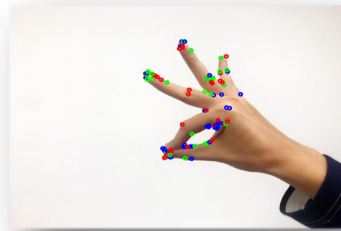


Adaptive-Partial Template Update with Center-Shifting Recovery for High Frame Rate and Ultra-Low Delay Deformation Matching System

修士課程卒業 徐余浩

Background

- Human-machine interaction
 - Projection mapping
 - Gesture recognition
 - Automatic driving
 - AR clothing system



Target

- FPGA implementation of high frame rate and ultra-low delay deformation matching system

Challenges

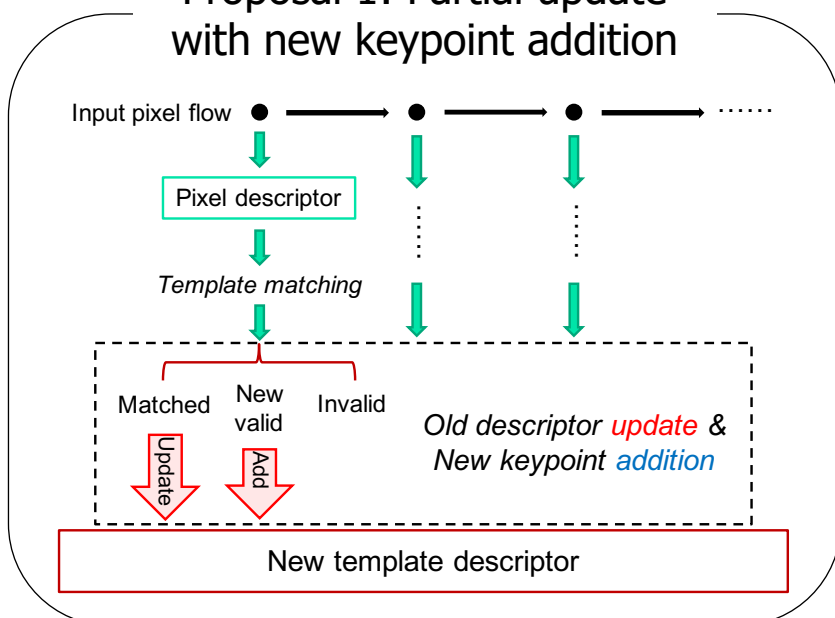
- Ensure ultra-low delay
- Improve robustness to Template-drift & Template-loss

require

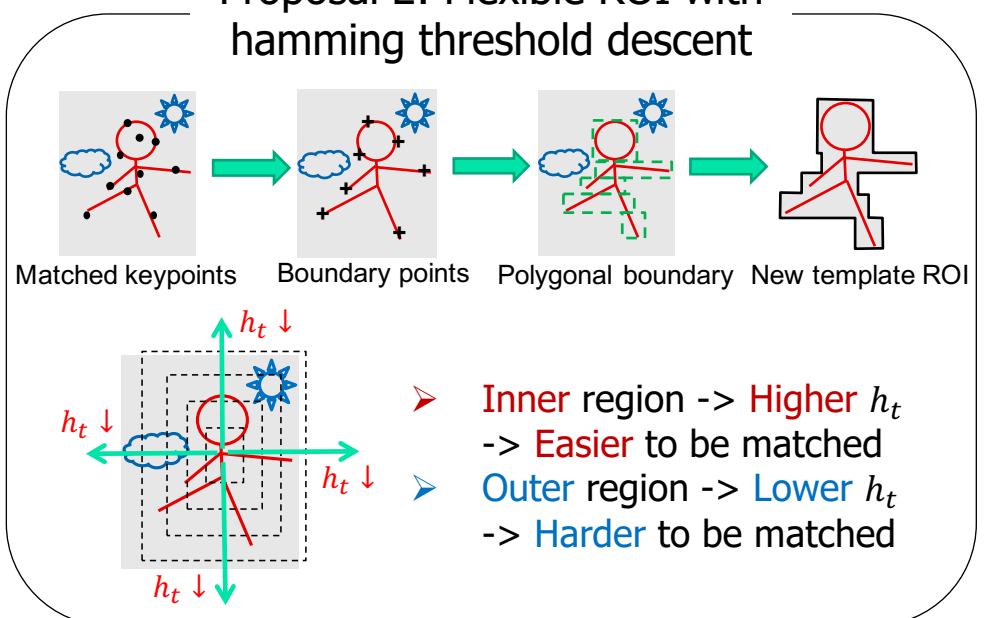
High frame rate & Ultra-low delay

Proposals

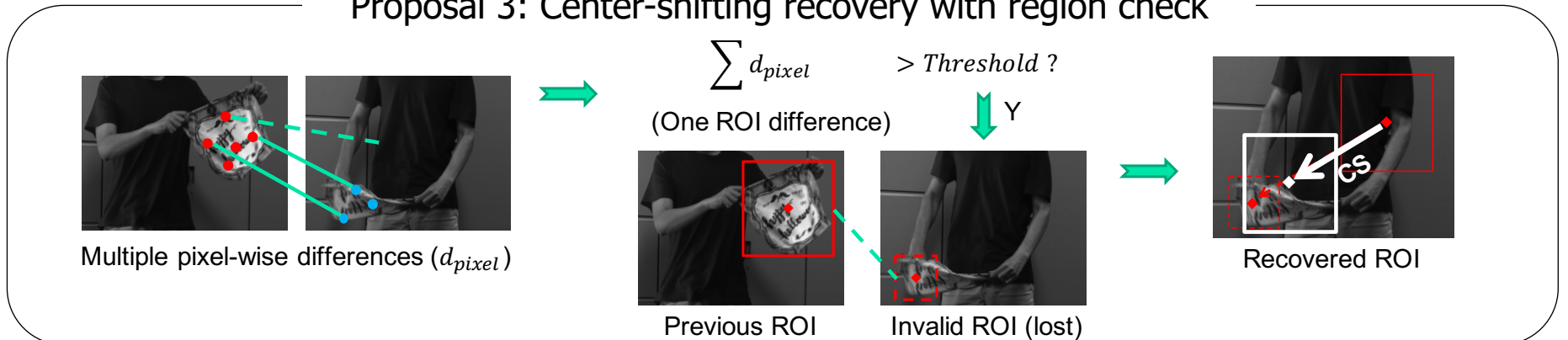
Proposal 1: Partial update with new keypoint addition



Proposal 2: Flexible ROI with hamming threshold descent



Proposal 3: Center-shifting recovery with region check



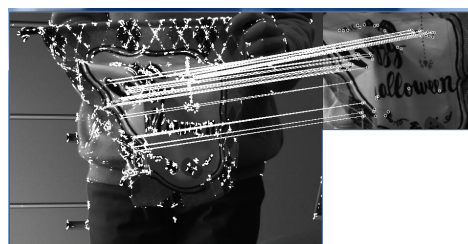
Evaluation results

- Matching accuracy
 - Average F-score: 71.01%
 - Solve problems in most cases

Conclusion

- Achieve deformation matching system (784fps, 640*480) with ultra-low delay (0.808ms/frame)

Hardware performance



Resource	Utilization
# LUT	101233 (49.67%)
# Flip Flop	112198 (27.53%)
# BRAM	28.50 (6.40%)
# DSP	36 (4.29%)
Input frame rate	Processing delay
784 fps	0.808 ms/frame

