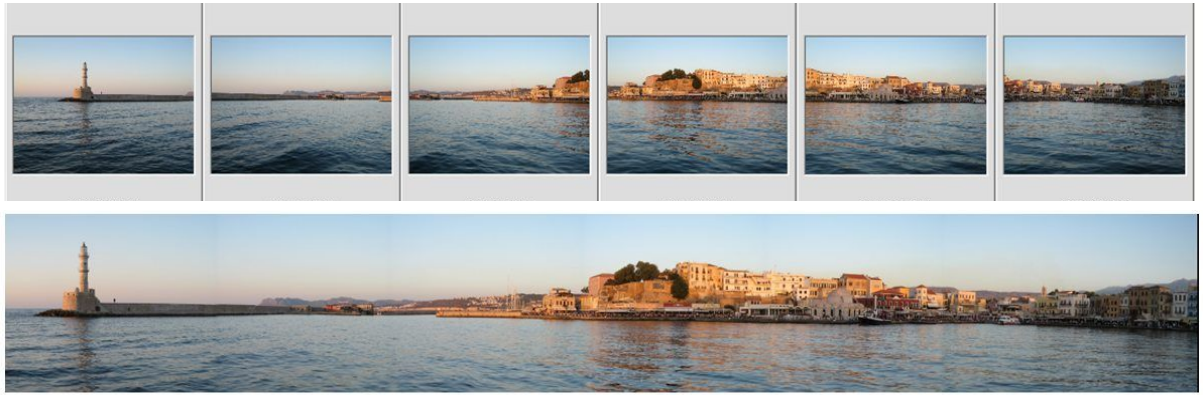
HARVARD
School of Engineering and Applied Sciences

CS205 Final Project Presentation

Real-time Image Stitching



Group Member:

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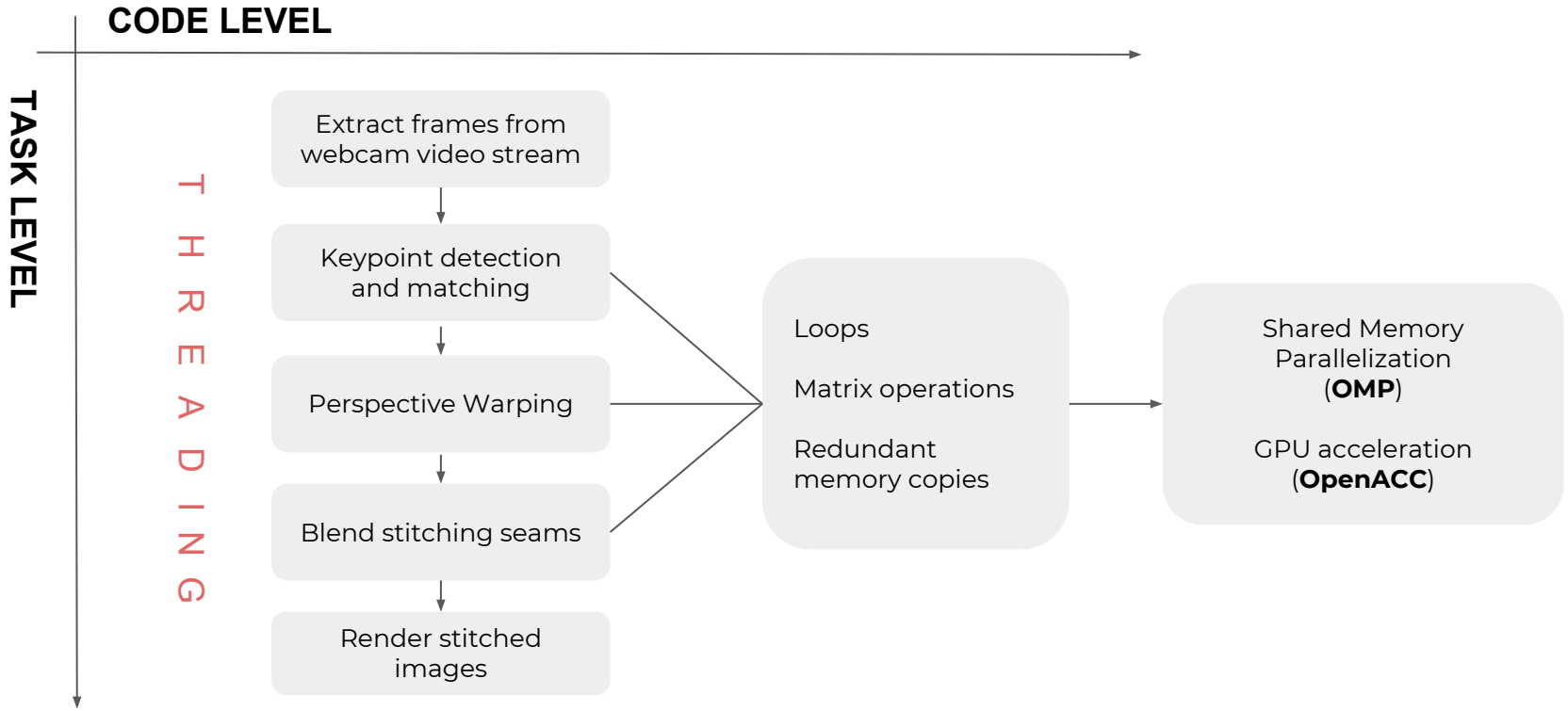
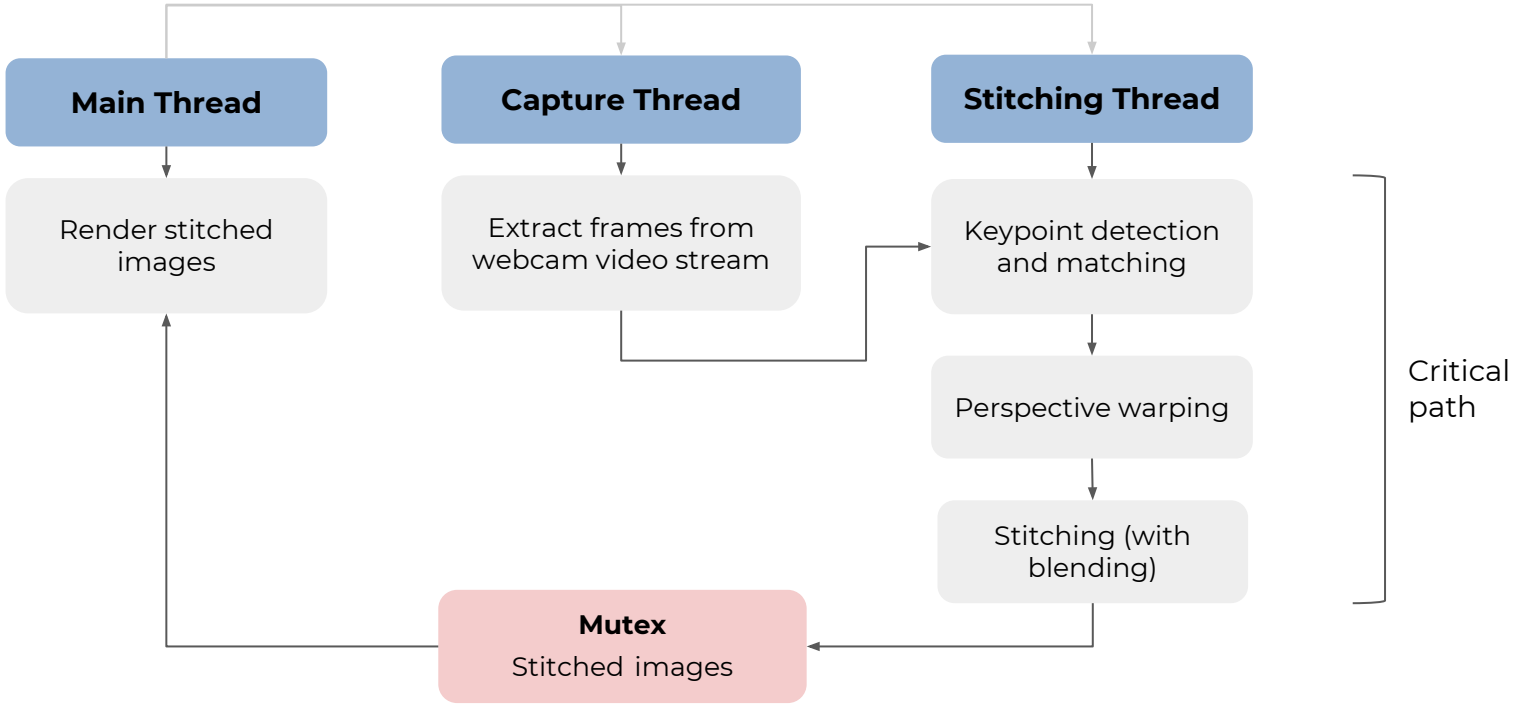
Jiacheng Shi
Xuefeng Peng
Weihang Zhang

Github repo: https://github.com/ziqiguo/CS205-ImageStitching
Website: https://cs205-imagestitching.github.io

Parallel Design



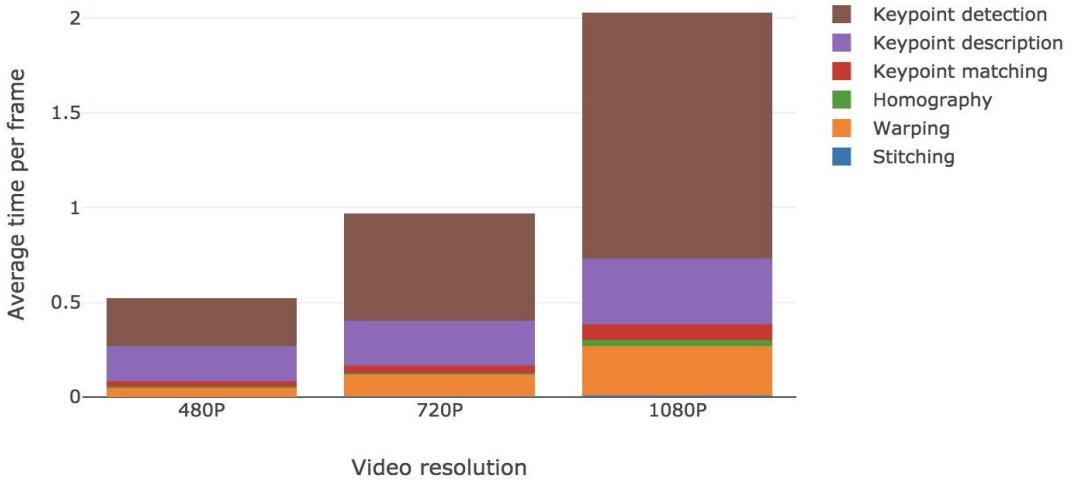
Task-level Parallelization



Evaluation

Platforms:

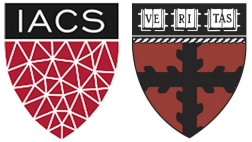
- Serial and OpenMP: AWS EC2 **t2.2xlarge**
- OpenACC: local PC(**NVIDIA GeForce GTX 1070**), AWS EC2 **g3.4xlarge.**



	FPS
480P	1.7
720P	1
1080P	0.5

Benchmarking of serial version

Evaluation



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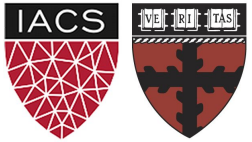
Parallel Version	OpenMP	OpenACC (Tesla M60)	OpenACC (GeForce GTX 1070)
Keypoint detection	**4.4**	**17.1**	**20.9**
Keypoint description	**0.5**	**10.0**	**17.1**
Keypoint matching	1.9	10.0	13.3
Hormography	2.3	1.2	0.8
Warping	**4.8**	**10.5**	**14.4**
Stitching	1	1.6	4
Total	1.4	8	9

Parallel Speedup Comparison

Conclusion & Demo



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Parallel Version	480P	720P	1080P
Serial	1.7	1	0.5
OpenMP	2.5	1.4	0.7
OpenACC (Tesla M60)	18	8	3.7
OpenACC (GeForce GTX 1070)	20	10	3.8
OpenACC with pipeline	35	14	5

- GPU acceleration is very suitable for image stitching. With better GPU, better performance can be achieved.
- Task-level pipeline can improve image rendering speed.
- The success of this application can be extended into other CV tasks, such as video stabilization, object contouring and object straightening.