Master in Computer Vision Barcelona

Project Module 4 Coordination

Video Surveillance for Road Traffic Monitoring

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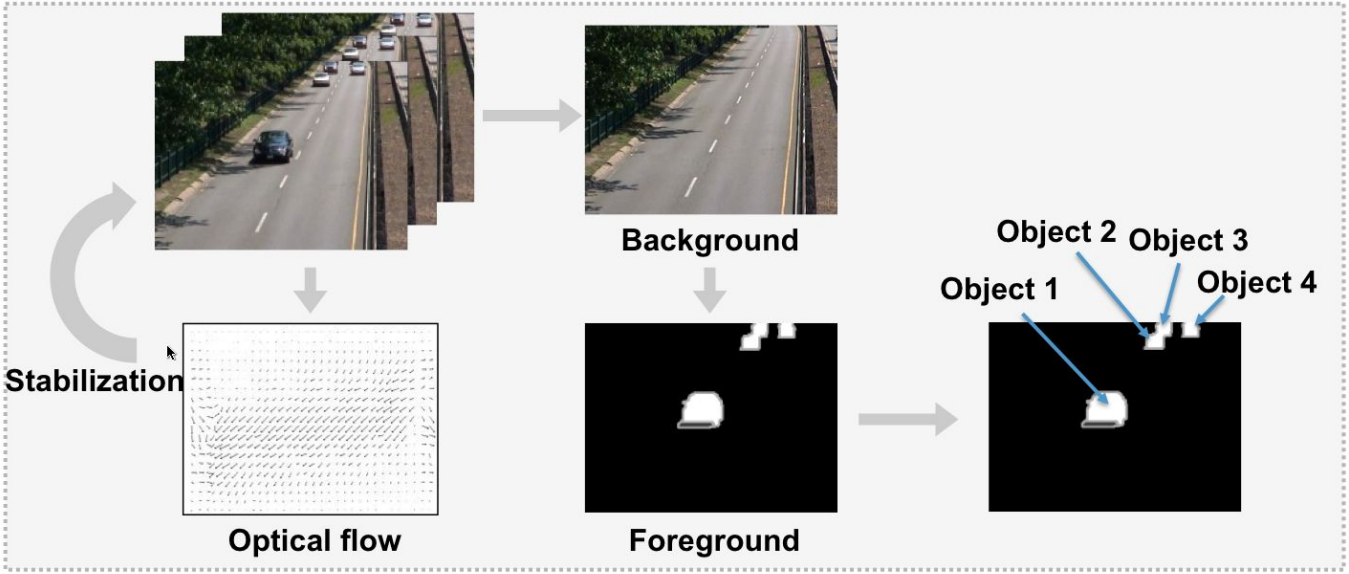
Week 4: Tasks Description

Project Schedule



Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
•Introduction •DB •Evaluation metrics	•Background estimation •Stauffer & Grimson	•Foreground segmentation •Area filter •Hole filling •Shadow removal	•Optical flow •Video stabilization	•Region tracking •Kalman filter	•**Presentation**

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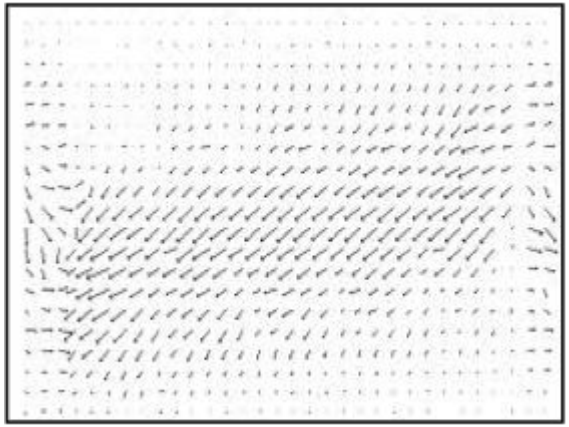
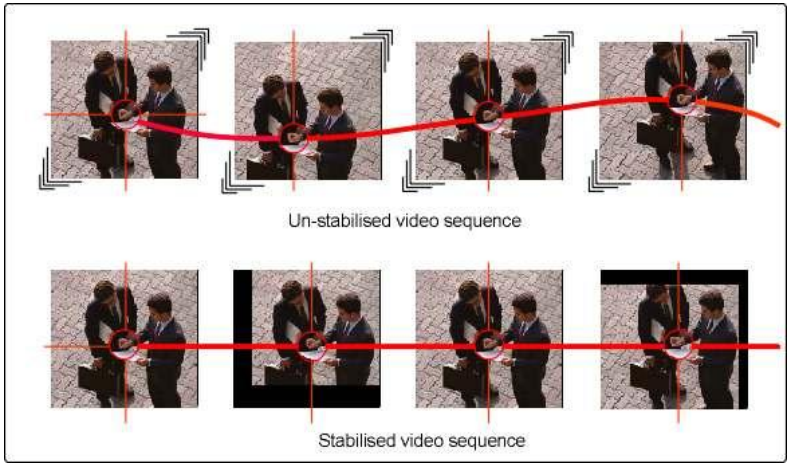
Goals Week 4

- Estimate the optical flow of a video sequence.
- Use the optical flow to correct any potential camera jitter.





Source: http://www.ovation.co.uk/video-stabilization.html

Sequences

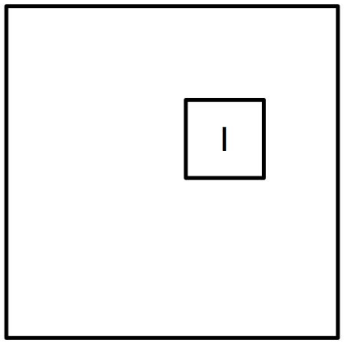
- Same as in week 1.
- Sequences 45 and 157 (image_0) from the KITTI dataset.

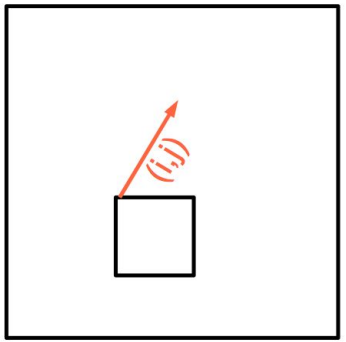
- Same as in weeks 2 and 3.
- TRAFFIC: frames 950 to 1050.

Task 1

- Implement a block matching solution for optical flow estimation.
- Your decisions:
  - Forward or Backward compensation.
  - Area of Search.
  - Size of the blocks.

$$E(i,j)=\sum_{(m,n)\in I}(q_c[m,n]-q_r[m-i,n-j])^2$$





Task 2: Comparison with Lucas-Kanade

- Compare the generated optical flows with the results obtained with Lucas-Kanade

	Mean Magnitude Error (MMEN)	Percentage of Erroneous Pixels (PEPN)
Your block matching		
Lucas-Kanade		

Task 3

- Use the estimated flow between two frames to align them.
- Apply it to stabilize the camera on the TRAFFIC sequence.
- Assess the foreground extraction algorithm after camera stabilization with your best configuration of previous weeks
    - Provide a PR curve for both (video stabilization and not)
    - Compute AUC and compare both results
    - Provide F1-score for best configuration for both results

https://upload.wikimedia.org/wikipedia/commons/d/d7/Video_image_stabilization.ogv

Task 4 (optional)

- Search online for implementations of optical flow estimations and run them on the provided sequences (middlebury)
- Provide the source code and references in your submission.

	Mean Magnitude Error (MMEN)	Percentage of Erroneous Pixels (PEPN)
Optical Flow 1		
Optical Flow 2		

Task 5 (optional): Additional stabilization

- Search online for up to 2 other implementations of video stabilizations and test them (run them) on the provided sequences.
- Provide the source code and references in your submission
- Use PR curves, AUC and F1-score to compare results

Source : Mercalli V3 SAL

Task 6 (optional)

- Record a short (maximum 5 seconds) video with a handheld camera.
- Stabilize it with any technique you choose.
- Submit the non-stabilised and stabilised versions of the same sequence.
- If using an external source code, provide a reference and code.
- Example: http://youtu.be/0MiY-PNy-GU and research paper.

Source : http://thenextweb.com/apps/2013/02/25/luma-improves-its-super-smooth-image-stabilization-for-shooting-video-on-ios/#!r9ZFi

Deliverables

- Short presentation
- Code used for the week assignement.
- Link your stabilized videos from youtube

- **Wednesday 20th January 2016**
  - **Upload presentation link to github**
  - **Fill the intra-group evaluation**