Introduction to Matlab
Of matrices and big cats

Pouyan R. Fard and Dario Cuevas

27. Januar 2016

Fun with lions

Get the lion.jpg image from the website. Put it in your folder. Import the figure to matlab using the commands: `A = imread('lion.jpg','jpg'); A = rgb2gray(A); A = double(A);`. Do each of the following, saving each as a function with a descriptive name. Create a script that calls every one of these functions and plots the results of each in a subplot. Use the comand `imagesc` for plotting. After each one, always do `colormap(gray)` and give them descriptive titles. Remove axes.

1. Apply a horizontal gradient to the picture, such that the image fades (to black) on the left. Do this by multiplying the left-most column by 0, for example. Then multiply the second one by something a bit bigger, and so on.

2. Apply a vertical gradient, such that it fades on the bottom.

3. Create a horizontally flipped version of the image. Then, create an image that is the 'average' of the flipped and non-flipped versions.

4. Increase the contrast of the image. To do this, select a cutoff number between 1 and 255; let's use 120 as an example. Every pixel darker than 120, make it darker by multiplying its value by 0.5. Every pixel lighter than 120, make it lighter by multiplying by 2. Make the function so that its inputs are the matrix A, the cutoff value (120 in this example) and the scaling factor (0.5 in the example, such that $2 = 1/0.5$). In this case, set to 255 any pixel bigger than 255.

5. Remove the black space at the right of the lion. Do this by finding the first column in which all pixels are smaller than 5 (in the 1-255 scale), and remove all columns afterward.

6. From the result of the previous cropping, reduce the number of pixels by eliminating every 'second' pixel, both vertically and horizontally.

7. Take the reduction from the previous exercise and insert it somewhere in the black space on the original picture.