Computational Photography - Fall 2015 - Exam

Part 1 of 26 - 0 — 0.25/ 0.25 Points

Question 1 of 28 — 0.25/ 0.25 Points

I certify that

- [x] A. I am talking this exam solely and entirely on my own, without any help from any other individual.
- [x] B. I am aware of the Georgia Tech Honor Code (link) and I affirm to here, as I take this exam.
- [x] C. I am the student who is enrolled in this class
- [x] D. I will NOT print or save any part of this exam, for any purpose whatsoever.

Feedback:

Feedback: Thanks.

Part 2 of 26 - 1 — 4.0/ 4.0 Points

Question 2 of 28 — 4.0/ 4.0 Points

[CP02a1] Consider a Binary Image. The resolution of this image is height = 3456 and width = 5184. What is the exact memory requirement of this image?

- (•) A. 2187 Kilobytes
- ( ) B. 2.056 Megabytes
- ( ) C. More than 34,000,000 bits
- ( ) D. 4374 Kilobytes

Feedback: YES!

W x H x BitsPerPixelPerChannel x Number of Channels / 8192

8192 is the number of bits in a kilobyte.
1 BitsPerPixel for Binary Image
1 Number of Channels for Binary Image

Part 3 of 26 - 2b: Image Histograms — 4.0/ 4.0 Points

Question 3 of 28 — 4.0/ 4.0 Points

[CP02b2] Which of the following is an accurate description of an Image Histogram?

- [x] A. Photographers can use them as an aid to show the distribution of intensity of image captured, and whether image detail has been lost to over or under exposure.
- [ ] B. Should not ever be applied to subregions of images separately.
- [x] C. Can be separate for each channel.
- [x] D. It plots the number of pixels at each intensity value.
- [x] E. This is less useful when using a camera raw image format, as the dynamic range of the displayed image may only be an approximation to that in the raw file, where the raw file captures the actual sensor responses.
- [ ] F. It plots the number of intensities for each pixel value.
- [x] G. By looking at the histogram for a specific image, one is able to judge the entire intensity distribution of the image at a glance.

Feedback: This statement from the Wiki page on Image Histograms, not from a lecture ... But an important one, so hopefully will be learned here. Sorry!

Feedback: This was all covered in lecture 02-1, with the issues related to the camera raw format in 03-4. For more details you can review the Wikipedia Entry for Image Histogram (http://en.wikipedia.org/wiki/Image_histogram)

Part 4 of 26 - 02c: Image Overlay — 4.0/ 4.0 Points

Question 4 of 28 — 4.0/ 4.0 Points

[CP02c1] The attached image is the equation of the blend mode "Overlay." Which of the following statements are true about about this blend mode?

$$f_{blend}(a,b) = \begin{cases} 2ab, & \text{if } a < 0.5 \\ 1-2(1-a)(1-b), & \text{otherwise} \end{cases}$$

- [ ] A. It is the reason we see the green effect in the lecture videos.
- [ ] B. It models the Dodge blend mode, well-known by dark room photographers.
- [x] C. The parts of the top layer where the base layer is light become brighter, and the parts where the base layer is dark becomes darker.
- [x] D. It combines the "Multiply" and the "Screen" blend modes depending on the pixel value of the bottom layer.
- [ ] E. It combines the "Lighten" and the "Darken" blend modes depending on the pixel value of the bottom layer.

Feedback: Please review Lecture "Digital Images" or Lecture 02-3

Feedback: Please review Lecture "Digital Images" or Lecture 02-3 on Udacity

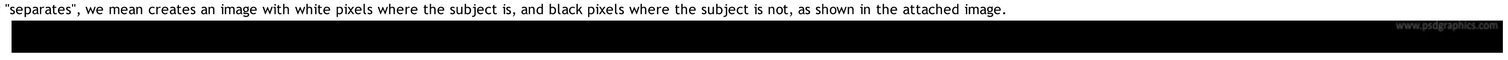
Feedback: This question entirely based on Lecture "Digital Images" or Lecture 02-3

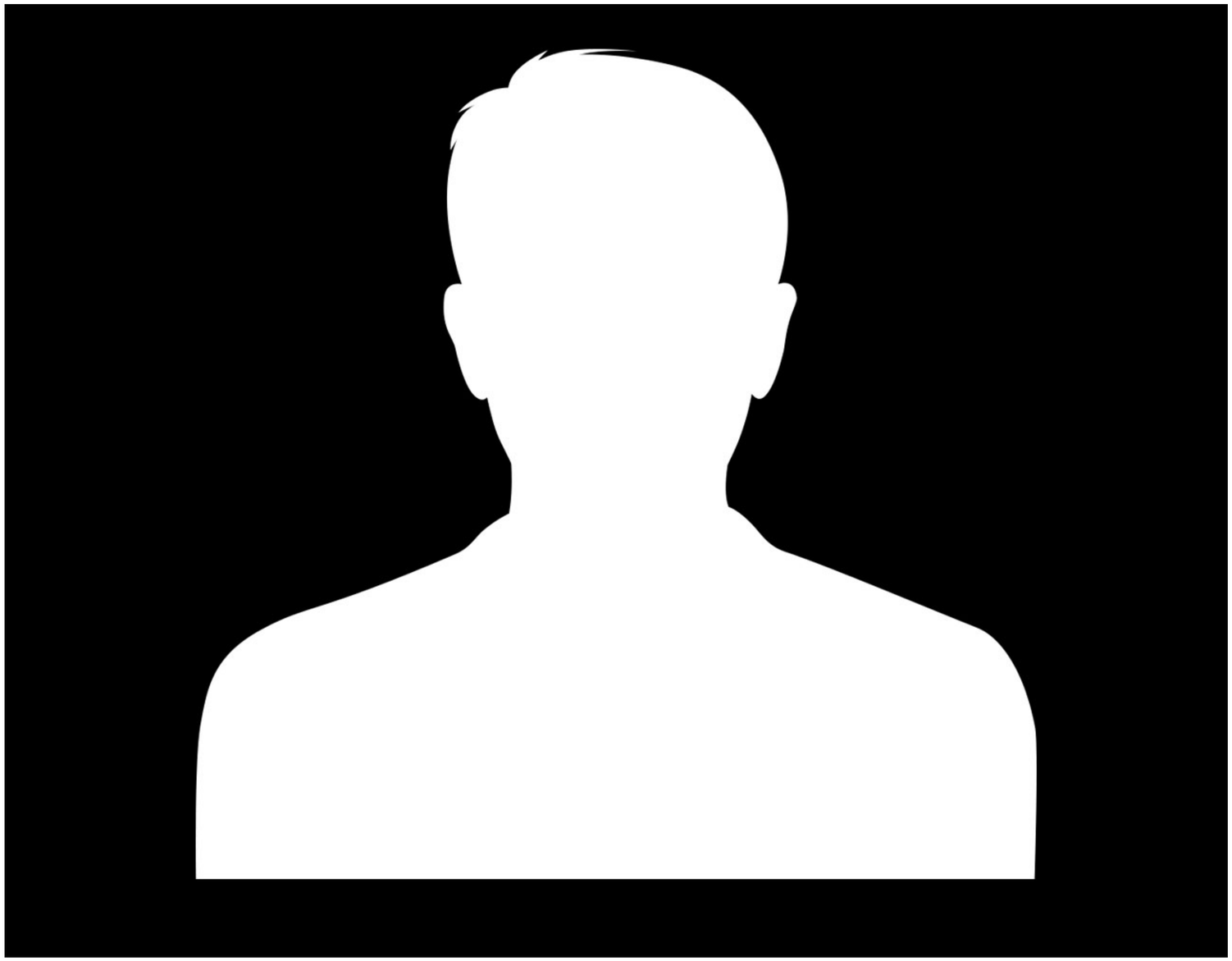
Part 5 of 26 - 02d: Point Processes — 4.0/ 4.0 Points

Question 5 of 28 — 4.0/ 4.0 Points

[CP02d2] Given $Image_1$, which is simply background plates, and $Image_2$, which is exactly the same image as $image_1$ with a subject added, how would one create a binary image that separates the foreground from the background?

By "separates", we mean creates an image with white pixels where the subject is, and black pixels where the subject is not, as shown in the attached image.





A.

1. Add $Image_2$ to $Image_1$: (Out = $Image_2$ + $Image_1$)
2. Scale output to range 0-255
3. Convert output image to binary, with a threshold: Mask = Binary (Out, threshold)

B.

1. Multiply $Image_2$ by $Image_1$: (Out = $Image_2$ X $Image_1$)
2. Scale output to range 0-255
3. Convert output image to binary, with a threshold: Mask = Binary(Out, threshold)

C.

1. Subtract $Image_2$ from $Image_1$: (Out = $Image_2$ - $Image_1$)
2. Multiply output image by $Image_2$, Mask = Out X $Image_2$

D.

1. Subtract $Image_2$ from $Image_1$: (Out = $Image_2$ - $Image_1$)
2. Convert output image to binary, with a threshold: Mask = Binary (Out, threshold)

Feedback: Lecture "Digital Images" and Lecture 02-2 explains this.

Part 6 of 26 - 2e: Convolution / X-Correlation I **4.0/ 4.0 Points**

Question 6 of 28 4.0/ 4.0 Points

[CP02e1] Convolution is ... (select the correct statements)

- [ ] A. a sliding dot product or sliding inner-product
- [x] B. Associative: (F * G) * H = F * (G * H)
- [x] C. an operation that calculates the area of overlap between two functions
- [ ] D. a measure of similarity of two waveforms
- [x] E. Commutative: F * G = G * F
- [x] F. equivalent to cross-correlation when the kernel is symmetric in both x and y.

Feedback: Lectures 02-5/6

Part 7 of 26 - 2f: Convolution / X-Correlation II

4.0/ 4.0 Points

Question 7 of 28

4.0/ 4.0 Points

[CP02f1] See the attached equation. Select the choices below which are correct, considering this equation.

$$G[i,j] = \frac{1}{(2k+1)^2} \sum_{u=-k}^{k} \sum_{v=-k}^{k} F[i+u, j+v]$$

- [ ] A. This is the general form of an equation for convolution over a neighborhood of pixels, where *k* is the size of the neighborhood (above, below, left, right).
- [x] B. This is the equation for cross-correlation with uniform weights over a neighborhood of pixels, where *k* is the size of the neighborhood (above, below, left, right). Feedback: Lectures 02-4/5/6
- [ ] C. This is the equation for convolution with uniform weights over a neighborhood of pixels, where *k* is the size of the neighborhood (above, below, left, right).
- [x] D. This equation only applies to square or average smoothing, as weights are equally distributed across the neighborhood. Feedback: See Lectures 02-4/5/6
- [ ] E. This equation only applies Gaussian kernels, as weights are distributed across the neighborhood.

Feedback: See Lectures 02-4/5/6

Part 8 of 26 - 2g: Image Gradients

4.0/ 4.0 Points

Question 8 of 28

4.0/ 4.0 Points

[CP02g1] Image Gradients (select the correct statements)

- [ ] A. An edge in an image is usually aligned with the Gradient direction (remember the arrows in lectures!) in an image.
- [x] B. Image Gradient is the change in the image function in *x* and *y* Feedback: See lecture "Groups of Pixels" and Lecture 02-6 on Udacity
- [ ] C. Image Gradient is a change in the image function in *x*, *y* and *t*
- [x] D. Gradient Magnitude at any point in the image provides edge strength. Feedback: See lecture "Groups of Pixels" and Lecture 02-6 on Udacity
- [x] E. Gradient vectors point in the direction of most rapid increase in the intensity of an image at any point in the image. Feedback: See lecture "Groups of Pixels" and Lecture 02-6 on Udacity

Feedback: See Lectures 02-4/5/6

Part 9 of 26 - 03a: Pinhole Photography

4.0/ 4.0 Points

Question 9 of 28

4.0/ 4.0 Points

[CP03a1] A photograph from a pinhole camera .... (select statements that are correct)

- [x] A. Usually suffers from low light due to the size of the opening / aperture. Feedback: See Lecture "Cameras" or Lecture 03-1 on Udacity
- [x] B. Usually suffers from geometric and diffraction blur. Feedback: See Lecture "Cameras" or Lecture 03-1 on Udacity
- [ ] C. Ideally, has a finite depth of field.
- [x] D. Ideally, has virtually no distortion. Straight lines remain straight. Feedback: See Lecture "Cameras" or Lecture 03-1 on Udacity

Feedback: See Lecture "Cameras" or Lecture 03-1 on Udacity

Part 10 of 26 - 03b: Aperture

3.0/ 4.0 Points

Question 10 of 28

3.0/ 4.0 Points

[CP3b1] Consider the following statements about aperture and select the correct ones. Attached is an equation relating the Area (A) of an aperture opening to the focal length (f) and the aperture number (N).

$$Area = \pi \left(\frac{f}{2N}\right)^2$$

- [x] A. The amount of light that falls on a sensor or film in a camera is proportional to the area of the aperture opening, is referred to as IRRADIANCE and is measured in amount of light on a unit area of sensor per second. Feedback: See Lecture "Camera Sensors" or lecture 03-3
- [x] B. The aperture number, the f-number (N) usually marked on all lenses, is designed to give irradiance irrespective of the lens in use. Feedback: See Lecture "Camera Sensors" or lecture 03-3 on Udacity
- [ ] C. Doubling N reduces Area by 4 times, and therefore reduces light by 4 times.
- [x] D. A low f-number (N) on a lens usually means it has a BIG lens. This is especially noticeable for Telephoto lenses, which have larger focal lengths. [A 800mm lens of f-number 4, will have 100mm aperture radius] Feedback: See Lecture "Camera Sensors" or lecture 03-3 on Udacity
- [ ] E. The diameter of the opening is simply f/2N (from the above equation of Area of the opening, which is usually in the shape of a circle).

Feedback: Lecture 03-3

Part 11 of 26 - 03c: Lenses

2.67/ 4.0 Points

Question 11 of 28

2.67/ 4.0 Points

[CP03c1] Select the the following correct statements about lenses.

- [x] A. The Combined Focal length of a combination of lenses can vary and depends on the distance between the lenses and their individual focal lengths.
- [x] B. A focused image for a lens forms only on a screen placed focal length distance from the lens. Anywhere else, the image formed is unfocused and suffers from optical blur.
- [x] C. Focal length is a variable parameter for a lens and can be changed.
- [x] D. The field of view (FOV) of a lens depends on Focal Length and Sensor Size. Feedback: See 03-2. FOV = 2 arctan (h/2f).

Feedback: see Lecture "Cameras" or Lecture 03-2 on Udacity

Part 12 of 26 - 4a1 - Optimal Window Size — 4.0/ 4.0 Points

Question 12 of 28 — 4.0/ 4.0 Points

[CP04a12] Factors to consider for optimal window size for image blending are ... (Choose the correct ones!):

- A. To avoid ghosting: Window ≤ 2× size of smallest prominent “feature” — Feedback: See Lecture "Image Processing" or Lecture 04-2 on Udacity.
- B. Largest frequency ≤ 2 × size of smallest frequency — Feedback: See Lecture "Image Processing" or Lecture 04-2 on Udacity.
- C. To avoid seams: Window = size of largest prominent “feature” — Feedback: See Lecture "Image Processing" or Lecture 04-2 on Udacity.
- D. Image frequency content should occupy two pyramid levels

Feedback: Lecture 04-2.

Part 13 of 26 - 4a2 - Pyramids — 2.0/ 4.0 Points

Question 13 of 28 — 2.0/ 4.0 Points

[CP04a21] Choose the statement that are CORRECT about a Laplacian Pyramid

- A. A Laplacian is simply computed using

$L_k = \text{REDUCE}(g_{k-1})$

- B. Each Laplacian Image in the Pyramid is a combination of two consecutive levels of a Gaussian Pyramid — Feedback: Not a combination, a difference. Please review Lecture "Image Processing" or Lecture 04-3 on Udacity
- C. Each Laplacian is computed using

$L_l = g_l - \text{EXPAND}(g_{l+1})$ — Feedback: Please review Lecture "Image Processing" or Lecture 04-3 on Udacity

- D. A Laplacian Pyramid is a series of “error” images, L_0, L_1, L_2, ... — Feedback: Please review Lecture "Image Processing" or Lecture 04-3 on Udacity

Feedback: Please review Lecture "Image Processing" or Lecture 04-3 on Udacity

Part 14 of 26 - 4a3 - Cuts vs Blends — 4.0/ 4.0 Points

Question 14 of 28 — 4.0/ 4.0 Points

[CP04a31] Which of the following statements are TRUE for using Cuts vs. Blending images?

- A. Seam Carving is not similar in terms of computation to Cuts. Cuts are used to merge two images. Seams remove a set of pixels from the same image, and the methods are completely different.
- B. Using Cuts is better when there is motion that causes ghosting, as the same object will have moved to another point in image during blending. — Feedback: See Lecture 04-4
- C. Cuts are like median filtering, as they give you an actual pixel value, whereas blending merges pixel values.
- D. Using Cuts is better when there are too many objects in the image and registration is hard.

Feedback: See Lecture 04-4

Part 15 of 26 - 4b1 - Good Features — 4.0/ 4.0 Points

Question 15 of 28 — 4.0/ 4.0 Points

[CP04b11] Please select from the following characteristics of Good Features.

- A. Repeatability/Precision -- Find the same feature despite geometric and photometric transformations — Feedback: Review Lecture "Corners and Features" or Lecture 04-5 on Udacity
- B. Variability - Variety of metrics that define a feature.
- C. Dominant -- Give a strong response to x-correlation
- D. Saliency/Matchability -- Distinctive description — Feedback: Review Lecture "Corners and Features" or Lecture 04-5 on Udacity
- E. Locality -- Relatively small area of the image; robust to clutter and occlusion — Feedback: Review Lecture "Corners and Features" or Lecture 04-5 on Udacity

Feedback: Review Lecture "Corners and Features" or Lecture 04-5 on Udacity

Part 16 of 26 - 4b2 — 3.0/ 4.0 Points

Questions related to Harris Detector

Question 16 of 28 — 3.0/ 4.0 Points

[CP04b21] Which of the following is CORRECT about the Harris Detector?

- A. Harris detectors are NOT Invariant to Image Scale changes. One needs to use a scale-space representation using Pyramids to detect features at different scales. — Feedback: See Lecture "Corners and Features" or Lecture 04-6 on Udacity
- B. Harris detectors are Invariant to Translation. — Feedback: See Lecture "Corners and Features" or Lecture 04-6 on Udacity
- C. Harris detectors are Invariant to Rotation. — Feedback: See Lecture "Corners and Features" or Lecture 04-6 on Udacity
- D. Harris detectors are Invariant to Image Scale changes
- E. Harris detectors are NOT Invariant to Image Scale changes. One needs to use Fourier transforms to convert the image into the Frequency domain and model the variations. — Feedback: See Lecture "Corners and Features" or Lecture 04-6 on Udacity
- F. Harris detectors are Invariant to Image Intensity Variations. — Feedback: See Lecture "Corners and Features" or Lecture 04-6 on Udacity

Feedback: See Lecture "Corners and Features" or Lecture 04-6 on Udacity

Part 17 of 26 - 5a1: Image Transformations — 4.0/ 4.0 Points

Image Transformations

Question 17 of 28 — 4.0/ 4.0 Points

[CP05a13] Which of the following statements are correct about Rotation Transformation?

- A. The leftmost one columns of the transformation matrix need to be computed to model this transformation.
- B. 2 Degrees of Freedom

- [x] C. 2 Point Correspondences Needed for computation — Feedback: See Lecture "Image Transformations and Warping" or Lecture 05-1 on Udacity
- [ ] D. 3 Point Correspondences Needed for computation
- [x] E. 3 Degrees of Freedom — Feedback: See Lecture "Image Transformations and Warping" or Lecture 05-1 on Udacity
- [x] F. Just the four values a, b, d and e (the top two row/columns) of the transformation matrix need to be computed to model this transformation. — Feedback: See Lecture "Image Transformations and Warping" or Lecture 05-1 on Udacity

Feedback: See Lecture "Image Transformations and Warping" or Lecture 05-1 on Udacity

Part 18 of 26 - 5b1: Camera Calibration — **4.0/ 4.0 Points**

Question 18 of 28 — 4.0/ 4.0 Points

[CP05b11] Camera Calibration: Select the statements that are correct about Camera Calibration from the following

- [ ] A. Homography calculation in support of Camera Calibration can work well with only 8 data points. There is no need for more points.
- [x] B. In Geometric Camera Calibration, the goal is to extract extrinsic (location, orientation) and intrinsic (focal length, etc.) of the camera, so as to the know the real geometry of the scene captured in photographs.
- [x] C. To forgo accurate modeling of geometric camera calibration, we can get good estimates of camera calibration by taking many pictures of a known geometry from different viewpoints and solve for an overdetermined linear system. — Feedback: See Lecture "Panorama" or Lecture 05-3 on Udacity
- [x] D. In lieu of accurate radiometric camera calibration, we can get good estimates of how pixels match to scene radiance by taking many pictures of a scene at different settings of the camera, and using data/curve fitting to estimate the response curve of a camera for a scene. — Feedback: See Lecture "HDR" or Lecture 05-4 on Udacity
- [ ] E. In Radiometric/Photometric Camera Calibration, the goal is extract how sensor irradiance can be captured by a Camera Raw Image File on the sensor, for later post-processing.
- [x] F. In Radiometric/Photometric Camera Calibration, the goal is to extract how pixel values in the camera relate to the actual radiance amounts of the scene captured in photographs.
- [ ] G. In Geometric Camera Calibration, we only need to extract the location and orientation the camera and then we can compute measurements of known objects in the scene.

Part 19 of 26 - 5b2: Stereo — **2.0/ 4.0 Points**

Question 19 of 28 — 2.0/ 4.0 Points

[CP05b21] Determine which of the following statements are CORRECT about a Stereo method to compute Depth or Disparity in a scene

- [x] A. A simple stereo system used to compute 3D scene geometry assumes that there are two cameras, just displaced slightly. No other information is needed about the cameras, except the distance between them. — Feedback: How about focal length? Need it for computing 3D, but not for disparity. See Lecture "Stereo Vision" or Lecture 05-5 on Udacity. Simple system also assume same focal length for both cameras.
- [x] B. The disparity computed from a stereo pair is usually larger for closer surfaces than farther ones. This is due to parallax in the scene. — Feedback: See Lecture "Stereo Vision" or Lecture 05-5 on Udacity.
- [ ] C. The Epipolar constraint does not provide any computational efficiency in the case of a Kinect RGBD sensor.
- [x] D. The Epipolar constraint for computing disparity makes searching for corresponding pixels in a stereo pair easier. — Feedback: See Lecture "Stereo Vision" or Lecture 05-5 on Udacity.

Feedback: See Lecture "Stereo Vision" or Lecture 05-5 on Udacity.

Part 20 of 26 - 6a: Video — **4.0/ 4.0 Points**

Question 20 of 28 — 4.0/ 4.0 Points

[CP6a1] What is the resolution of a video clip that has a frame rate of 15 fps, a width of 800 pixels, and a height of 512 pixels?

- (•) A. 409,600 pixels
- ( ) B. 12,000 pixels
- ( ) C. 6,144,000 pixels
- ( ) D. 262,144 pixels

Part 21 of 26 - 6b: Video Textures — **2.0/ 4.0 Points**

Question 21 of 28 — 2.0/ 4.0 Points

[CP6b1] Select the statements from the following which are correct for the concept of Video Textures.

- [x] A. Crossfading, blending and cutting can be used with video textures to create smooth videos. — Feedback: See lecture 06-02
- [x] B. Video textures only work well when there is repetition in the video, hence the term video textures, relating image textures with stochastic repetition in images. — Feedback: See lecture 06-02
- [ ] C. Video textures require the entire image to compute similarity, and it is not possible to break down the image into sub-images.
- [ ] D. Only L1 and L2 similarity metrics can be used to generate video textures.
- [x] E. The primary concept supporting Video Texture analysis is that similar objects repeat in videos. — Feedback: See lecture 06-02

Feedback: See lecture 06-02

Part 22 of 26 - 6c: Video Stablization — **0.0/ 4.0 Points**

Question 22 of 28 — 0.0/ 4.0 Points

[CP06c11] Which of the following statements is true about the Video Stabilization system discussed in lecture 06-3?

- [x] A. Cropping is used to crop the view, which avoids dealing with hole filling. When the whole frame is aligned, we may see regions with no pixels from the original video as the camera shakes. — Feedback: See Lecture 06-3
- [ ] B. It is a 3D camera path stabilization method, where a 3D path is computed and then a smoothing process applied.
- [ ] C. Rolling shutter can be removed by adding median filtering in time.
- [x] D. Rolling shutter adds unwanted non-rigid motion in the video due to a delay in readout from photosites. — Feedback: See Lecture 06-3
- [x] E. Cropping is used to crop the view, which avoids problems with a rolling shutter. — Feedback: See Lecture 06-3
- [ ] F. It is a 2D camera path stabilization method, where only estimates of 2D motion are used, then constrained using standard notions of camera movements like pan or dolly.
- [x] G. It is a 2D camera path stabilization method, where only estimates of 2D motion are used, then constrained using cropping. — Feedback: See Lecture 06-3

Feedback: See Lecture 06-3

Part 23 of 26 - 07a: Lightfields

4.0/ 4.0 Points

Question 23 of 28

4.0/ 4.0 Points

[CP7b21] Which of the following statements are CORRECT about a Light field Camera?

- [x] A. A plenoptic or light field camera attempts to capture a light field, rather than pixels. The captured light field can be rendered as a traditional image in pixels as a post-capture step. — Feedback: See 07-2
- [ ] B. A hologram does not have anything to do with a Light Field.
- [x] C. One can build a light field camera, capable of depth from defocus estimation, using a lens and micro-lens array. — Feedback: See 07-2
- [x] D. Typical examples of light-field cameras use an array of cameras to capture multiple viewpoints, similar to a panorama. — Feedback: Panorama is indeed a light field capture, but a limited form of a light field. See 07-2

Feedback: See 07-2

Part 24 of 26 - 07c: Coded Photography

4.0/ 4.0 Points

Question 24 of 28

4.0/ 4.0 Points

[CP7b11] Which of the following statements are correct about Epsilon or Coded Photography?

- [ ] A. Low light and image resolution are not artifacts of adding coding to apertures
- [ ] B. Coded Photography cannot be used to take a 'standard' picture
- [x] C. Coded photography uses a "code" to encode variations in an image (or video) in neighboring pixels. Epsilon photography captures all variations and tends to deal with it in a post-processing. — Feedback: See lecture 07-3
- [x] D. Coded Photography is akin to Bayer Patterns. It encodes a code with an image, which can be used to extract a novel image. — Feedback: See lecture 07-3
- [x] E. Epsilon Photography assumes that multiple images are taken and then combined to form a novel image. — Feedback: See lecture 07-3
- [x] F. A coded aperture essentially changes the aperture to provide variations in a captured image, which can then be computationally adapted. — Feedback: See lecture 07-3

Part 25 of 26 - 8: Additional Readings

4.17/ 7.5 Points

Question 25 of 28

1.67/ 2.5 Points

[81] Select the statements that are correct for the "Interactive Photomontage" approach presented in 08-1

- [x] A. It works on a stack of images, along the lines of Epsilon Photography — Feedback: See module 08-1
- [x] B. Gradient-domain image fusion in the color space is used to align the colors amongst the stack of images. — Feedback: See module 08-1
- [ ] C. Alignment of images if NOT required for the processing of images.
- [x] D. Cuts are used to merge and generate a new image — Feedback: See module 08-1
- [x] E. Images are blended to generate a new image — Feedback: See module 08-1

Feedback: See module 08-1

Question 26 of 28

0.0/ 2.5 Points

[85] Consider the paper on "Poisson Image Editing" in module 08-4. Which of the following relates to that effort?

- [x] A. Using this approach, the color, texture, or illumination of an object, for the task of interactive object cut and paste to a new scene, can easily be modified without any need for precise delineation of object boundaries. — Feedback: See module 08-5
- [x] B. Spots and blemishes are removed from fur images by separating out the brightness component from details in a selected region and replacing the brightness by harmonic interpolation (solving a Laplace equation) of the brightness at the selection boundary. — Feedback: Nope, that is another method. See module 08-5.
- [x] C. The mathematical tool at the heart of the approach is the Poisson partial differential equation with Dirichlet boundary conditions which specifies the Laplacian of an unknown function over the domain of interest, along with the unknown function values over the boundary of the domain. — Feedback: See module 08-5
- [x] D. A system is introduced to edit an image via a sparse set of its edge elements (edgels). — Feedback: Nope, that is another effort. See module 08-5.

Feedback: See module 08-5

Question 27 of 28

2.5/ 2.5 Points

[84] Which of the following applies the "Seam Carving" approach from Module 8-4?

- [x] A. A key insight is use of an Image Energy Measure and removing seams with lowest energy on a gradient-based energy measure, to reduce size of images. — Feedback: See module 08-4
- [ ] B. A key insight is the use of an Image Energy Measure and removing seams with high energy on a gradient-based energy measure, to reduce size of images.
- [x] C. Seam carving strikes the best balance between the demands for energy preservation and visual coherency. — Feedback: See module 08-4
- [x] D. Image retargeting to new aspect ratios is achieved by repeatedly carving out or inserting seams in one either vertical or horizontal directions. — Feedback: See module 08-4

Feedback: See module 08-4

Part 26 of 26 - Closing

0.25/ 0.25 Points

Question 28 of 28

0.25/ 0.25 Points

[Closing] Reminder and recertification on closing:

I certify that

- [x] A. I took this exam solely and entirely on my own, without any help from any other individual.
- [x] B. I am aware of the Georgia Tech Honor Code (link) and I affirm it here as I take this exam.
- [x] C. I am the student who is enrolled in this class.
- [x] D. I will not copy or print this exam for any reason!

Feedback: Thanks.