Report on Labwork 3

TRAN Thi Hong Hanh

November 24, 2019

1 Explain how you implement the labwork?

```
__global__ void grayscale(uchar3 *input, uchar3 *output) {
    // this will execute in a device core
    int tid = threadIdx.x + blockIdx.x * blockDim.x;
    output[tid].x = (input[tid].x + input[tid].y +input[tid].z) / 3;
    output[tid].z = output[tid].y = output[tid].x;
}

void Labwork::labwork3_GPU() {
    // Calculate number of pixels
    int pixelCount = inputImage->width * inputImage->height;
    // Allocate CUDA memory
    uchar3 *devInput;
    uchar3 *devOutput;
    cudaMalloc(&devInput, pixelCount *sizeof(uchar3));
    cudaMalloc(&devOutput, pixelCount *sizeof(uchar3));
    // Copy CUDA Memory from CPU to GPU
    cudaMemcpy(devInput, inputImage->buffer,
                        pixelCount * sizeof(uchar3),cudaMemcpyHostToDevice);
    // Processing
    int blockSize = 64;
    int numBlock = pixelCount / blockSize;
    grayscale<<<numBlock, blockSize>>>(devInput, devOutput);
    // Copy CUDA Memory from GPU to CPU
    outputImage = static_cast<char *>(malloc(pixelCount * sizeof(uchar3)));
    cudaMemcpy(outputImage, devOutput, pixelCount * sizeof(uchar3),
                                                    cudaMemcpyDeviceToHost);
    // Cleaning
    cudaFree(devInput);
    cudaFree(devOutput);
}
```

2 What's the speedup?

```
Labwork 3 ellapsed 13.0ms
```

3 Try experimenting with different block size values

Block size	128	256	512
Time elapsed (ms)	13.0	13.7	14.2