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Object Detection Based on GPU Programming

Team Project Update 2

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Summary of Accomplishments

1. Image Blurring:

In this part, we blurred an image. To do this, imagine that we have a square array of weight values. For each pixel in the image, imagine that we overlay this square array of weights on top of the image such that the center of the weight array is aligned with the current pixel. To compute a blurred pixel value, we multiply each pair of numbers that line up. In other words, we multiply each weight with the pixel underneath it. Finally, we add up all the multiplied numbers and assign that value to our output for the current pixel. We repeat this process for all the pixels in the image.

2. HDR Tone-mapping:

Tone-mapping is a process that transforms the intensities in the image so that the brightest values aren't nearly so far away from the mean. That way when we transform the values into [0-255] we can see the entire image. In this part, we transformed the luminance channel by compressing its range to [0, 1]. To do this, we used the cumulative distribution of the luminance values. To store this extra information, we use single precision floating point for each channel. This allows for an extremely wide range of intensity values.

3. Seamless image composition:

Seamless image composition part is suspended, because we spent plenty of time on debugging the first step, employing matting technique which will help user effortlessly locate the object of interest. Then, we still got stuck in building transition zones to coordinate the influence from source and target images with the matte from matting techniques.

Challenges

1. Current challenges:

- 1) The seamless image composition part in image processing is not successfully developed. Hopefully to figure out a possible solution.
- 2) Figure out minor bugs in image blurring and HDR Tone-mapping

2. Ongoing challenges:

- 1) Learning corner detection algorithm and red eye removal
- 2) Optimize the code in image blurring and HDR Tone-mapping

Scope change

As mentioned above, we have encountered with some challenges which deviated our goal to some extent. Therefore, after discussion, we change some content in our tasks list to guarantee we can complete a project with integrity.

Firstly, in the image processing part, we are trying to realize seamless image composition. However, due to some challenges in development, the final effect may be not successful. In this case, after researching some material, we add another processing step in this part, the red-eye removal for portrait images.

Secondly, we decided to combine the feature extraction part with object detection part to make sure we can complete this project with limited time. In this part, we will implement FAST algorithm to realize corner detection and try to achieve the object detection function after the development of tracking objects.

Project Schedule

Due to some changes in sections and tasks, the latest version of gantt chart is shown as below.

