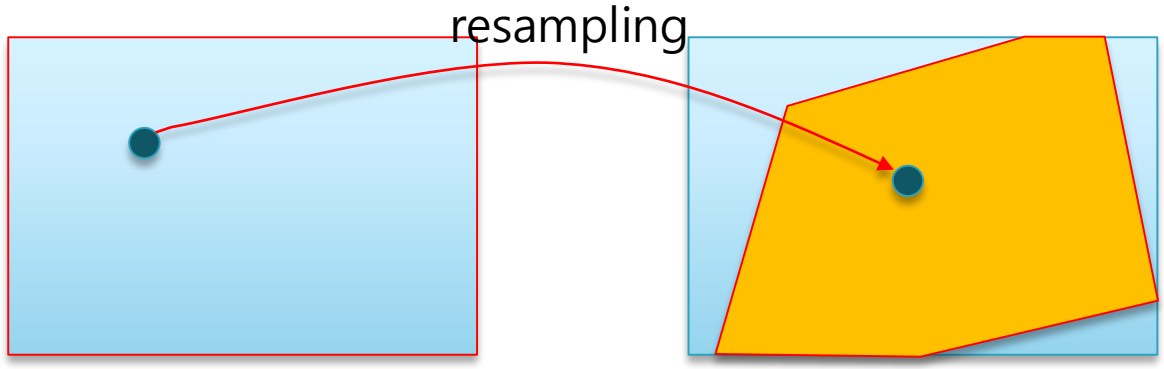
Lecture 11

Image Resampling

Multimedia System

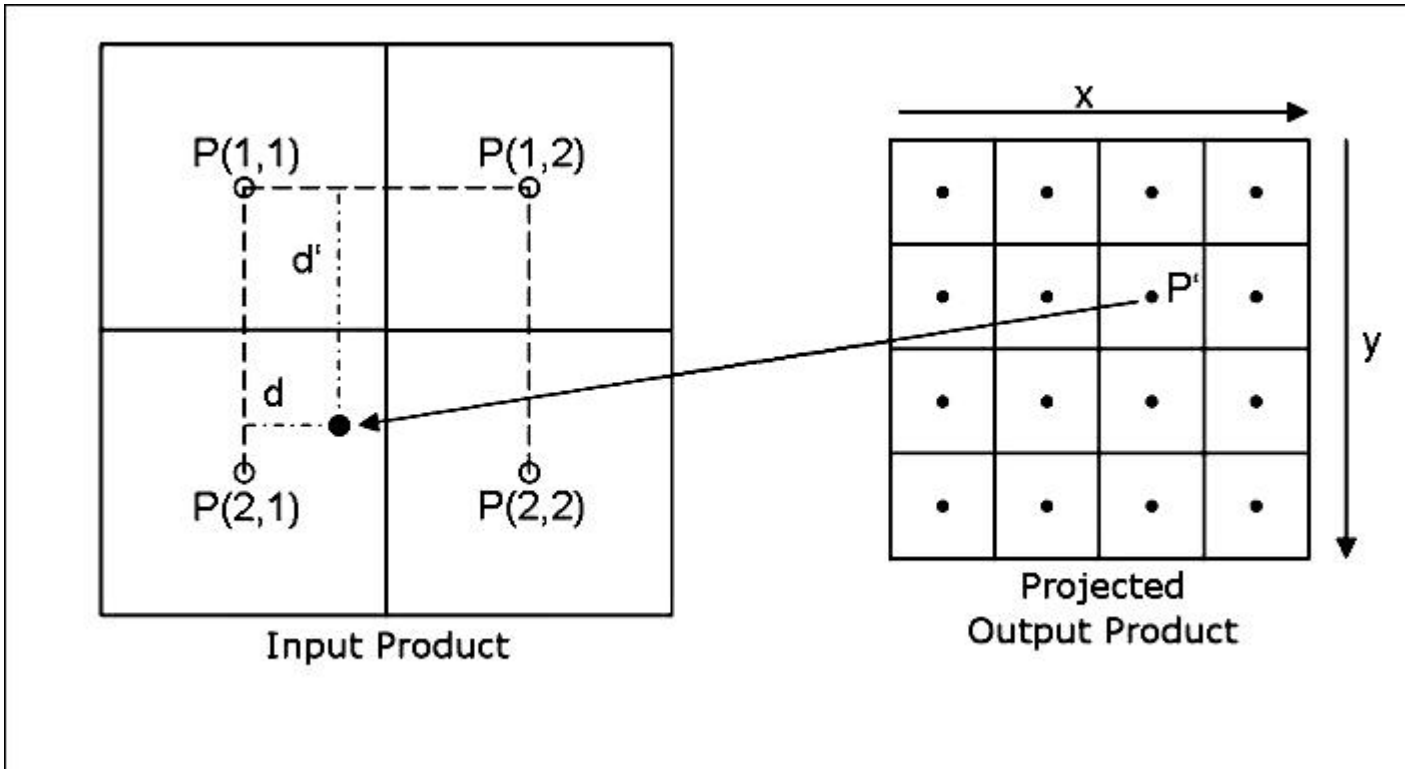
Spring 2020

Image Resampling



- The purpose is to assign pixel values to the empty pixel s in a new matrix output
- The intensity of a pixel in the output matrix is assigned based on the intensity of its surrounding pixels in the o riginal image
- Methods
  - Nearest neighbor
  - Bilinear interpolation
  - Cubic interpolation

Bilinear interpolation



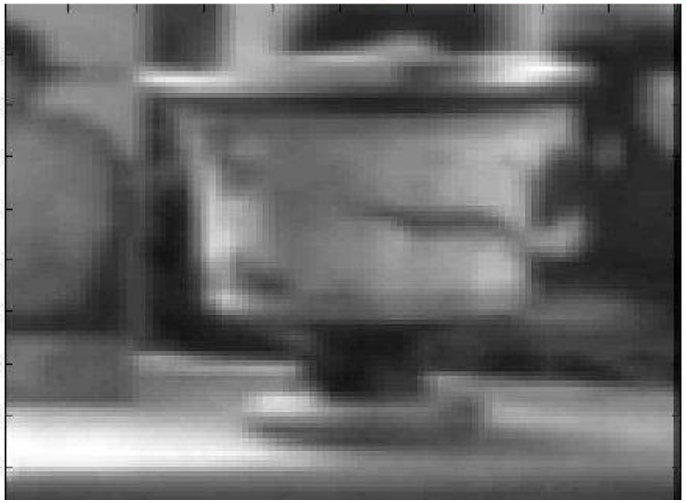
$$P'(x,y) = P(1,1)\cdot(1-d)\cdot(1-d') + P(1,2)\cdot d\cdot(1-d') + P(2,1)\cdot d'\cdot(1-d) + P(2,2)\cdot d\cdot d'$$

Interpolation Result

Original Image

Nearest Neighbor

Bilinear Interpolation



Interpolation Result

Original image:  x 10

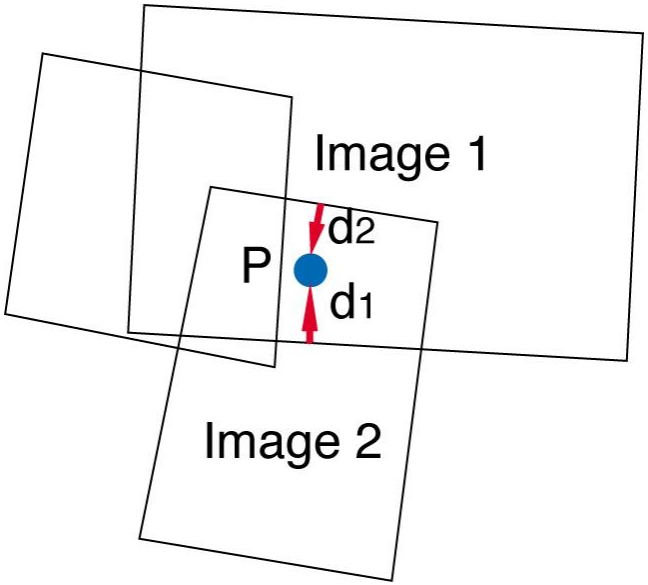
Nearest-neighbor interpolation

Bilinear interpolation

Bicubic interpolation

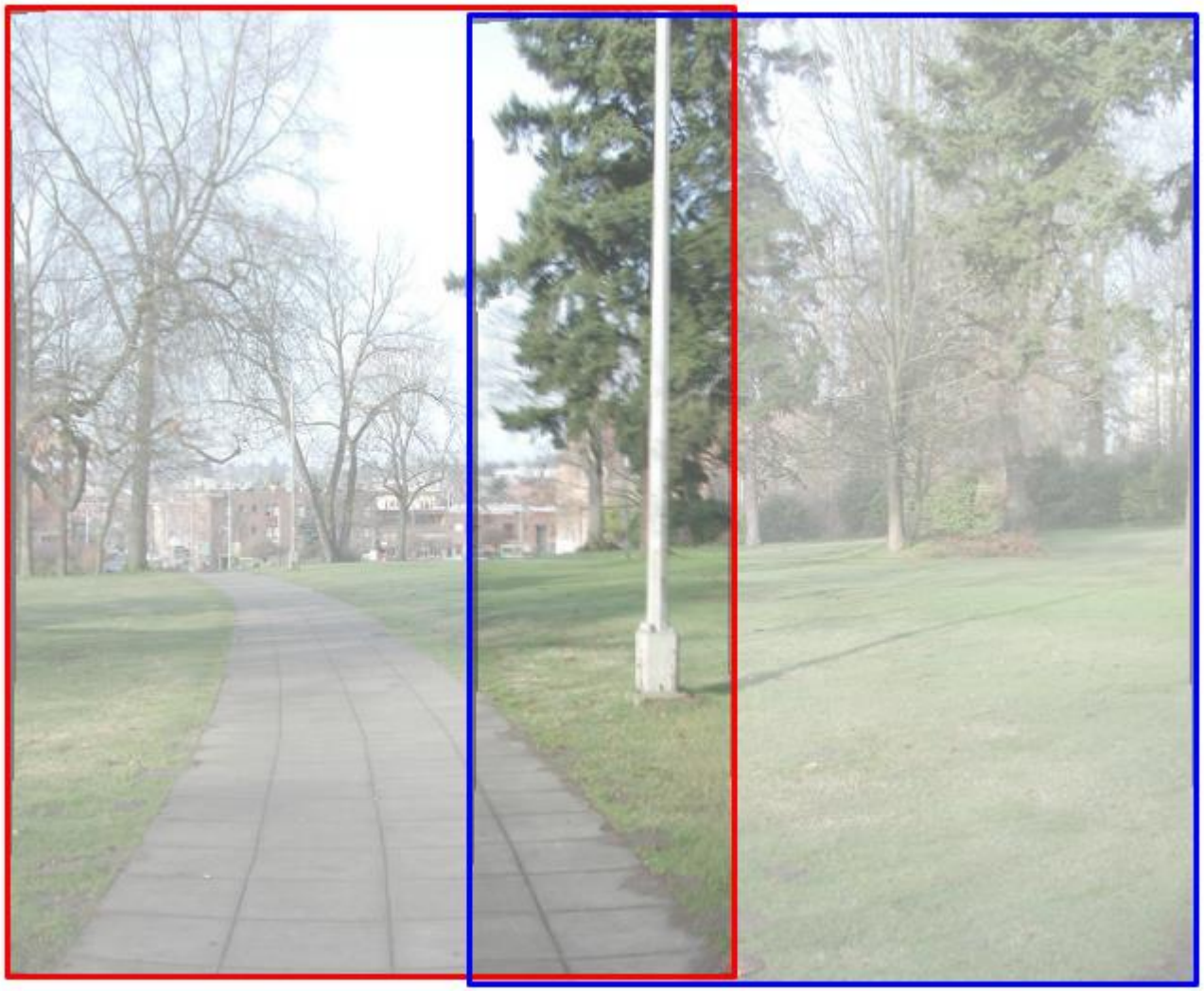
Composing: Blending

- Problem: Smoothly blend over between images to hide seams
- Rather complicated math
- Instead: Use simple heuristic
  - Every pixel is weighted with the distance to the closest im age boundary to the nth power



$$f(P) = \frac{d_1 f_1(P) + d_2 f_2(P)}{d_1 + d_2}$$

Blending



Blending

Composing: Blending

without blending

Composing: Blending

with blending