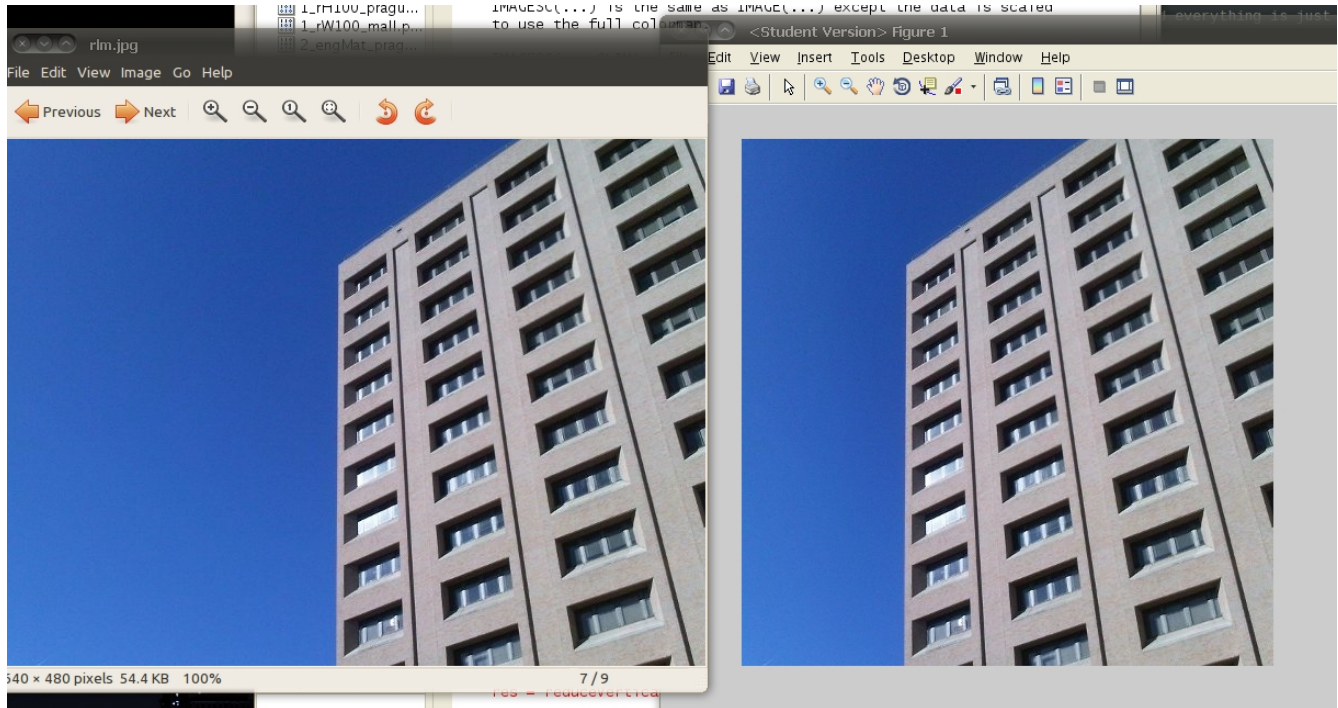
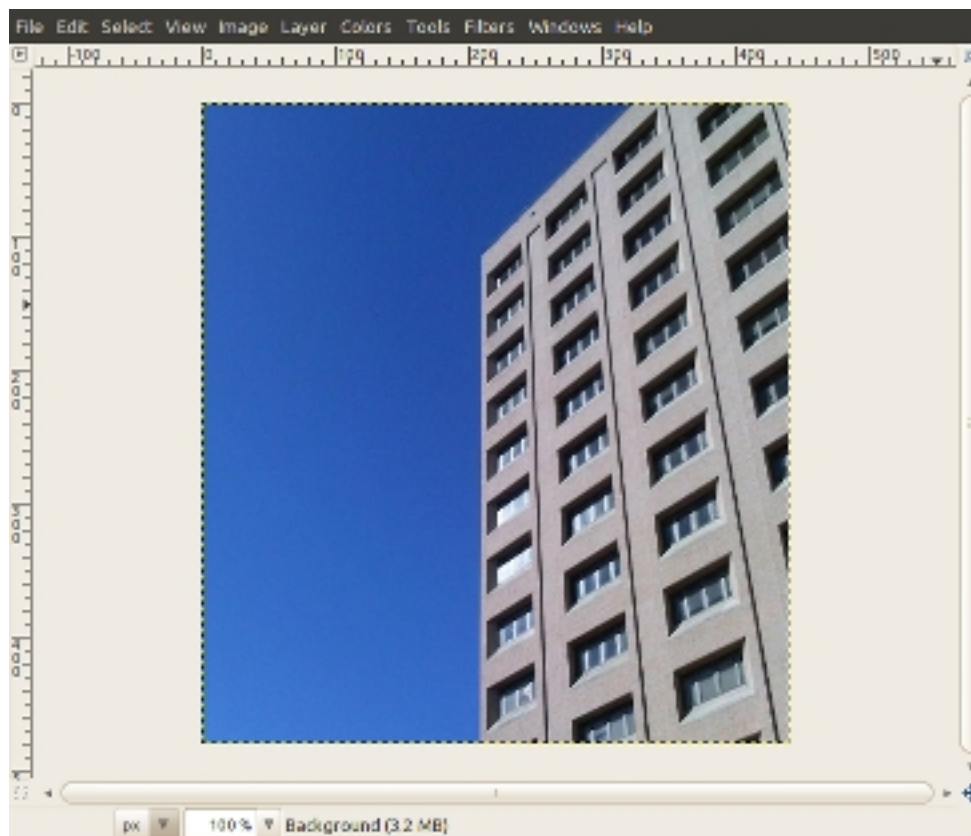


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1.
 - a. Input Image (on left)
 - b. Output Image (on right), 200 vertical lines carved out



- c. If the image had been created with imresize



d.

Input Dimensions: 640 x 480

Output Dimensions: 440 x 480

e.

The seam carved image underwent 200 vertical seam carvings.

The naively resized image was horizontally “squished” by 200 pixels.

f.

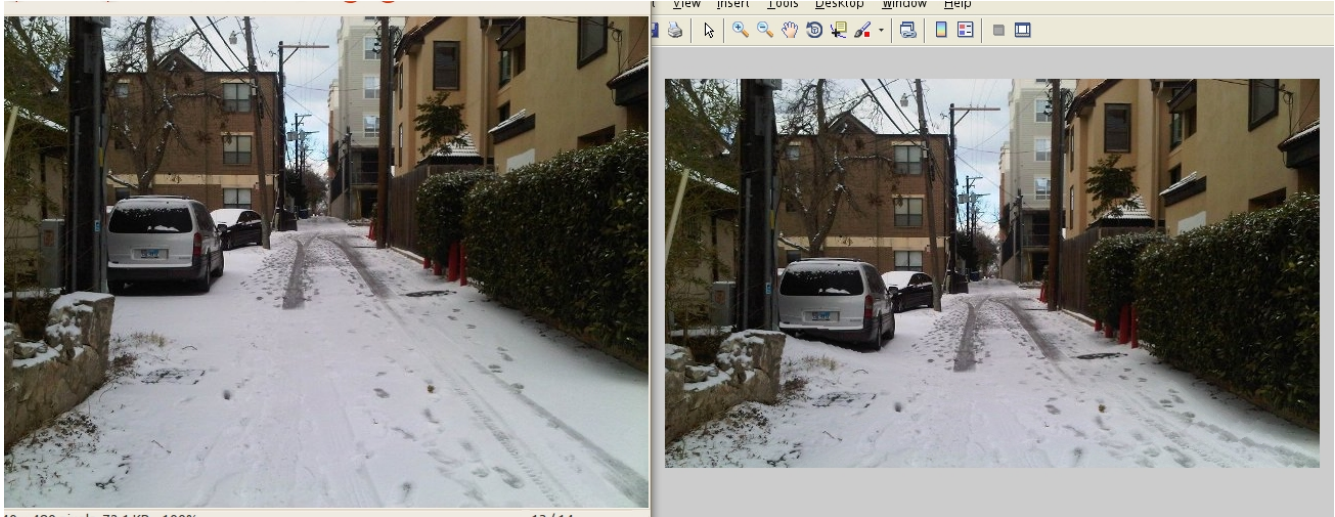
The seam carving in this image is obviously going to carve out the large areas of blue where there is low image energy. The colors vary only by small amounts, which causes the first partial derivatives of this area to be small, which means the energy will be low, and the seams will be smartly biased to this area. The building itself is left largely untouched. Admittedly, this is kind of a boring image but I knew it would work well for vertical seams. Just for kicks, below is the same image with horizontal seams cut out; obviously it does not fair nearly as well!



2.

Input Image (on left) 640 x 480

Output Image (on right) 640x380



The output image was produced by running `reduceHeight(img, 100)` so that it would shrink vertically by 100 pixels. At first glance it doesn't seem to bad; the snow was the main thing that gets cut out from the seam carver. However, looking closely at the bottom left of the gray van, we notice it is no longer a normal car. The rear left tire looks like it should be a foot off the ground.

The following image is the snow.jpg image squished vertically by 100 pixels. Obviously the seam carving algorithm does a much better job of keeping the image looking believable.

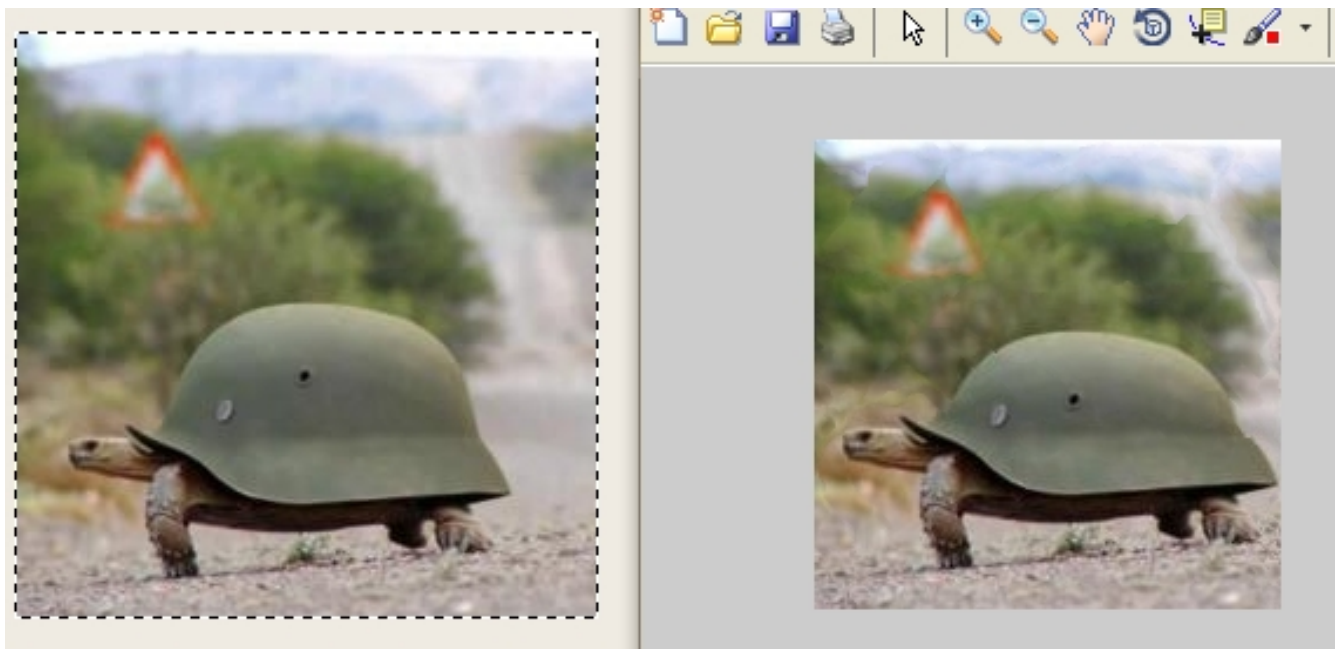


3.

This is a cute little image I found on the internet somewhere (no source provided). I chose it because it is square in dimensions. Theoretically, shrinking it with a dumb algorithm in the width and height dimensions by the same amount should produce good results, because the ratio of the image will remain the same. Let's see if seem carving can do as good of a job...

Input Image: 250 x 250

Output Image: 200 x 200



The turtle's shell did not do so well. The common green color was shrunk unnaturally in the horizontal direction whereas it resisted shrinking in the vertical direction. (You can see that a lot of the road was removed in the vertical direction instead).

Now for the normal scaling of this image (50 pixels in both dimensions):



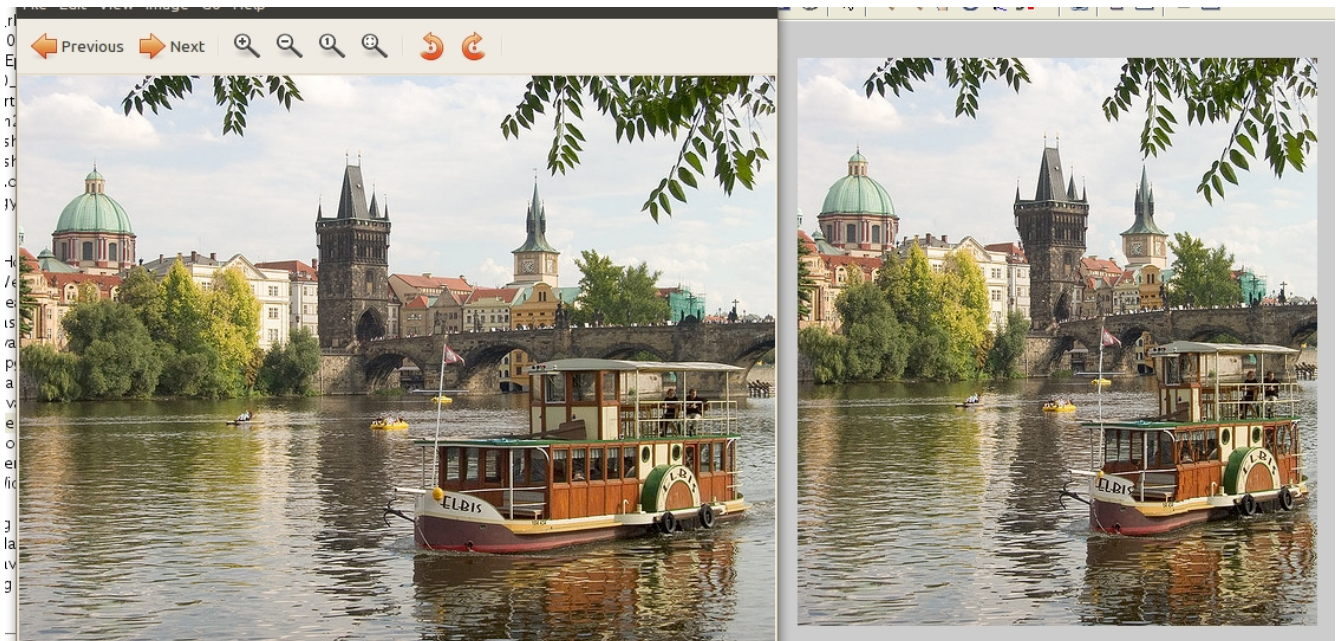
It looks just about perfect even after having been shrunk by 50 pixels both vertically and horizontally. The turtle is the right shape, the road still exists, and there is no awkward modification of the shapes in the original picture.

4.

Here is prague.jpg before and after 200 horizontal carvings.

Original Image: 640x480

Carved Image: 440x480



The carving algorithm didn't really do all that great of a job, but then again 200 pixels coming out of only 640 pixels to begin with is asking to cut nearly 1/3 of the image out. At least the image is still very recognizable. If we had done a simple 200 pixel horizontal squish, the image would have looked like this:



Actually, it doesn't look all that much different from the seam carved version. In fact, I would say this naively squished version looks better than the seam carved version. Perhaps this is a product of the GIMP using more advanced algorithms than what I'm expecting it to use when doing these naive scalings.