FYP5: Object Detection, Tracking and Suspicious Activity Recognition for Maritime Surveillance using Thermal Vision

Weekly Tasks

- Feasibility Study Report
- Activity Detection
- Going ahead with IPATCH dataset

Activity Detection

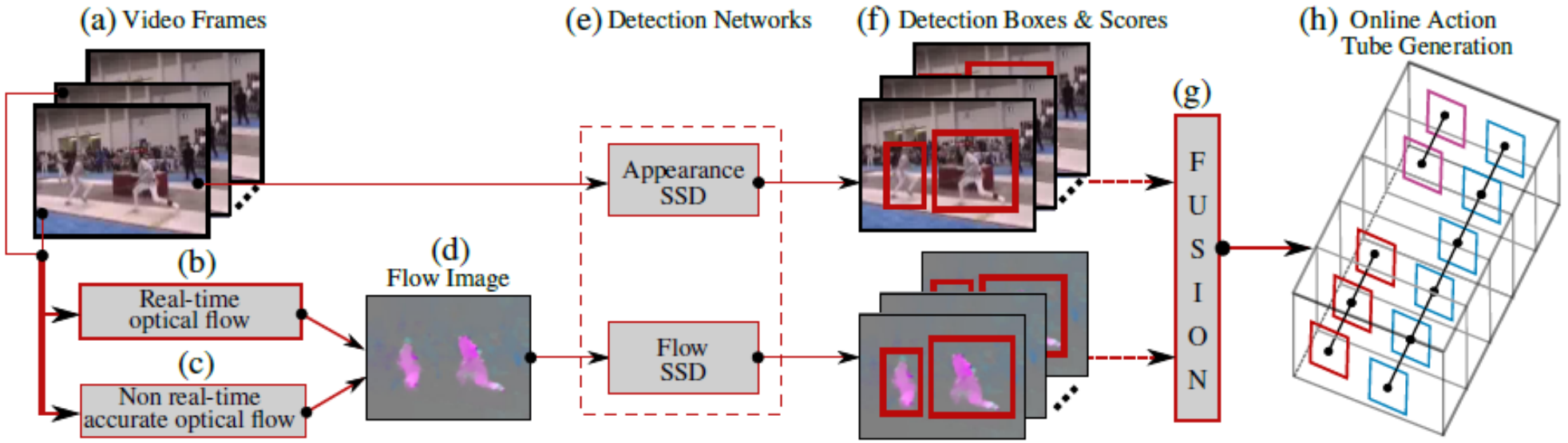


Figure 2. *At test time, the input to the framework is a sequence of RGB video frames (a). A real-time optical flow (OF) algorithm (b) [16] takes the consecutive RGB frames as input to produce flow images (d). As an option, (c) a more accurate optical flow algorithm [1] can be used (although not in real time). (e) RGB and OF images are fed to two separate SSD detection [22] networks (§ 3.2). (f) Each network outputs a set of detection boxes along with their class-specific confidence scores (§ 3.2). (g) Appearance and flow detections are fused (§ 3.3). Finally (h), multiple action tubes are built up in an online fashion by associating current detections with partial tubes (§ 3.4).*

Inference Time

Framework modules	A	A+RTF	A+AF	[33]
Flow computation (ms*)	–	7.0	110	110
Detection network time (ms*)	21.8	21.8	21.8	145
Tube generation time (ms*)	2.5	3.0	3.0	10.0
Overall speed (fps**)	40	28	7	4

* ms - milliseconds ** fps - frame per second.

Using a desktop computer with an Intel Xeon CPU@2.80GHz (8 cores) and two NVIDIA Titan X GPUs

Initial Results

- Only RGB Images
- VGG16-SSD
- Author's pretrained model

Results

- IoU 0.2: 0.714 mAP
- IoU 0.5: 0.4 mAP

These are similar results to what is reported in the paper.

IPATCH Dataset

- Contain 03 thermal image sets captured by three thermal cameras on a moving vessel
- Contains 15 scenarios captured and for each scenario has at least 2000 images per one thermal image directory
- All the videos were captured in the morning from 6 a.m. to 7 a.m. of an interval of 1-3mins

From camera 01

From camera 02

- FLIR SC655
- Mounted at side of the vessel
- 640 x 480-pixel resolution
- 25 fps

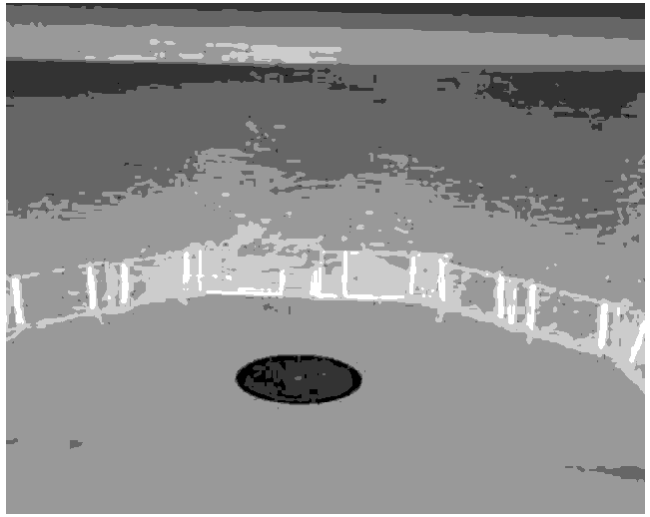
Enhancing washed out IPATCH Images

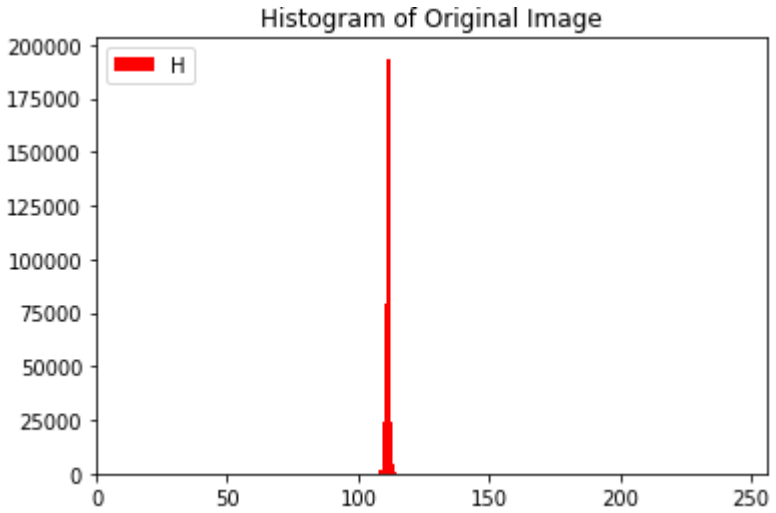
From camera 03

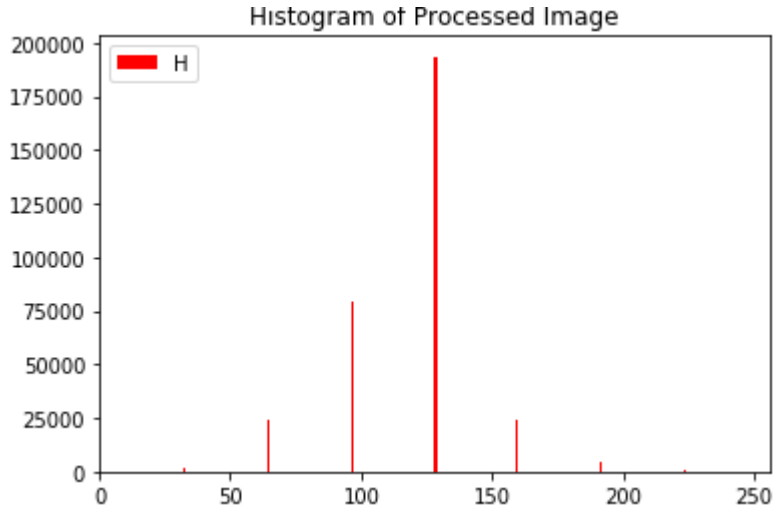
- FLIR A65
- Mounted at the stern of the vessel
- 640 x 512-pixel resolution
- 30 fps

Normalizing + Noise Removal

Enhancing the Contrast







Tasks for next week

- Modifying Activity detection pipeline with Cornernet-Lite
- Looking into the RGB-Thermal conversion