Image Warping Lab (50% of Graded Assignment 1)

Marking scheme [out of 100 points]

1. Forward mapping [15]

Criterion ID	Points	What you need to achieve:
1a	5	Correctly implement the *transform_pixel_nn()* function, which transforms a point (x, y) using a homogeneous 2D transformation matrix, rounding the resulting coordinates to the nearest integer pixel location
1b	10	Correctly implement forward mapping using the per-pixel transform function from 1a

2. Backward mapping [20]

Criterion ID	Points	What you need to achieve:
2a	20	Correctly implement backward mapping using the per-pixel transform function from part 1 and nearest-neighbour interpolation

3. Linear interpolation [20]

Criterion ID	Points	What you need to achieve:
3a	15	Correctly implement backward mapping with bilinear interpolation for comparison to the nearest neighbour implementation from part 2.
3b	5	Correctly handle the off-the-image grid source pixels in the interpolation of 3a to achieve the *fading-to-black* effect at the edges of the output image.

4. Lens Undistortion [45]

Criterion ID	Points	What you need to achieve:
4a	5	Based on the provided polynomial lens distortion model, correctly implement a function that returns the pixel location in the source image corresponding a pixel (u,v) in the (undistorted) target image for a given camera matrix and lens distortion coefficients.
4b	15	Using the function from 4a, correctly implement undistortion for a complete image via backward mapping with bilinear interpolation. Partial credit can be awarded at marker's discretion for not completely correct answers provided basic undistortion functionality is achieved.
4c	15	**Advanced:** Correctly implement functionally identical but fast image undistortion using vectorisation, without any for-loops. Your function must run in less than 3 seconds. Partial credit is rarely awarded for this question.
4d	10	Full credit if the outputs in 4b and 4c are correct and identical as validated by the test cell in the jupyter notebook. Partial credit (at marker's discretion) if the outputs are identical but not completely correct. No credit if either (or both) of the outputs in 4b and 4c being compared here are completely wrong given the task or not computed.