

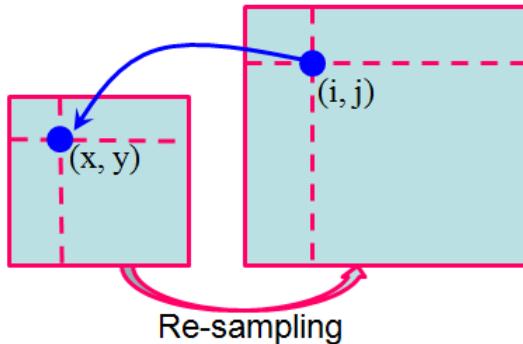
## Project 1: Digital Image Re-Sampling (10 points)

Assigned: February 5, 2026 (Thursday)

Due: 11:59pm February 15, 2026 (Sunday)

In this project, you are asked to **re-sample** a 2D digital image. Specifically, you are asked to re-sample an input image by  $t$  times in both x-axis and y-axis, where  $t$  is an arbitrary positive **float-type** scale factor. Please consider bi-linear (BL) interpolation at  $(x, y)$  in case  $x$  or  $y$  is not at a grid point (or integer).

Hint: Assume the input image has a size of  $M * N$ . First you need to determine the size of the output image by multiplying both  $M$  and  $N$  by  $t$ . That is,  $M' = M * t$  and  $N' = N * t$ .



Please submit the following files to Canvas drop-box:

- (1) The source code (C/C++ or Matlab) and a readme file
- (2) Two output images in PGM format or others (BMP, JPG, etc.): one for down-sampling ( $t < 1$ ) and one for up-sampling ( $t > 1$ ), where  $t$  is a floating-point number. You should indicate in the readme file what  $t$  values are used for the two output images.

### Additional notes:

- (1) In case you are using C for this project, a sample code written in C is available on Canvas. It tells you how to read and write a PGM image.
- (2) A sample image is provided on Canvas for you to use as input.
- (3) The scaling factor  $t$  must be generally defined as a variable in your code so that a user can simply change its value to generate another scaled image.
- (4) You must implement the bi-linear interpolation algorithm by yourself – calling any built-in functions provided by a 3rd party library is NOT allowed.