TRECVID-2016
Concept Localization : Overview

George Awad

National Institute of Standards and Technology
Dakota Consulting, Inc

- Goal
  - Make concept detection more precise in time and space than current shot-level evaluation.
  - Encourage context independent concepts design to increase their reusability.
- Task set up
  - For each of the 10 new test concepts, NIST provided set of ≈1000 shots.
  - Any shot may or may not contain the target concept.
- Task
  - For each I-Frame within the shot that contains the target, return the x,y coordinates of the (UL,LR) vertices of a bounding rectangle containing all of the target concept and as little more as possible.
- Systems were allowed to submit more than 1 bounding box per I-frame but only the ones with maximum f-score were scored.

10 New evaluated concepts

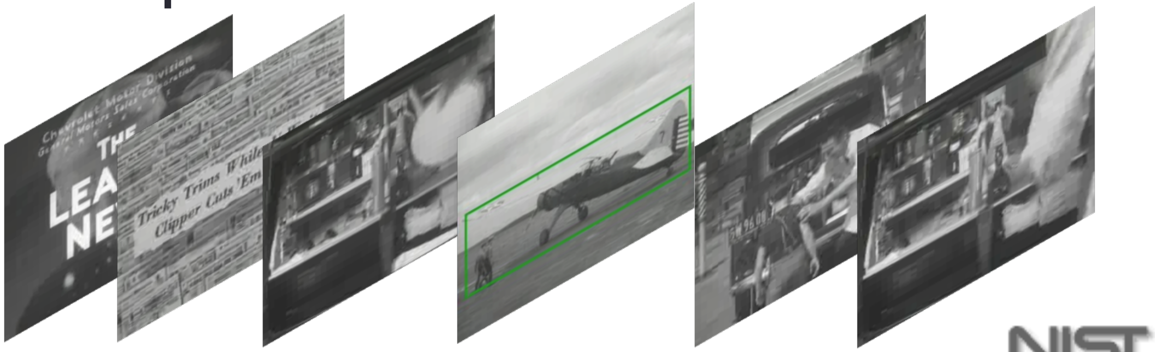
Non action concepts	New action concepts
Animal	Bicycling
Boy	Dancing
Baby	Instrumental_musician
	Running
	Sitting_down
	Skier
	Explosion_fire

NIST Evaluation framework

- Testing data
  - IACC.2.A-C (600 h, used between 2013 to 2015 in semantic indexing task).
  - About 1000 shots per concept were sampled from the ground truth (with true positive (TP) clips of max = 300, avg = 178, min = 12).
  - Total of 9587 shots and 2205140 i-frames were distributed to systems.
  - Human assessors were given all the i-frames (total of 55789 images) of all TP shots to create the ground truth (drawing bounding box around the concept if it exists).
  - Human assessors had to watch the video clips of the images to verify the concepts.

Evaluation metrics

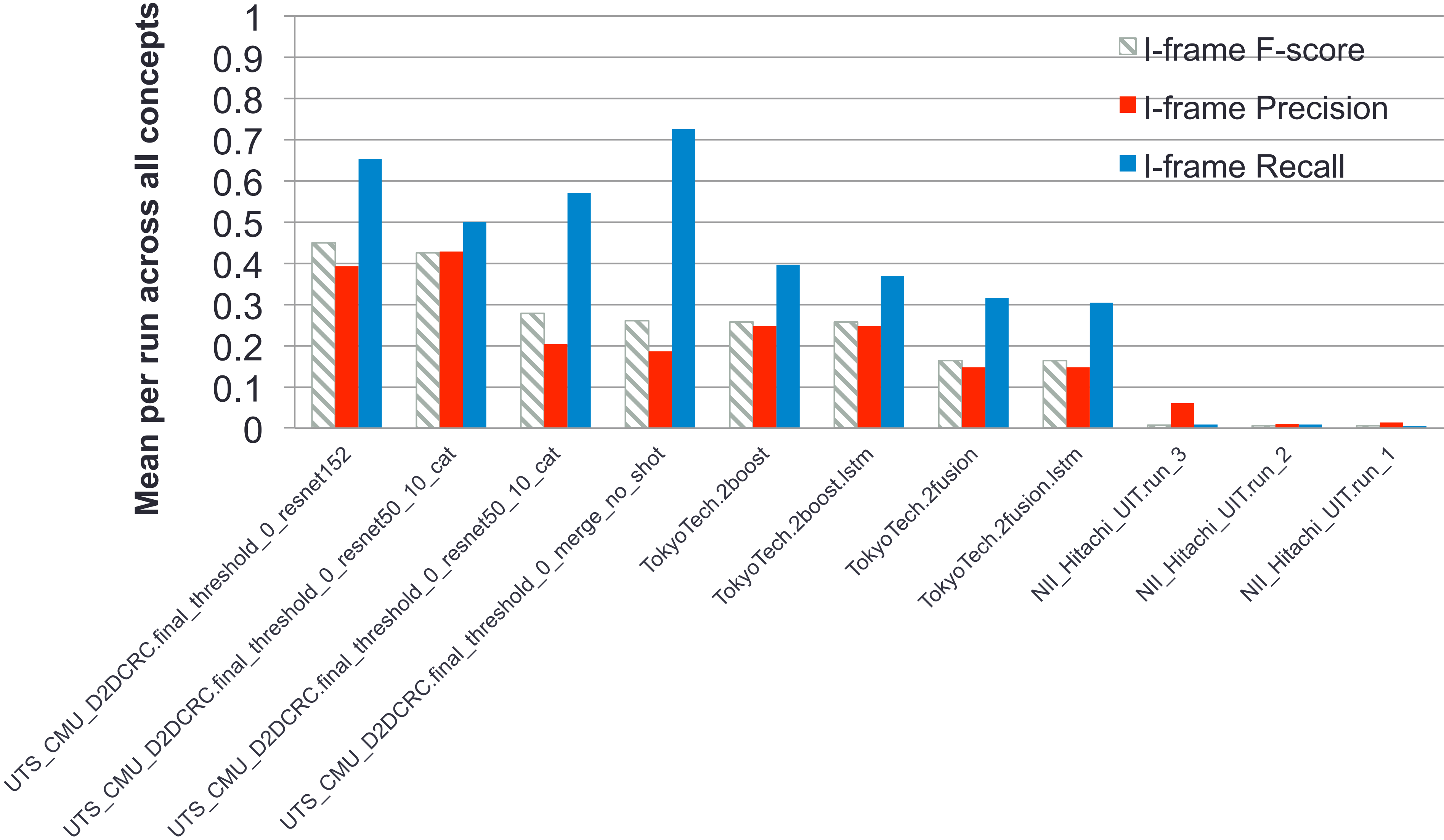
- Temporal localization: precision, recall and f-score based on the judged I-frames.
- Spatial localization: precision, recall and f-score based on the located pixels representing the concept.
- An average of precision, recall and f-score for temporal and spatial localization across all I-frames for each concept and for each run.

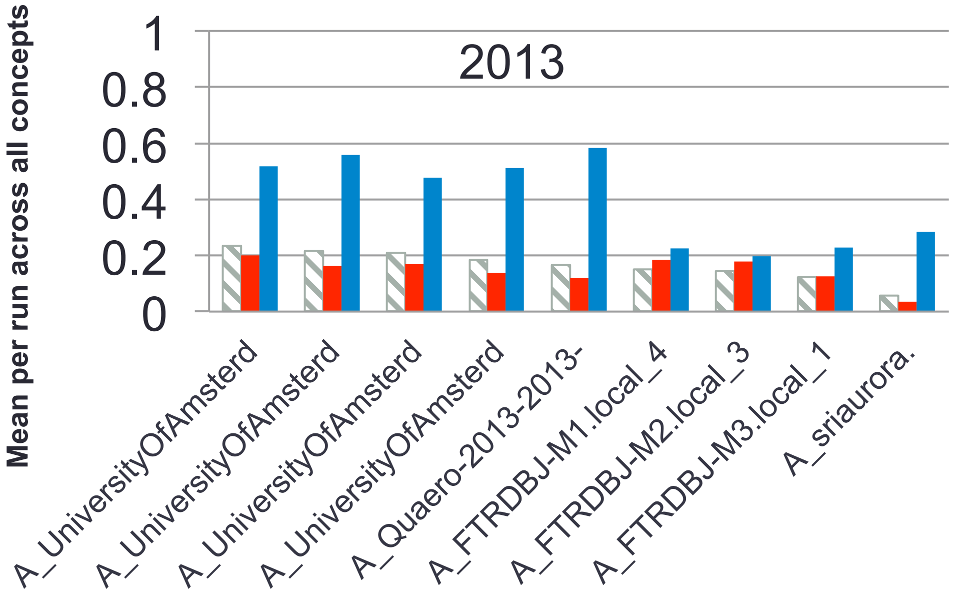


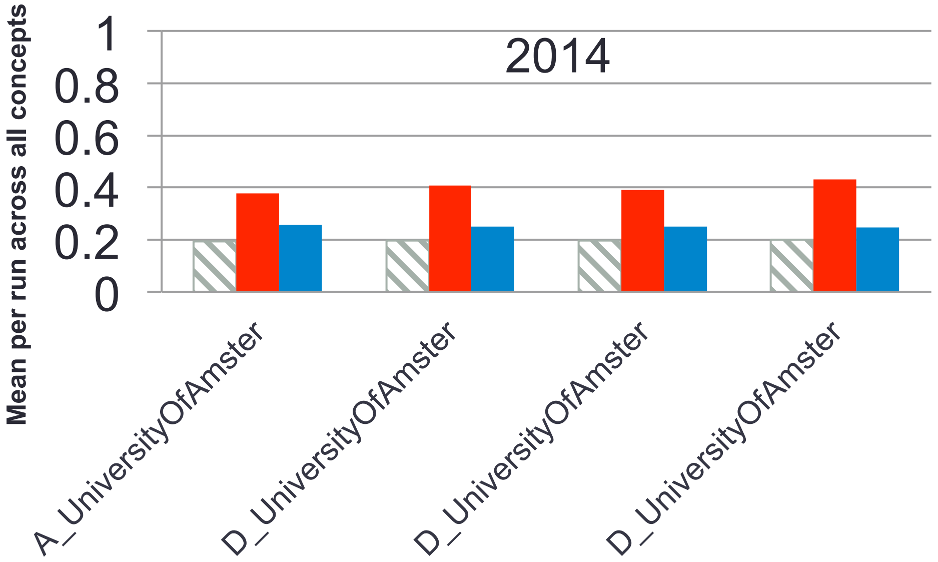
Participants (Finishers: 3 out of 21)

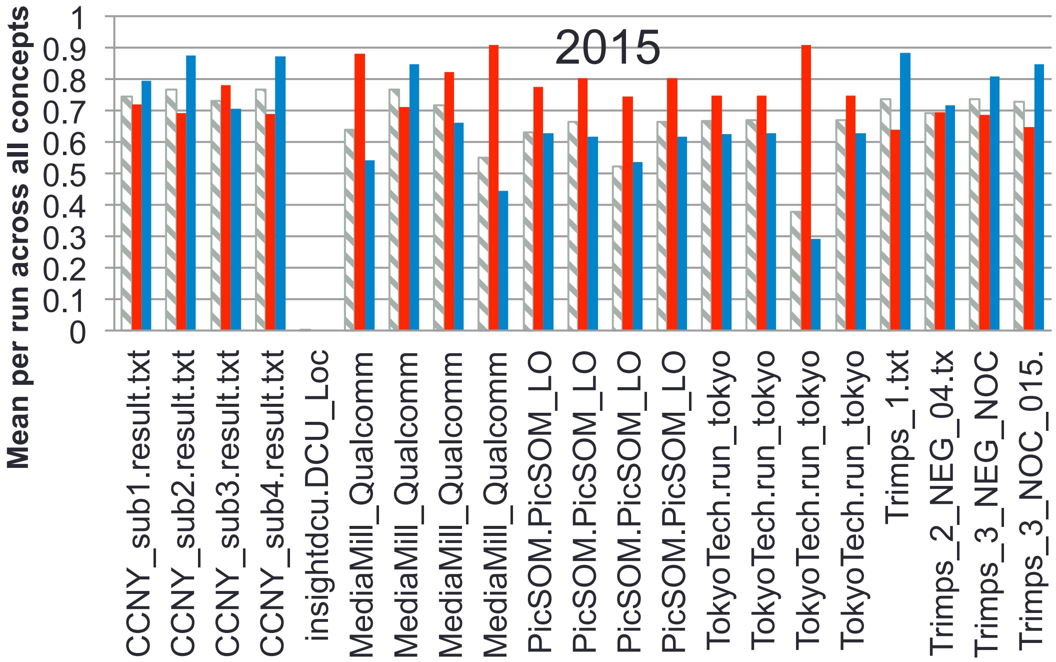
- 3 teams submitted 11 runs
  - TokyoTech (4 runs)
    - Tokyo Institute of Technology
  - NII_Hitachi_UIT (3 runs)
    - National Institute of Informatics; Hitachi, Ltd; University of Information Technology
  - UTS_CMU_D2DCRC (4 runs)
    - University of Technology, Sydney; Carnegie Mellon University; D2DCRC

Temporal localization results by run (sorted by F-score)







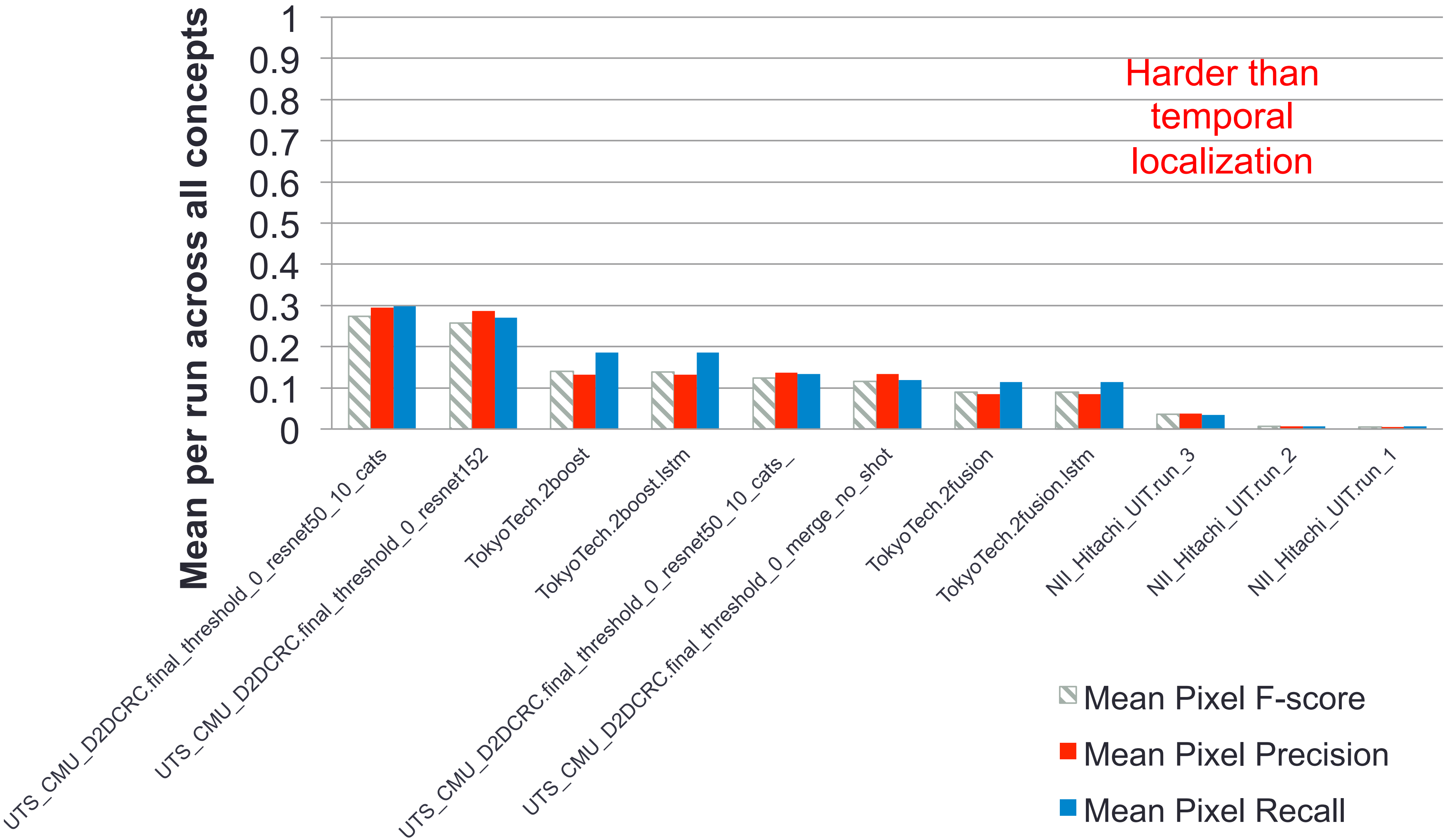


2016 (mainly action) >> 2013 & 2014 (mainly objects)

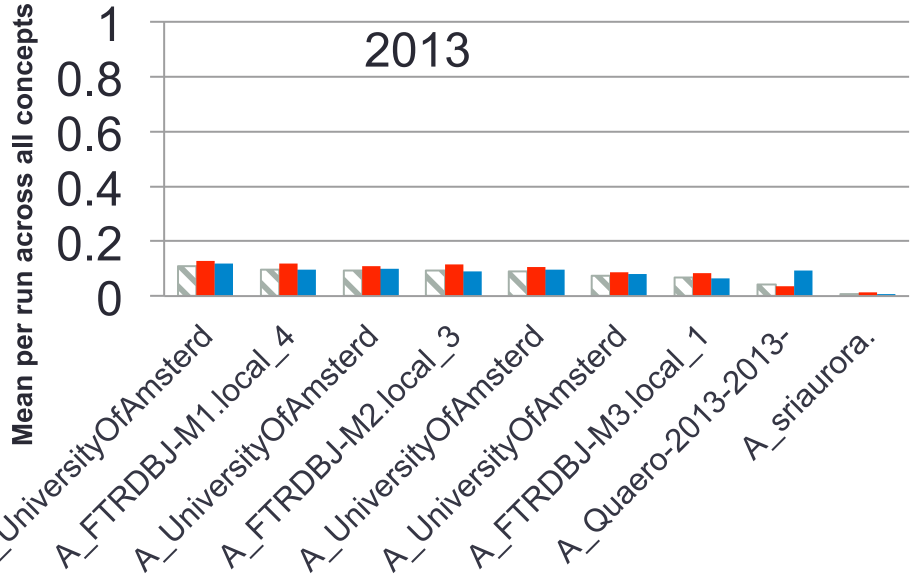
ONLY TP shots were given to systems to localize.

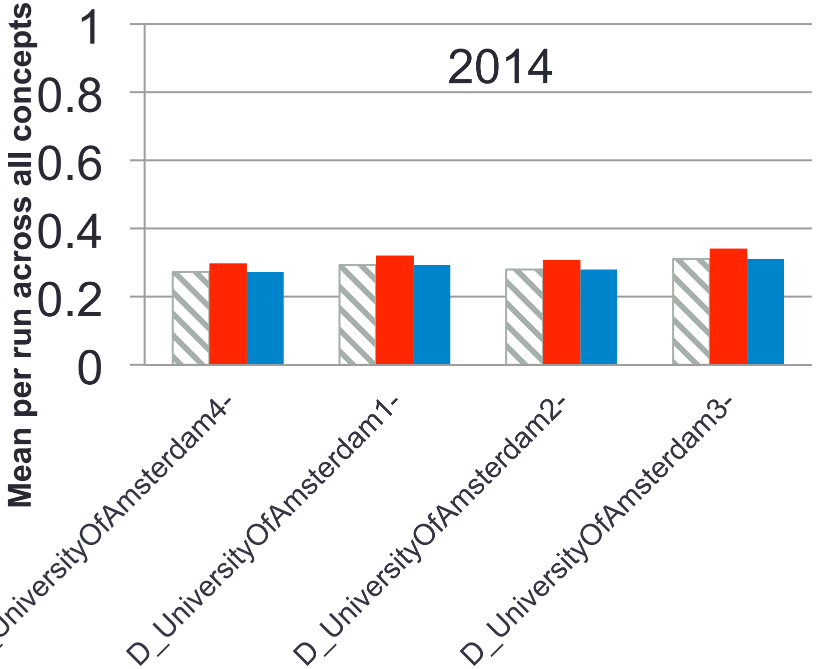
Temporal Localization results

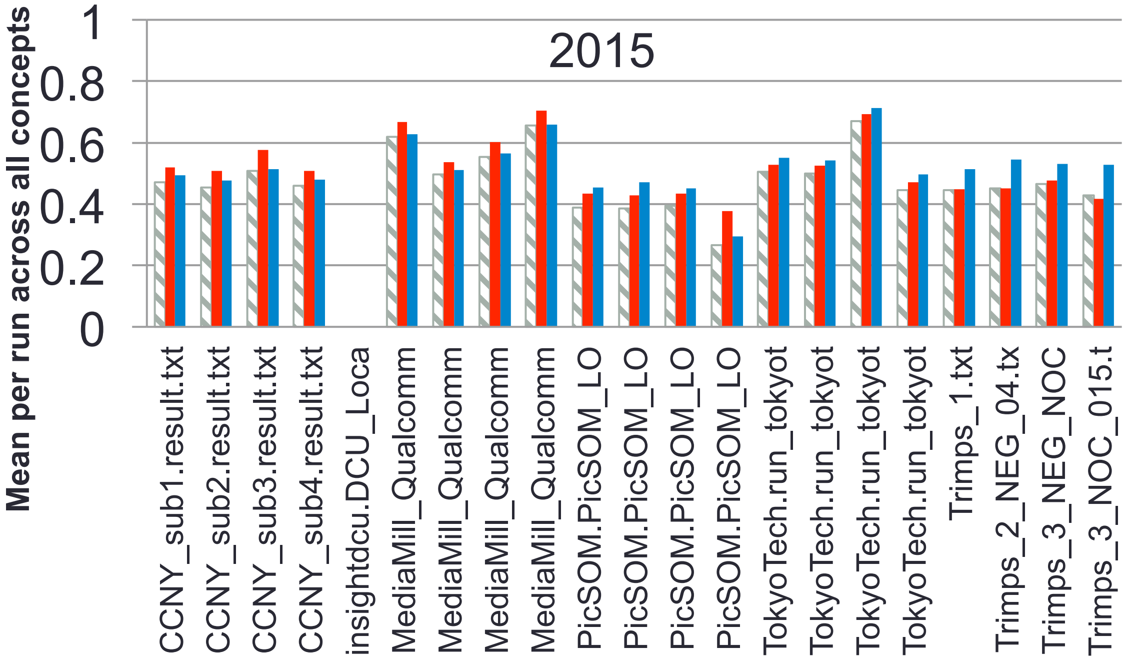
Spatial Localization results by run (sorted by F-score)



Harder than temporal localization





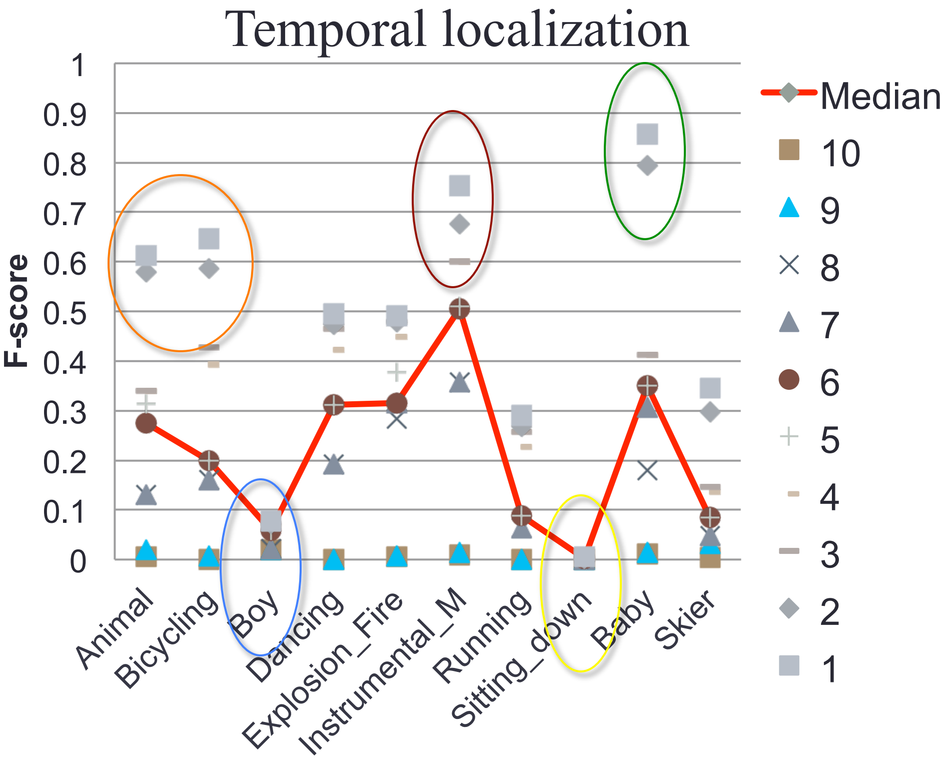


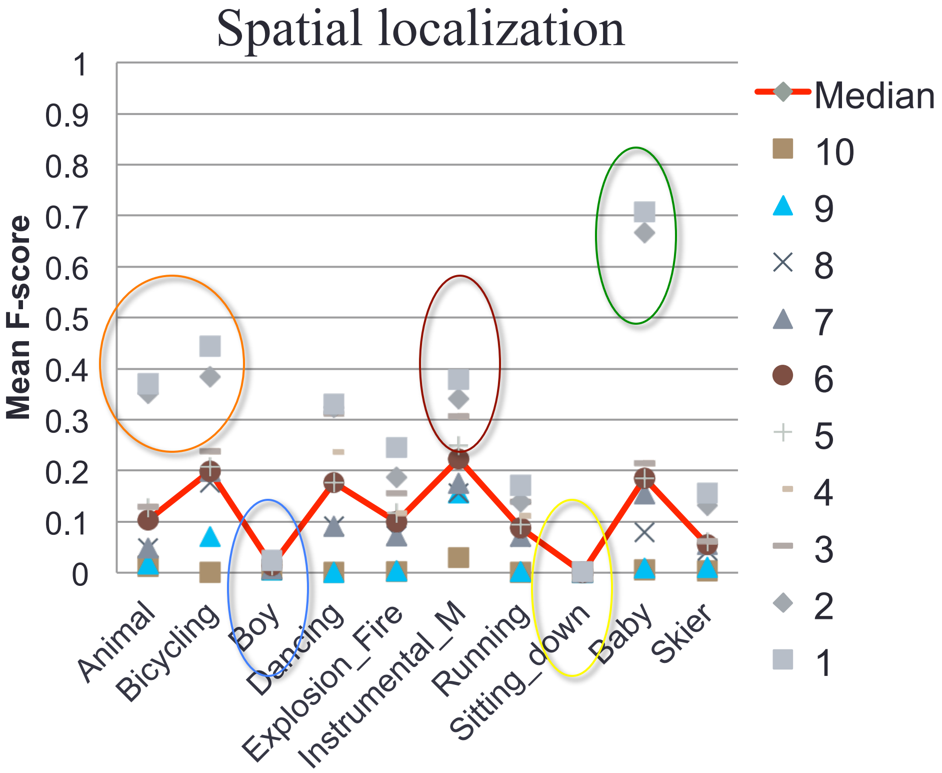
2016 (actions) > 2013 (objects)
2016 (actions) ~ 2014 (objects)

← ONLY TP shots were given to systems to localize.

Spatial Localization results

Results per concept top 10 runs

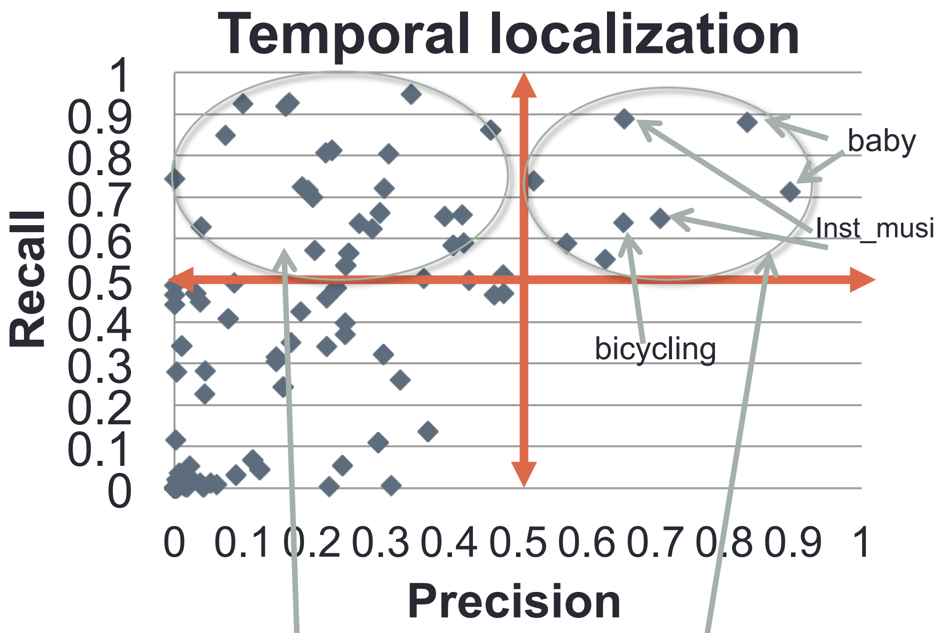


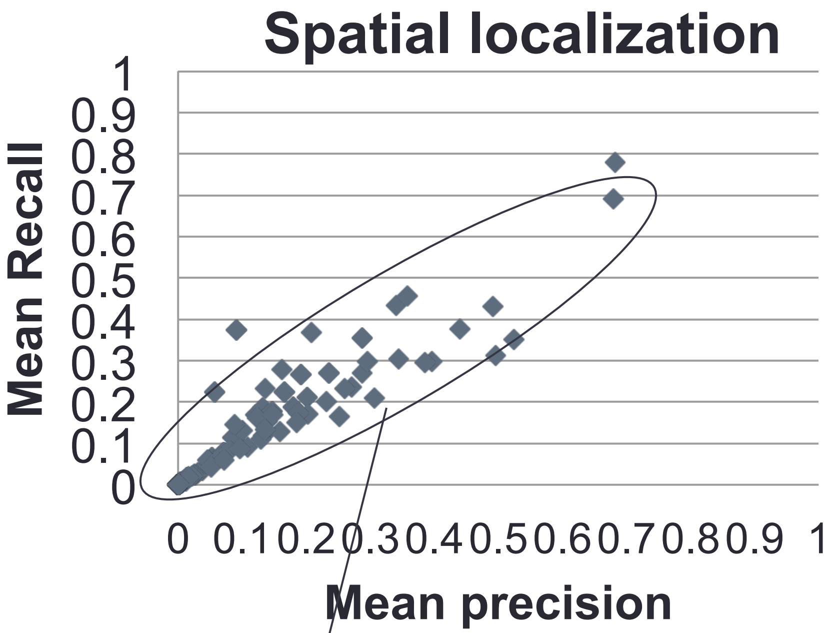


Most concepts perform better in temporal compared to spatial localization

A lot of resemblance between same concepts

Results per concept across all runs





Many systems submitted a lot of non-target I-frames, while few found a good balance.

submitted bounding boxes approximate the size of ground truth boxes and overlap with them. Many systems are good in finding the real box sizes.

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General Observations

- Consistent observations in the last 4 years
  - ✓Temporal localization is easier than spatial localization.
  - ✓Systems report approximate G.T box sizes.

- Performance of action/dynamic concepts are higher than object concepts tested in 2013 to 2014.

- Assessment of action/dynamic concepts proved to be challenging in many cases to the human assessors.

- Lower finishing% of teams compared to signups.

Next team talks

- TokyoTech
- UTS_CMU_D2DCRC