# HW1

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I.   Method:

According to the spec, three methods are applied, which are Nearest Neighbor Interpolation, Bilinear Interpolation, and Bicubic Interpolation.

The formula to do the two Bi-interpolations are the same as what is written on the spec, and the method to do the Nearest Neighbor interpolation is simply using (int(x), int(y)).

For rotation, I use the inverse rotation matrix to find the point that is corresponding to the current point, and for scaling, I find the point by simply divided by the scale (2 in this homework).

II.   Result:

The results for rotating the image by 30 degrees are here, they are Nearest Neighbor, Bilinear, and Bicubic Interpolation, respectively.
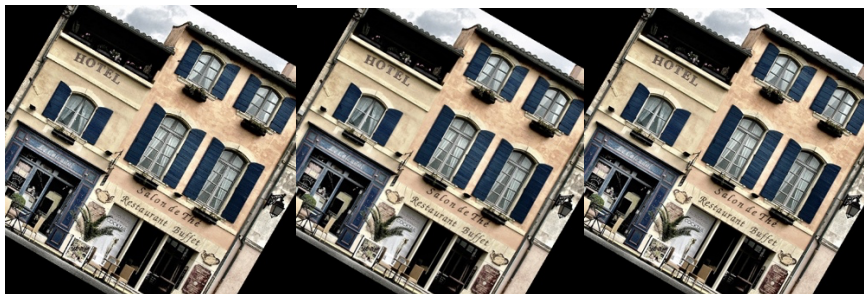
The main difference is that, the result in bicubic interpolation is the best but is also the most time, and the result in nearest neighbor is the worst, but takes only a few seconds.

The results for scaling the image by 2 are here, they are placed by the same order as above.

We can draw the same conclusion as above, but I also want to mention that there would be some black edges for bicubic interpolation, it is because that it needs 2 pixels to the right and 1 pixel to the left for every pixel in the new image, which cannot be found in the original image for the edge pixels, so the black edges cannot be avoided.

Also, I zoomed out the images to put them in this report, the original images can be generated with the code.

III.   Feedback

In this homework, I learned how to implement the three interpolations, and also get to know that there are some important points to notice while implementing, like sometimes there might be overflow, and we also need to notice not to make x and y exceed the bounds. It is a very nice to have a chance to practice!