

# DeeperAction Workshop @ ECCV2022

## FineAction Track on Temporal Action Localization

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# Outline

**Part 1: Dataset Introduction**

**Part 2: FineAction Competition**

# Part 1



## Dataset Introduction

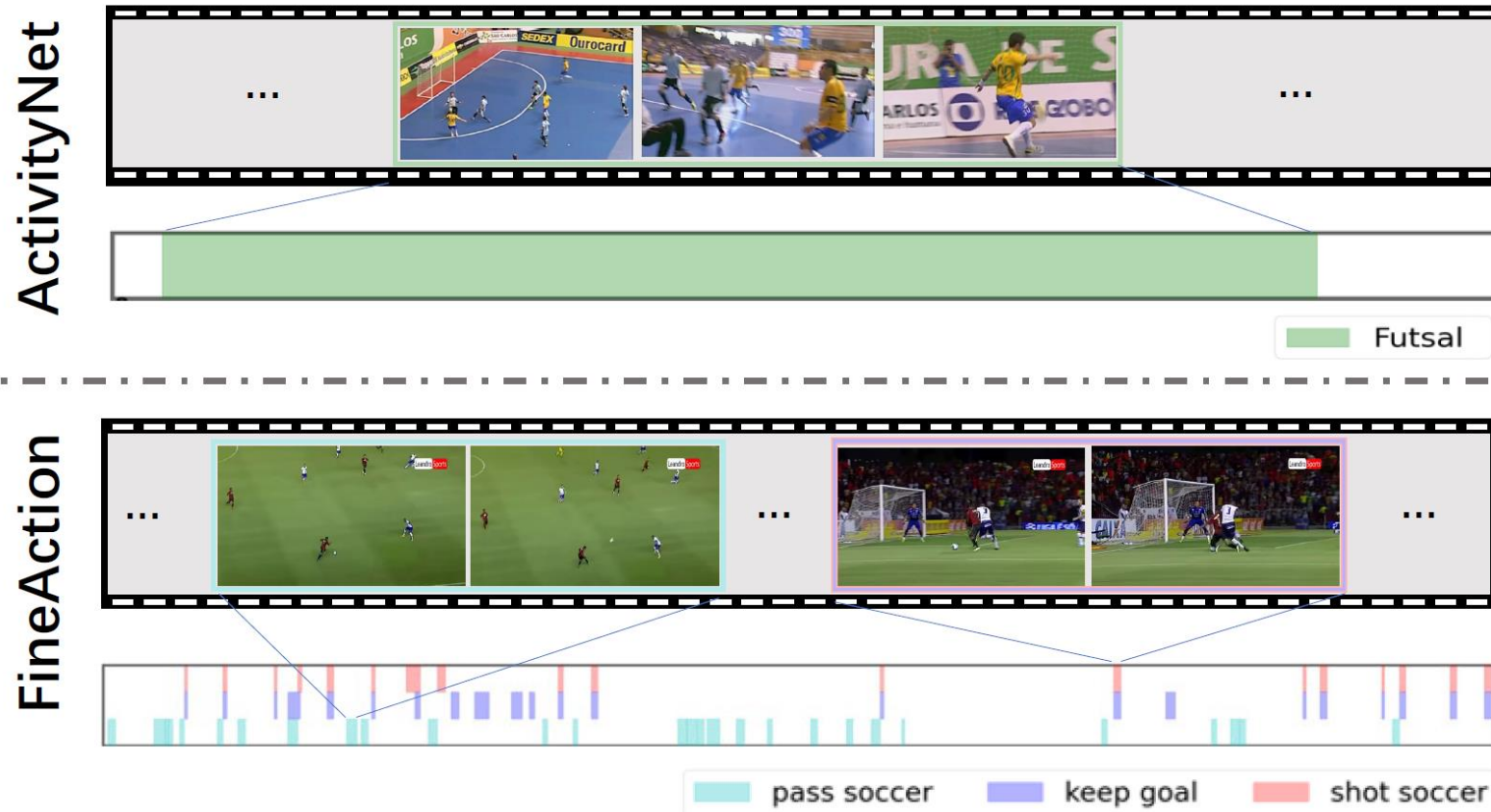
# Why to do?

## ActivityNet

- ❑ *Sparse annotations*
- ❑ *Coarse-level action*



- ❑ **Dense annotations**
- ❑ **Fine-Grained action**



# Why to do?

## THUMOS-14

- ❑ *Small scale*
- ❑ *Specific domain*

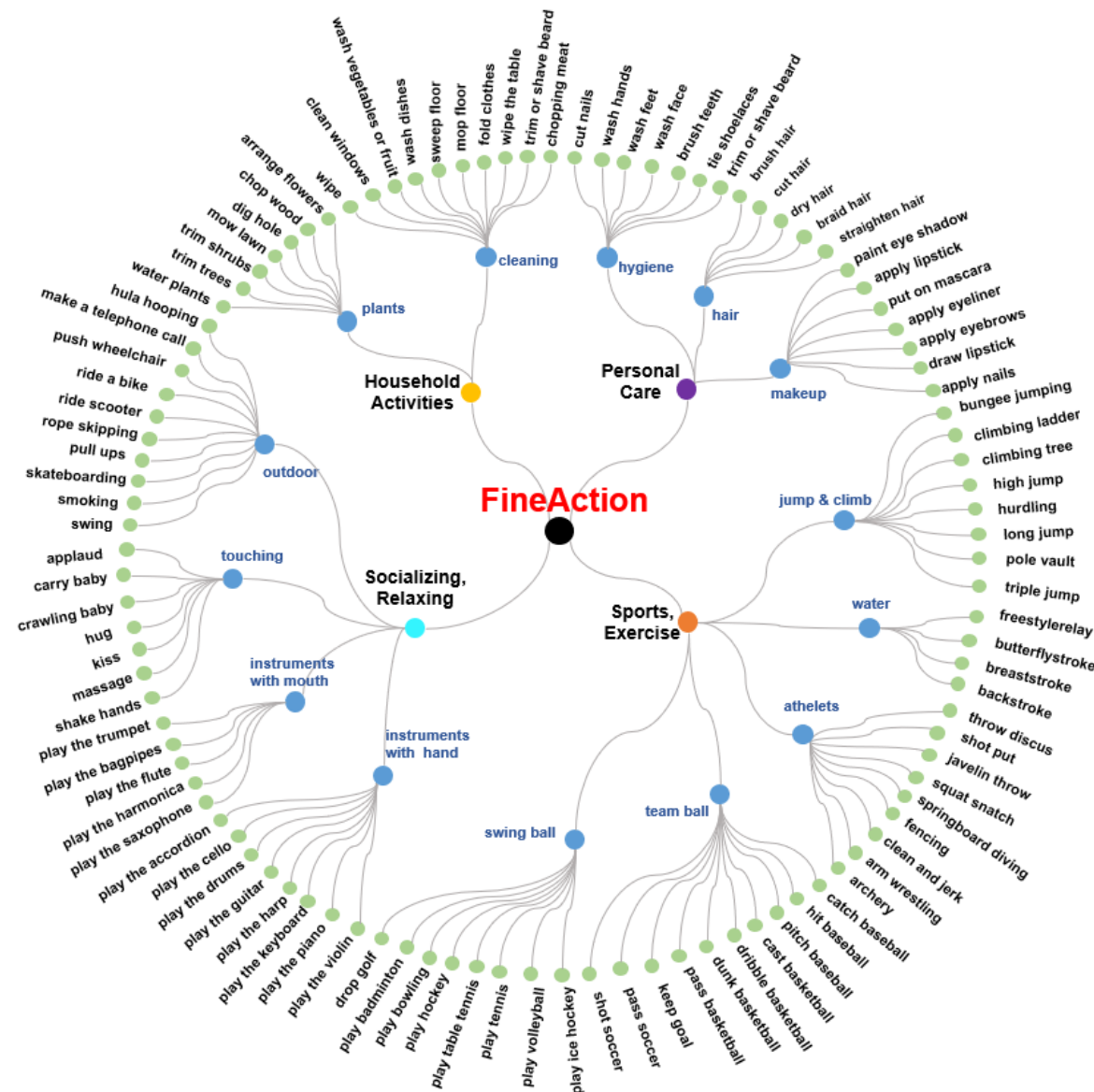


- ❑ **Large scale**
- ❑ **Diversity domain**



## FineAction

- ❑ 4 top-level categories
- ❑ 14 middle-level categories
- ❑ 106 bottom-level categories

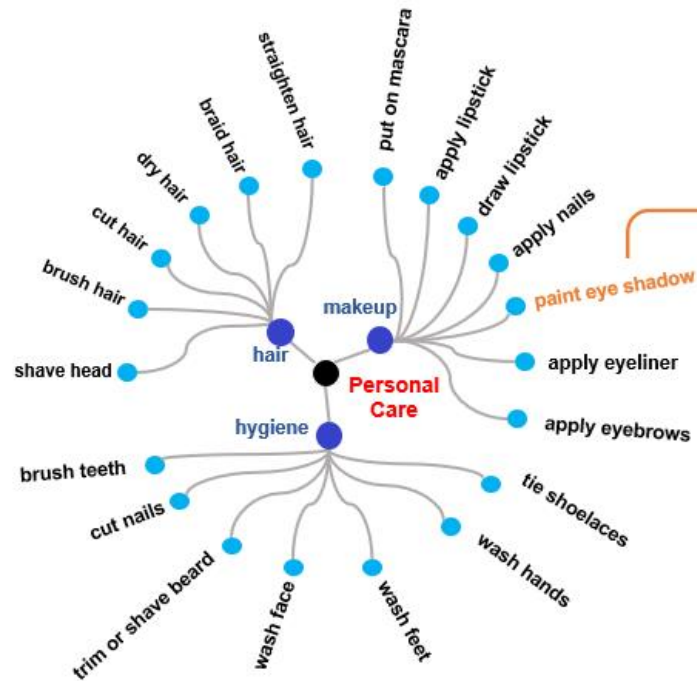


## Video Selection

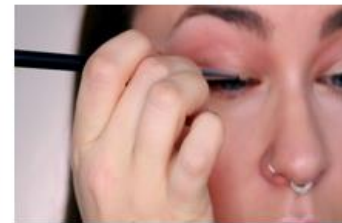
- ☐ Existing video datasets
  - *YouTube 8M*
  - *Kinetics 400*
  - *FCVID*
- ☐ Crawl from YouTube videos



## Framework of Annotation Process



(a) Category Taxonomy



**Start Definition:**  
Draw eye shadow with tools such as brushes.



**End Definition:**  
Take off the tool.

(b) Annotation Guidance

**Video Browsing Area**

02.mp4  
03.mp4

Choose Middle-Level label  
Choose Bottom-Level label

make up  
paint eye shadow

delete label save

**Label Display Area** Reliable

|                                           |                     |                                              |
|-------------------------------------------|---------------------|----------------------------------------------|
| <input type="checkbox"/> make up          | Start Time: 12.15 s | <input checked="" type="checkbox"/> Reliable |
| <input type="checkbox"/> paint eye shadow | End Time: 13.56 s   |                                              |
| <input type="checkbox"/> make up          | Start Time: 18.66 s | <input checked="" type="checkbox"/> Reliable |
| <input type="checkbox"/> paint eye shadow | End Time: 23.33 s   |                                              |

**Frame Selection Area**

Start: 18.66s

Paint eye shadow

End: 23.33s

(c) Annotation Tool

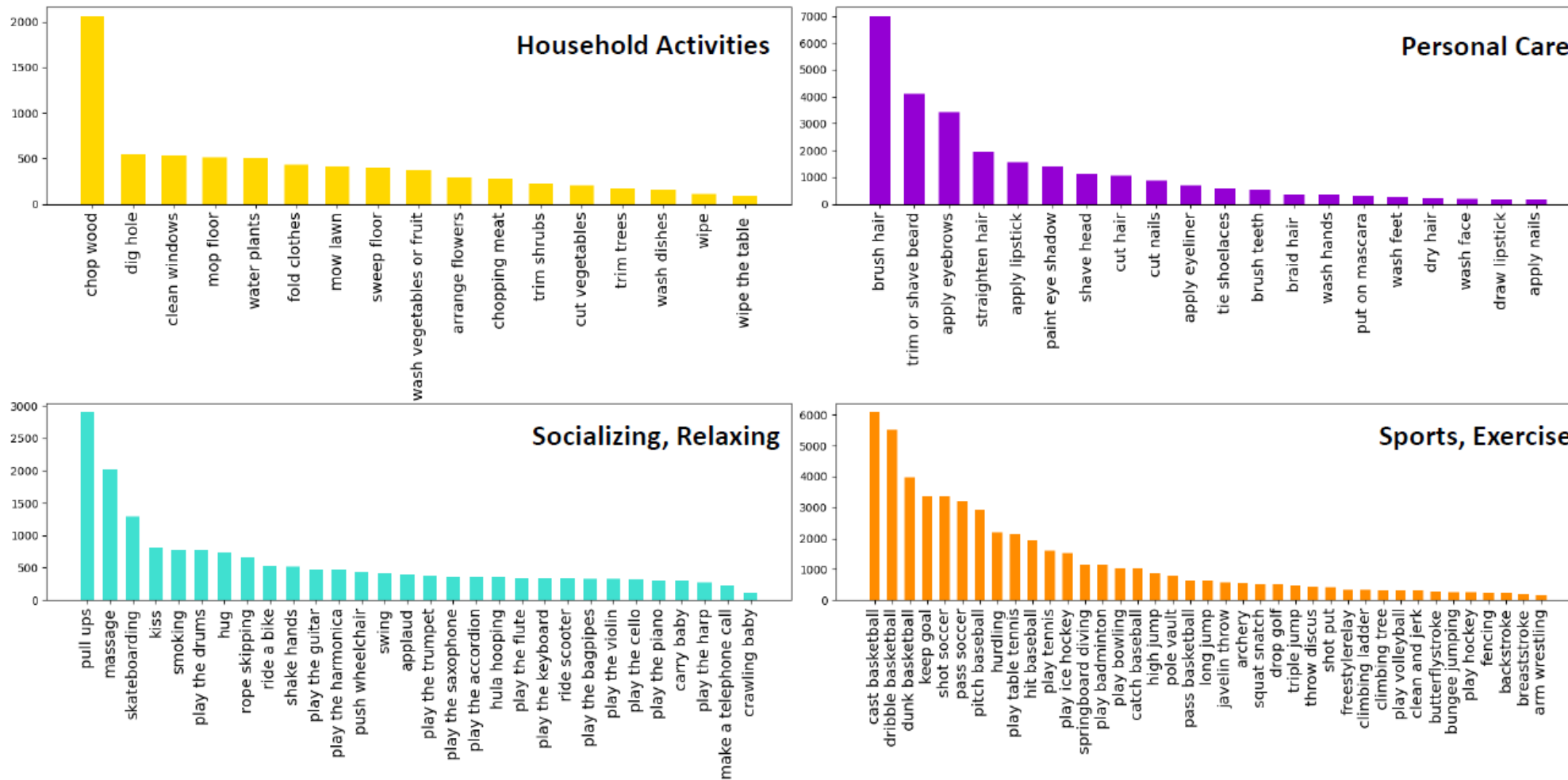
## □ Large-Scale & Fine-Grained

| Database           | Category | M-L | Video  | Instance | Overlap | Duration | Action type  | Main task                    |
|--------------------|----------|-----|--------|----------|---------|----------|--------------|------------------------------|
| MPII Cooking [24]  | 65       | ✓   | 45     | 5,609    | 0.1%    | 11.1 m   | kitchens     | Action Classification        |
| EPIC-Kitchens [26] | 4,025    | ✓   | 700    | 89,979   | 28.1%   | 3.1 s    | kitchens     | Action Classification        |
| FineGym V1.0 [23]  | 530      | ✓   | 303    | 32,697   | 0.0%    | 1.7 s    | sports       | Action Classification        |
| THUMOS14 [14]      | 20       | ×   | 413    | 6,316    | 17.5%   | 4.3 s    | sports       | Temporal Action Localization |
| ActivityNet [15]   | 200      | ×   | 19,994 | 23,064   | 0.0%    | 49.2 s   | daily events | Temporal Action Localization |
| HACS Segment [16]  | 200      | ×   | 49,485 | 122,304  | 0.0%    | 33.2 s   | daily events | Temporal Action Localization |
| <b>FineAction</b>  | 106      | ✓   | 16,732 | 103,324  | 11.5%   | 7.1 s    | daily events | Temporal Action Localization |

## □ Instance duration

| Database          | 0-2 s         | 2-6 s  | 6-15 s | >15 s  | Ins / Vid   |
|-------------------|---------------|--------|--------|--------|-------------|
| THUMOS14 [14]     | 2,029         | 2,753  | 1,437  | 99     | 15.29       |
| ActivityNet [15]  | 900           | 3,253  | 4,426  | 14,485 | 1.15        |
| HACS Segment [16] | 8,874         | 29,644 | 31,982 | 51,804 | 2.47        |
| <b>FineAction</b> | <b>66,890</b> | 15,253 | 10,523 | 10,586 | <b>6.17</b> |

## Instance distribution

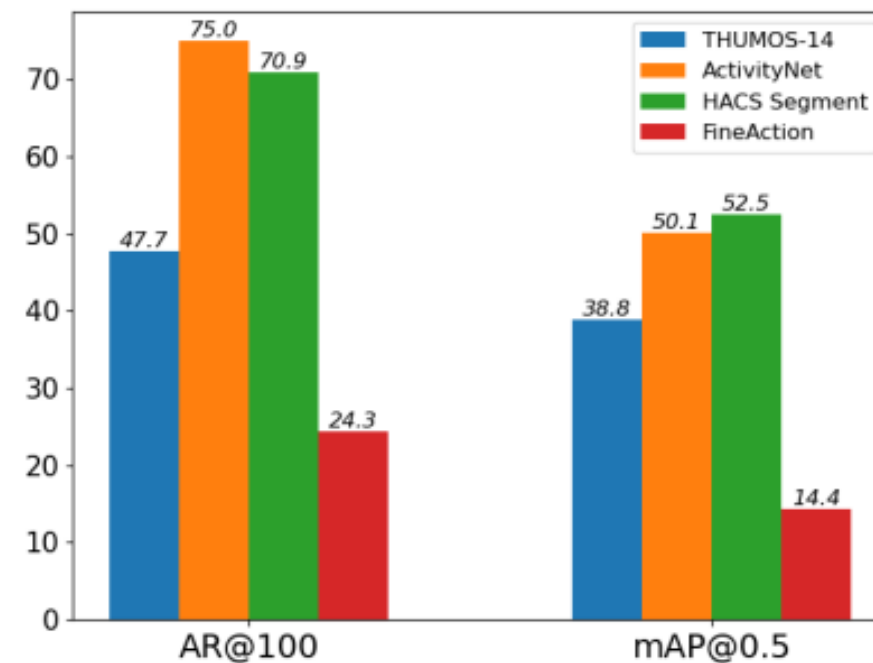


## SOAT methods on FineAction

| Method     | Modality | Action Proposal Generation |       |        |       |
|------------|----------|----------------------------|-------|--------|-------|
|            |          | AR@5                       | AR@10 | AR@100 | AUC   |
| BMN [11]   | RGB      | 8.62                       | 11.20 | 22.74  | 17.49 |
|            | Flow     | 9.85                       | 12.72 | 24.18  | 18.94 |
|            | RGB+Flow | 9.99                       | 12.84 | 24.34  | 19.19 |
| DBG [13]   | RGB      | 6.82                       | 9.01  | 21.26  | 15.48 |
|            | Flow     | 8.27                       | 10.90 | 23.37  | 17.70 |
|            | RGB+Flow | 7.82                       | 10.45 | 23.07  | 17.24 |
| G-TAD [12] | RGB      | 7.96                       | 10.45 | 20.86  | 16.06 |
|            | Flow     | 8.87                       | 11.60 | 22.01  | 17.09 |
|            | RGB+Flow | 9.02                       | 11.83 | 23.17  | 17.65 |

| Method     | Modality | Temporal Action Localization |          |          |         |
|------------|----------|------------------------------|----------|----------|---------|
|            |          | mAP@0.50                     | mAP@0.75 | mAP@0.95 | Avg.mAP |
| BMN [11]   | RGB      | 12.56                        | 7.49     | 2.62     | 7.86    |
|            | Flow     | 14.49                        | 8.92     | 3.19     | 9.23    |
|            | RGB+Flow | 14.44                        | 8.92     | 3.12     | 9.25    |
| DBG [13]   | RGB      | 8.57                         | 5.01     | 1.93     | 5.31    |
|            | Flow     | 11.03                        | 6.95     | 2.70     | 7.20    |
|            | RGB+Flow | 10.65                        | 6.43     | 2.50     | 6.75    |
| G-TAD [12] | RGB      | 10.88                        | 6.52     | 2.19     | 6.87    |
|            | Flow     | 12.58                        | 8.18     | 2.56     | 8.26    |
|            | RGB+Flow | 13.74                        | 8.83     | 3.06     | 9.06    |

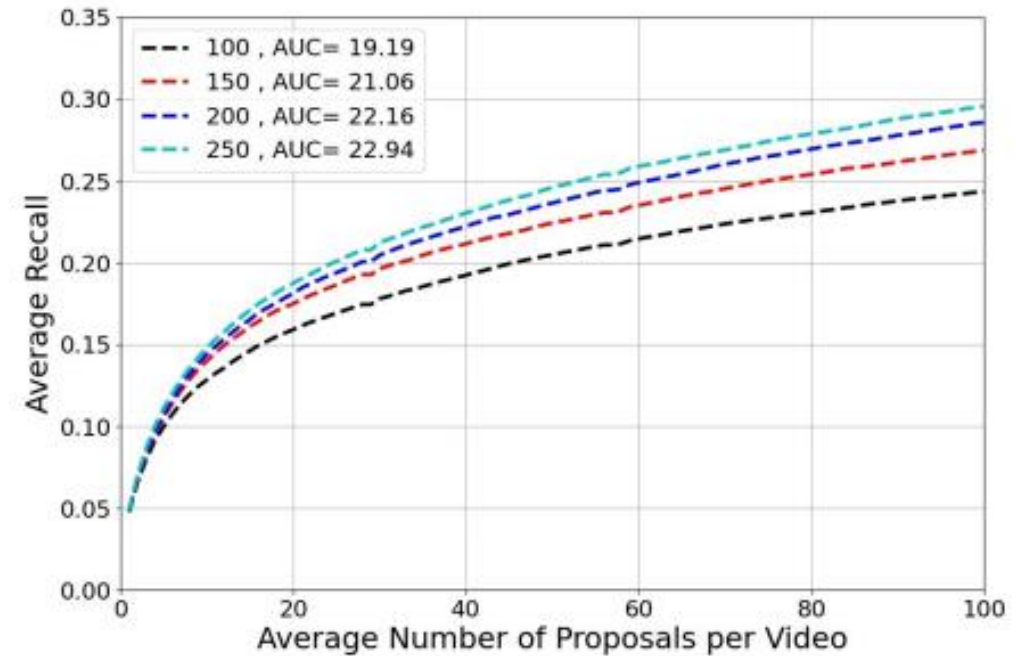
## Benchmark comparison



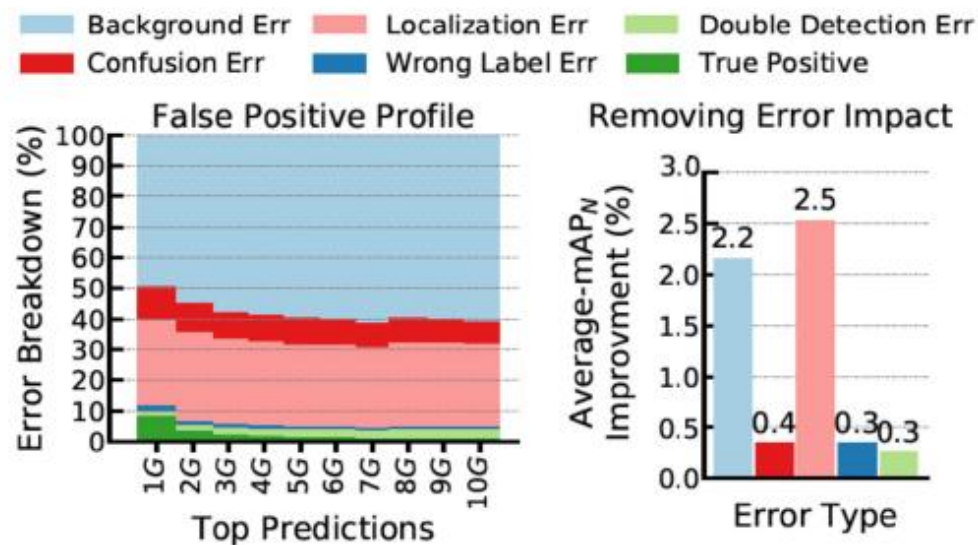
## □ Cross-dataset evaluation

| Dataset          | Parameters Initial | AUC(%)         |
|------------------|--------------------|----------------|
| ActivityNet [15] | Scrath             | 67.29          |
| FineAction       | Scrath             | 19.19          |
| ActivityNet [15] | FineAction         | 63.17 (↓ 4.12) |
| FineAction       | ActivityNet [15]   | 18.42 (↓ 0.77) |

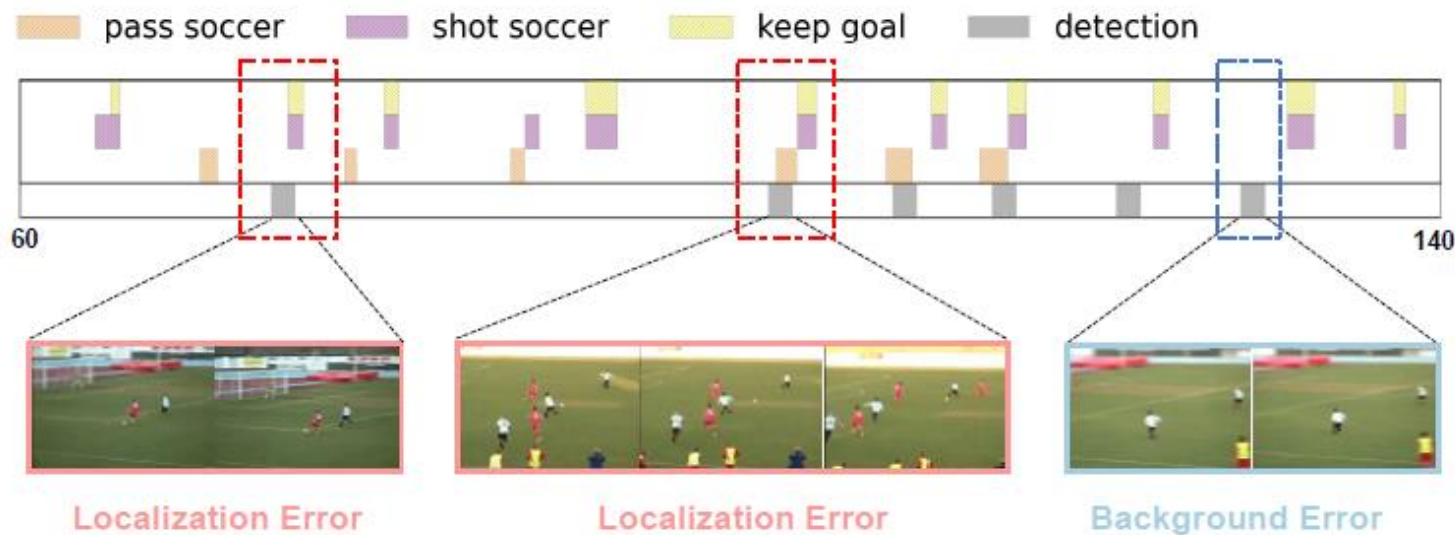
## □ Different sequence length



## □ Error analysis & visualization

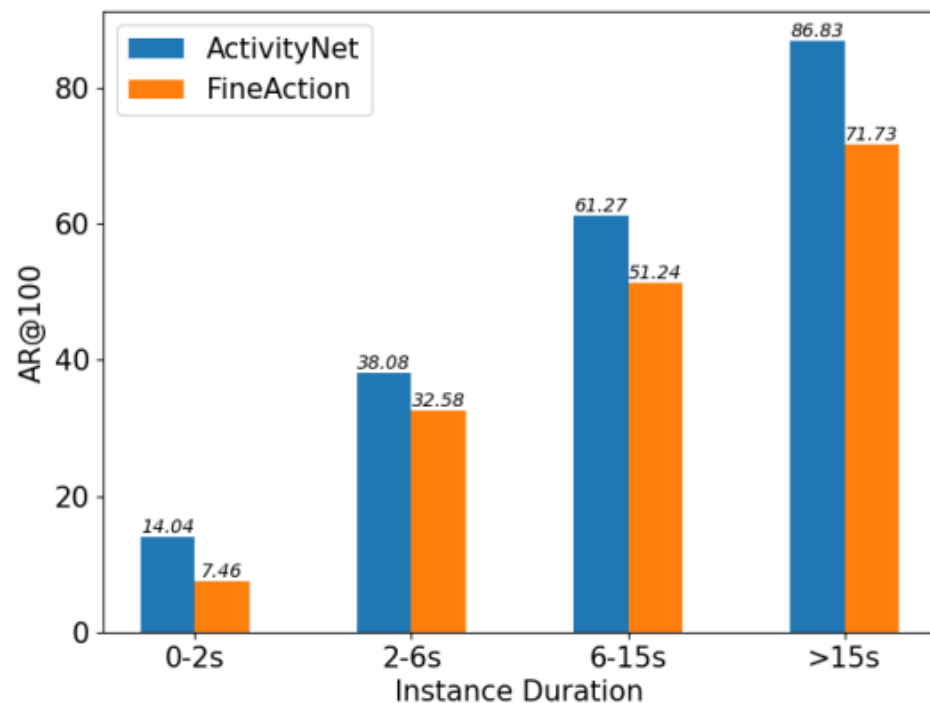


(a) Error Analysis.

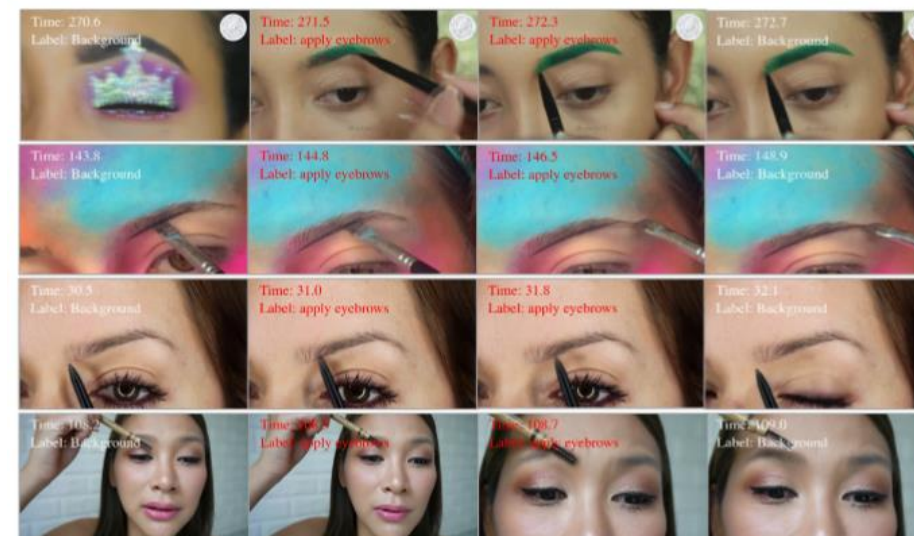


(b) Visualization of Typical Errors.

## □ Challenging categories



| FineAction      | AR@100 | Avg. Duration | Num  |
|-----------------|--------|---------------|------|
| straighten hair | 1.6    | 1.17 s        | 1934 |
| apply eyebrows  | 1.7    | 1.13 s        | 3428 |
| dig hole        | 2.2    | 0.83 s        | 544  |
| freestyle relay | 88.4   | 53.12 s       | 345  |
| breaststroke    | 94.5   | 53.59 s       | 211  |
| play the harp   | 96.2   | 69.21 s       | 268  |



# Part 2



## FineAction Competition

<https://codalab.lisn.upsaclay.fr/competitions/4386>



ECCV DeeperAction Challenge - FineAction Track on Temporal Action Localization

Organized by richard61

The challenge is Track 1 at ECCV DeeperAction Challenge. This track is to detect and recognise all action instances within ...

May 01, 2022-Aug 31, 2022

140 participants

- ❑ **Validation phase:** 2022.05.01-2022.08.15
- ❑ **Testing phase:** 2022.08.16-2022.08.31

## □ Goal

The challenge requires detecting and recognizing all-action instances within an untrimmed video.

## □ Metric

Mean Average Precision (mAP) is a conventional evaluation metric, where Average Precision (AP) is calculated for each action category with tIoU thresholds [0.5:0.05:0.95].

- ❑ Valid Participants : 137
- ❑ Valid Teams: 8+9 (Company, University, Institute)



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自动化研究所  
INSTITUTE OF AUTOMATION  
CHINESE ACADEMY OF SCIENCES



中山大學  
SUN YAT-SEN UNIVERSITY

oppo



中国科学技术大学  
University of Science and Technology of China



華中科技大學



上海交通大學  
SHANGHAI JIAO TONG UNIVERSITY



南京理工大学  
NANJING UNIVERSITY OF SCIENCE & TECHNOLOGY



Agency for  
Science, Technology  
and Research  
SINGAPORE

❑ Valid Submission: 58 (Val Phase) + 84 (Test Phase)

| Test Set (Mean Average Precision - mAP) |             |         |                    |               |               |               |               |               |               |               |               |               |               |              |
|-----------------------------------------|-------------|---------|--------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|--------------|
| #                                       | User        | Entries | Date of Last Entry | mAP@0.50<br>▲ | mAP@0.55<br>▲ | mAP@0.60<br>▲ | mAP@0.65<br>▲ | mAP@0.70<br>▲ | mAP@0.75<br>▲ | mAP@0.80<br>▲ | mAP@0.85<br>▲ | mAP@0.90<br>▲ | mAP@0.95<br>▲ | Avg.mAP<br>▲ |
| 1                                       | yptang      | 24      | 08/31/22           | 35.95 (1)     | 33.48 (1)     | 30.64 (1)     | 27.89 (1)     | 24.92 (1)     | 21.78 (1)     | 18.25 (1)     | 14.25 (1)     | 9.00 (1)      | 3.52 (3)      | 21.97 (1)    |
| 2                                       | linxt       | 12      | 08/25/22           | 28.55 (2)     | 26.14 (2)     | 23.78 (2)     | 21.35 (2)     | 18.67 (2)     | 15.91 (2)     | 12.85 (3)     | 9.54 (4)      | 5.93 (4)      | 2.16 (4)      | 16.49 (2)    |
| 3                                       | Strangelove | 14      | 08/31/22           | 25.50 (3)     | 23.58 (3)     | 21.66 (3)     | 19.46 (3)     | 17.59 (3)     | 15.70 (3)     | 13.74 (2)     | 11.35 (2)     | 8.36 (2)      | 4.25 (2)      | 16.12 (3)    |

## A One-Stage Method for FineAction Localization from Multiple Views

Yepeng Tang<sup>1,2†</sup>, Weining Wang<sup>3</sup>, Chunjie Zhang<sup>1,2\*</sup>, Jie Jiang<sup>3,4</sup>,  
Weitao Yuan<sup>3,4</sup>, Sihan Chen<sup>3,4</sup>, Jing Liu<sup>3,4</sup>, Yao Zhao<sup>1,2</sup>

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CHINESE ACADEMY OF SCIENCES

## Technical Report for FineAction 2022 - Temporal Action Localization

Yaokun Zhong , Xiaotong Lin  
Sun Yat-sen University, Guangzhou, China



中山大學  
SUN YAT-SEN UNIVERSITY

## Technical Report for FineAction 2022 - Temporal Action Localization

Shimin Chen<sup>1</sup> Yijia Duan<sup>1,2</sup> Wei Li<sup>1</sup> Changlong Li<sup>1,2</sup> Chen Chen<sup>1</sup>

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# Over & Thank you !

**Homepage:** <https://deeperaction.github.io/datasets/fineaction>

**GitHub:** <https://github.com/Richard-61/FineAction>

IEEE TRANSACTIONS ON IMAGE PROCESSING

## FineAction: A Fine-Grained Video Dataset for Temporal Action Localization

Yi Liu, Limin Wang *Member, IEEE*, Yali Wang, Xiao Ma, Yu Qiao *Senior Member, IEEE*