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Compile and run instructions:

- Extract the zipped file to a folder
- Import the folder as a project in eclipse
- Project->Build All
- The click File->Export->Java->Runnable JAR file
- In Launch configuration, select ‘ImageReader – ImageScaling’ and export to a desired destination
- Run the jar file using ‘java –jar file.jar cmdlineArguments’
- Or run the program from eclipse

Additional discussion

1. Methods to minimize/eliminate pixel stretching when changing pixel aspect ratios:

   - Cropping the image to the nearest multiple of the desired resolution

     Although naïve but this method entirely eliminates the pixel stretching problem resulting in images with no pixel stretching.

   - Adding additional pixels to the image to make up the desired aspect ratio

     This method preserves the original image when down sampling to a different aspect ratio.

2. Comments on seam carving output:
   The output from the seam carving method does seem to preserve the high importance (energy) areas in the image.

   Pros
   - Keeps the important areas of the image intact even after resizing to a different aspect ratio
   - Deletes/crops the redundant pixels in the image thereby increasing the overall efficiency

   Cons
   - Images get distorted when resizing to very low resolution or to a non-standard aspect ratio
   - Tends to lose seemingly important details in the image (e.g. flowers in hw1_3 image) when upsampling

   The method performs well when the high energy and low energy areas are segregated and well defined. Because the seams that are carved will not inadvertently take away the high energy content in the image.

   The method doesn't perform well when the high energy areas exist everywhere in the image. Also, geometric details like lines and boundaries in the images are distorted in the output which indicates that the method does not take into account these details.

   Attached output of seam carving: seam_carving_output.zip

3. An intelligent way to upsample is to make use of machine learning methods to learn the correspondence between high res and respective low res images. This learned model will be able to make good predictions when upscaling simple geometric shapes in the images.

   Also, a method could be derived from combining the machine learning model and matching of patterns within the same image. This all could be done with just one image. We could downsample the input image to multiple low res images. Then we could find patches in the input image from the downscaled versions. The found patches are used again to find their parent patches within the input image. These patches are copied over to the upscaled image appropriately, considering the change in dimensions to get the approximate final image.