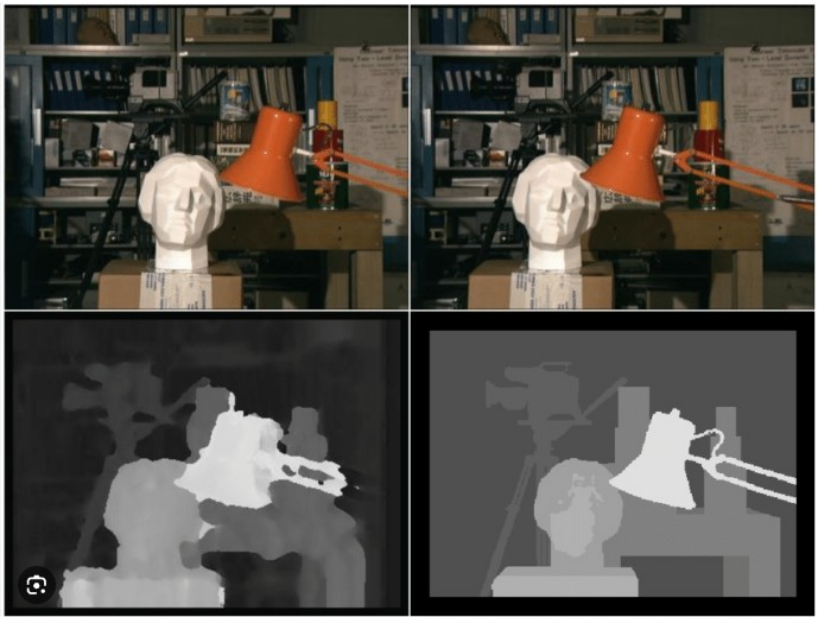
SWE 507 PARALLEL PROGRAMMING PROJECT STUDY 4 (for final) (2024)

Due date: 31 May 2024, class time.

In this project, you are expected to create a solution for stereo image processing with parallel programming model using C language. Implementations with other languages such as Phyton or Matlab will not be accepted. In the previous project you created a sequential solution to this problem; in this project, you are expected to propose a parallel programming model to improve the performance of your previous project. You are allowed to pick a parallelism method from Pthreads, OpenMP, MPI or GPU. You have to justify your approach and compare the performance of your new implementation with the sequential one in the end.

Expected outcome of your application is a dept image of objects in gray color which is called disparity. Stereo image pairs for testing your application can be obtained (will be provided as well) from KITTI benchmark suite. Figure 1 shows an example input pair and output of similar work in literature [1]. The first row depicts image pairs (left and right images), and the second row left image shows the output of the system which is a depth map of objects with gray level. Second row, right image is the rectified image of the depth map (left). Please use the references given below to complete the task properly [2, 3, 4, 5].



- In this project you are supposed to design and implement a parallel solution to the same problem of the previous project.
- Must use C language in your implementation.
- Tell us about your motivations selecting the parallel method.
- Measure the performance of your implementation.
- Compare the performance of your implementation with the serial one.

References:

[1] https://www.researchgate.net/publication/220595132_Stereo_Image_Quality_Assessment _Using_Visual_Attention_and_Distortion_Predictors/figures?lo=1
[2] Stereo Vision: Depth Estimation between object and camera

https://medium.com/analytics-vidhya/distance-estimation-cf2f2fd709d8
[3] Depth Map from Stereo Images.
https://docs.opencv.org/4.x/dd/d53/tutorial_py_depthmap.html
[4] Depth-Map Generation using Pixel Matching in Stereoscopic Pair of Images.
https://arxiv.org/pdf/1902.03471
[5] Kitti benchmark dataset. https://www.cvlibs.net/datasets/kitti/

Grading:

No	Task	Grade
1	Program works correctly	60
2	Present comparative performance improvements against sequential one	20
3	Discuss about the complexity that comes with parallelism.	20

PS: In class presentation is required.