COMMAND-LINE IMAGE MANIPULATION WITH IMAGEMAGICK

Jeremy.Moore@unt.edu

SALLY USES SHELL BY THE SEASHORE

- Translates user commands into operating system commands
- Bourne shell, or *sh*, was the first major shell written by Steven Bourne. Included in Unix, Version 7, starting in 1979.
- *bash*, or the Bourne Again Shell, was "born" in January 1988

A FEW TIPS FOR THE SHELL

- Every single character makes a difference
- Capitalization matters: "echo $shell" is not the same as "echo $SHELL"
- Spaces in folders and filenames can cause large problems
- Tab-completion is your friend
- TEST ON BACK-UP FILES and don't do anything on a network drive until you know what you're doing!

IMAGEMAGICK

- Open-source software suite for manipulating bitmap images
- http://www.imagemagick.org
- Currently in v6
- Available Commands:
    - animate, compare, composite, conjure, **convert**, display, **identify**, import, **mogrify**, montage, stream

IDENTIFY

- returns information about an image in a simple, useful fashion
- identify shells.tif
  - shells.tif TIFF 19000x16000 19000x16000+0+0 8-bit sRGB 912MB 0.000u 0:00.000
  - image name, file format, image size, virtual canvas size and offset, color depth, internal format type, size on disk, user time, and elapsed time
- -verbose provides more information including compression

CONVERT VS. MOGRIFY

- Convert and mogrify both do "stuff" to images
- Convert reads a file, modifies it, and then writes to a different file or format
- Mogrify reads a file, modifies, and then outputs to the same file, i.e. it processes files in-place
- Mogrify is faster for batch actions, but the original file is replaced - make sure you have a back-up!

THE STUFF YOU CAN DO

-adaptive-blur • -adaptive-resize • -adaptive-sharpen • -adjoin • -affine • -alpha • -annotate • -antialias • -append • -attenuate • -authenticate • -auto-gamma • -auto-level • -auto-orient • -backdrop • -background • -bench • -bias • -black-point-compensation • -black-threshold • -blend • -blue-primary • -blue-shift • -blur • -border • -bordercolor • -borderwidth • -brightness-contrast • -cache • -caption • -cdl • -channel • -charcoal • -chop • -clamp • -clip • -clip-mask • -clip-path • -clone • -clut • -coalesce • -colorize • -colormap • -color-matrix • -colors • -colorspace • -combine • -comment • -compose • -composite • -compress • -contrast • -contrast-stretch • -convolve • -crop • -cycle • -debug • -decipher • -deconstruct • -define • -delay • -delete • -density • -depth • -descend • -deskew • -despeckle • -direction • -displace • -display • -dispose • -dissimilarity-threshold • -dissolve • -distort • -distribute-cache • -dither • -draw • -duplicate • -edge • -emboss • -encipher • -encoding • -endian • -enhance • -equalize • -evaluate • -evaluate-sequence • -extent • -extract • -family • -features • -fft • -fill • -filter • -flatten • -flip • -floodfill • -flop • -font • -foreground • -format • -format[identify] • -frame • -frame[import] • -function • -fuzz • -fx • -gamma • -gaussian-blur • -geometry • -gravity • -grayscale • -green-primary • -hald-clut • -help • -highlight-color • -iconGeometry • -iconic • -identify • -ift • -immutable • -implode • -insert • -intensity • -intent • -interlace • -interpolate • -interline-spacing • -interword-spacing • -kerning • -label • -lat • -layers • -level • -level-colors • -limit • -linear-stretch • -linewidth • -liquid-rescale • -list • -log • -loop • -lowlight-color • -magnify • -map • -map[stream] • -mask • -mattecolor • -median • -metric • -mode • -modulate • -monitor • -monochrome • -morph • -morphology • -mosaic • -motion-blur • -name • -negate • -noise • -normalize • -opaque • -ordered-dither • -orient • -page • -paint • -path • -pause[animate] • -pause[import] • -pen • -perceptible • -ping • -pointsize • -polaroid • -poly • -posterize • -precision • -preview • -print • -process • -profile • -quality • -quantize • -quiet • -radial-blur • -raise • -random-threshold • -red-primary • -regard-warnings • -region • -remap • -remote • -render • -repage • -resample • -resize • -respect-parentheses • -reverse • -roll • -rotate • -sample • -sampling-factor • -scale • -scene • -screen • -seed • -segment • -selective-blur • -separate • -sepia-tone • -set • -shade • -shadow • -shared-memory • -sharpen • -shave • -shear • -sigmoidal-contrast • -silent • -size • -sketch • -smush • -snaps • -solarize • -sparse-color • -splice • -spread • -statistic • -stegano • -stereo • -stretch • -strip • -stroke • -strokewidth • -style • -subimage-search • -swap • -swirl • -synchronize • -taint • -text-font • -texture • -threshold • -thumbnail • -tile • -tile-offset • -tint • -title • -transform • -transparent • -transparent-color • -transpose • -transverse • -treedepth • -trim • -type • -undercolor • -unique-colors • -units • -unsharp • -update • -verbose • -version • -view • -vignette • -virtual-pixel • -visual • -watermark • -wave • -weight • -white-point • -white-threshold • -window • -window-group • -write

"I NEED YOU TO COMPRESS ALL THE BITONAL FILES"

- find . -name "*.tif" -size -5500k -print0 | xargs -0 -I '{}' mogrify -compress group4 "{}"

- find, because we're looking for stuff!

- Where? A period '.' means start looking *here*, which is your current working directory

- What? all files named *wildcard*.tif, or <anything>.tif, size must be under 5500k

- -print0 adds a null character to the end of each line found with *find*

- | is a pipe that says take everything you found here and send it to a different command (this key is found directly under the backspace/delete key)

COMPRESSION CONTINUED

- find . -name "*.tif" -size -5500k -print0 | xargs -0 -I '{}' mogrify -compress group4 "{}"
- xargs, which is a command that takes lists and does stuff with them
- -0 says separate each line at a null character (added by -print0)
- -I '{}' (capital i) means treat each file individually (note: linux and msys on windows can both use -i instead of -I '{}', which is required on OS X)
- mogrify, or process our files in place
- Do what? -compress them with group4 compression
- Which files? "{}" does a string replacement and mogrify is given each line found with our find command

CAN WE DO IT FASTER?

- find . -name "*.tif" -size -5500k -print0 | xargs -0 -n 1 -P 4 mogrify -compress group4

- -n 1 says, like -I '{}', we should treat each file individually, but -P 6 says run 6 of the commands at one time; we also do not need to include "{}" at the end

- You can put *time* in front of any command and it will tell you how long it takes; we'll test the 2 commands on real files

- Note: changing -compress to +compress with no option after it will decompress, or remove all compression from a file

WHAT ABOUT MY CROOKED FILES?

- ImageMagick has a deskew feature, using option -deskew
- -deskew takes a threshold value that I have yet to understand
- convert 0001.tif -deskew 40 deskewed_0001.tif
- It can also be run in parallel with find and xargs:
  - find . -name "*.tif" -print0 | xargs -0 -n 1 -P 6 mogrify -deskew 40 (note: we used mogrify here and convert in the last example)

BUT MY IMAGE IS TOO BIG!

- When you deskew an image, the area around the outside is filled in with white when the image is straightened, we can fix this

- -gravity sets the direction changes will be made, the default is from the northwest, or upper-left, corner

- -extent sets the extent, or area covered, in pixels by the image

- convert deskewed_0001.tif -gravity center -extent 5100x6600 fixed_0001.tif

- find . -name "*.tif" -print0 | xargs -0 -n 1 -P 6 mogrify -deskew 40 -gravity center -extent 5100x6600 -compress group4

DIDN'T SOMEONE MENTION WEB DERIVATIVES?

- convert 0001.tif -strip -resample 96x96 -filter lanczos -resize 700x\> -quality 85 0001.jpg

- convert TIFF file 0001.tif

- -strip removes everything from an image, including the color profile and weird comments that Photoshop adds. (Our TIFFs are sRGB)

- -resample the image so it is the physical size of the original, but at 96 ppi

DERIVATIVES, CONTINUED

- convert 0001.tif -strip -resample 96x96 -filter lanczos -resize 700x\> -quality 85 0001.jpg

- -filter lanczos is the practical application of the Sinc filter, which aims for mathematical perfection during interpolation -- it helps stop the jaggies

- -resize 700x\> resizes the image so it 700 px wide by whatever height

- the backslash "escapes" the next character so the shell properly reads the >, which means only resize if the image is getting smaller

- -quality is the jpeg compression quality, test this and find what works for you

- Save the file as 0001.jpg

SUPER EASY THUMBNAILS

- convert 0001.tif -thumbnail 68 -quality 60 thumb_0001.jpg
- convert TIFF file name 0001.tif

- -thumbnail is a special resize that is optimized for speed and requires an option for the geometry of the image
- -quality 60, which is much lower than 85 is used to keep the size as small as possible
- output our file as thumb_0001.jpg

HOW DO I MAKE DERIVATIVES WITH BATCH PROCESSING?

- Now you're thinking the right way!

- This is more than we can do today as it requires "for loops" or scripts or much more intricate ImageMagick options such as -path

- Just two more slides...

INSTALLING IMAGEMAGICK

- Linux:
  - sudo apt-get install imagemagick --fix-missing
- Mac:
  - Apple Xcode: https://developer.apple.com/xcode/
  - MacPorts: http://www.macports.org/install.php
  - xQuartz x11 server is needed for display: http://xquartz.macosforge.org/landing/ (note: log out and log back in after installing)
  - In the terminal: sudo port install ImageMagick

INSTALLING IMAGEMAGICK

- Windows:
  - MinGW: http://www.mingw.org/wiki/Getting_Started
    - Include the MSYS package during installation
  - ImageMagick: http://www.imagemagick.org/script/binary-releases.php#windows
  - Install Microsoft Visual C++ 2010 Redistributable Packages if there are any problems:
    - http://www.microsoft.com/en-us/download/details.aspx?id=5555 (x86)
    - http://www.microsoft.com/en-us/download/details.aspx?id=14632 (x64)