Deeper Action

ICCV 2021 Workshop

ICCV DeeperAction Challenge
FineAction Track on Temporal Action Localization

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Outline

Part 1: Dataset Introduction

Part 2: FineAction Competition

Part 1

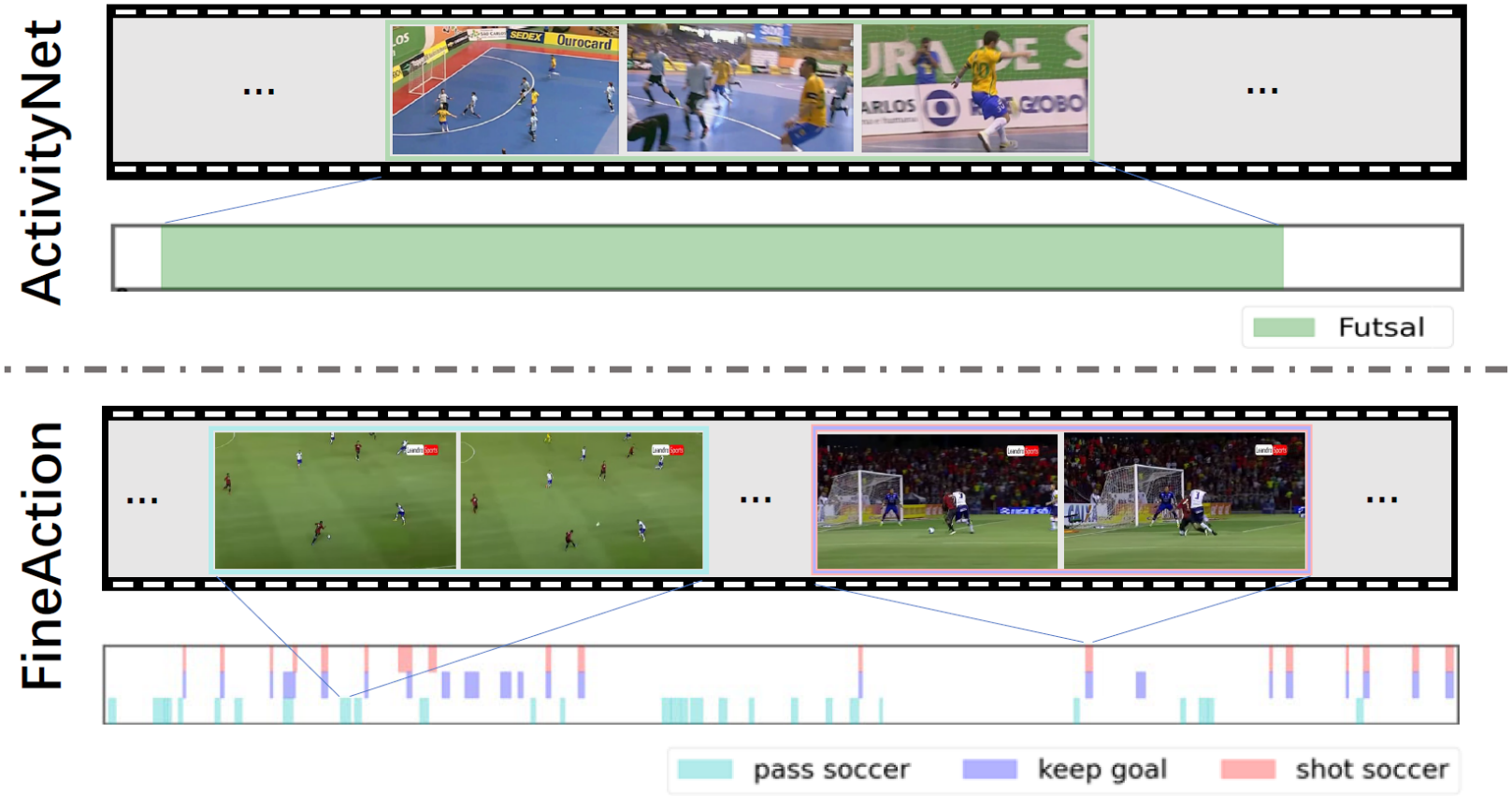
Dataset Introduction

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**

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FineAction: New Taxonomy

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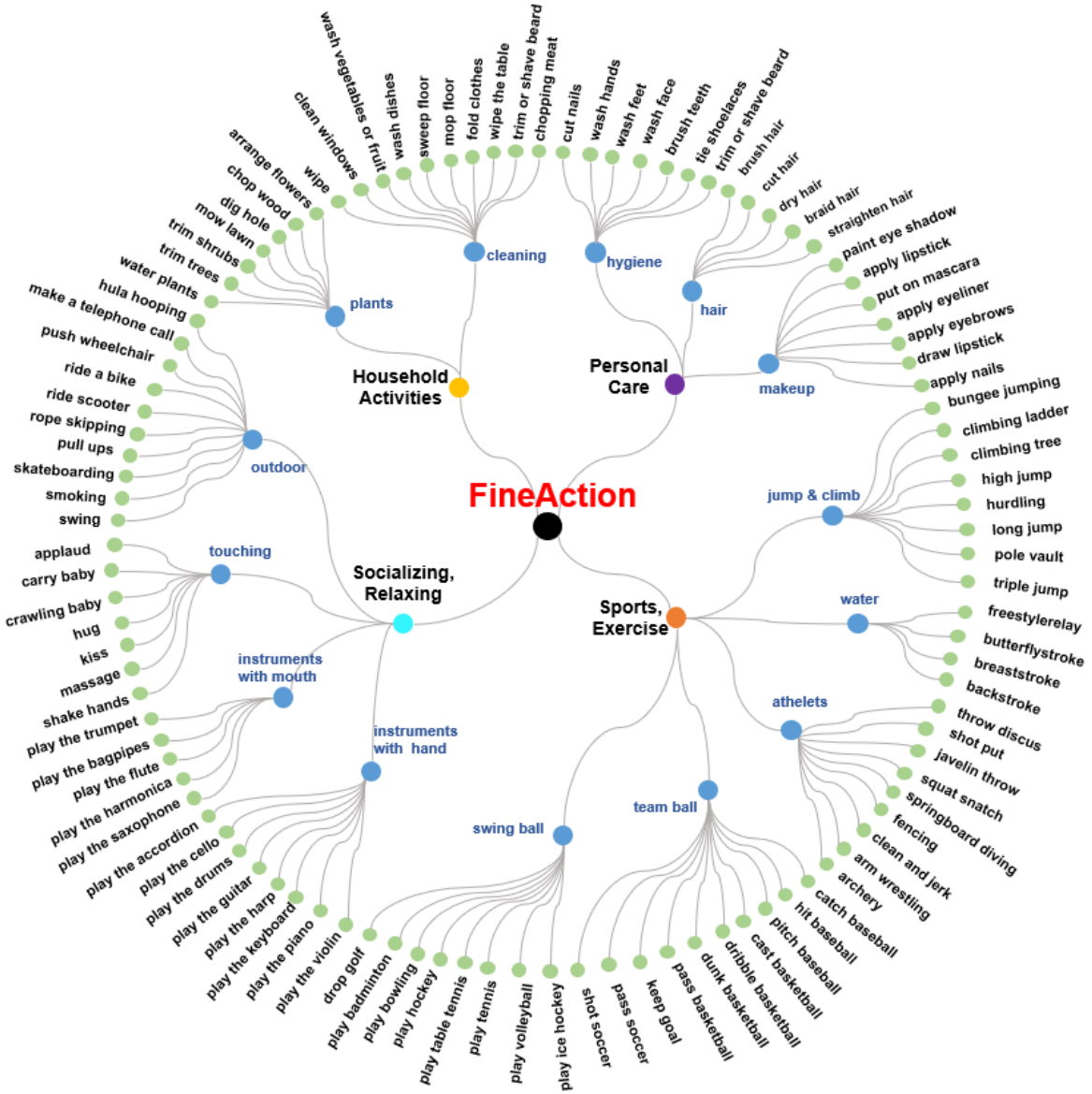
FineAction

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



FineAction: Video Collection

Video Select

- ❑ **Exisiting video datasets**
  - *YouTube 8M*
  - *Kinetics 400*
  - *FCVID*
- ❑ **Crawl from YouTube videos**

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FineAction: Annotation

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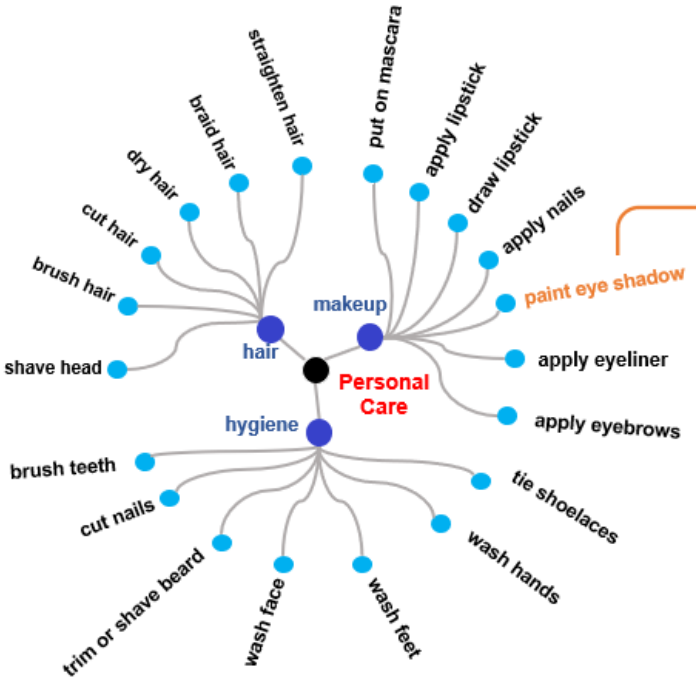
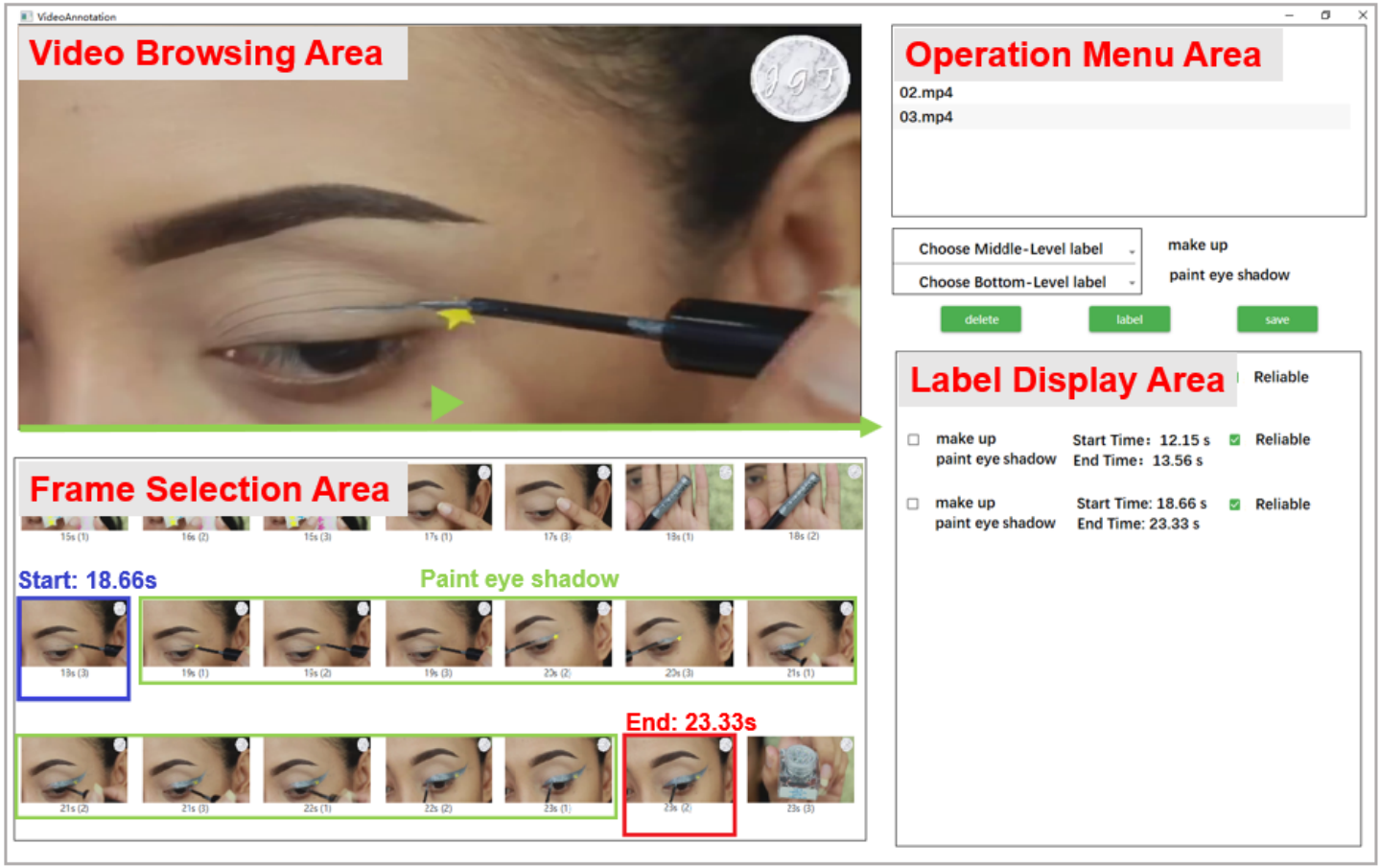
Framework of Annotation Process



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

End Definition:
Take off the tool.



(a) Category Taxonomy

(b) Annotation Guidance

(c) Annotation Tool

FineAction: Statistics

❑ Large-Scale & Fine-Grained

Database	Category	Video	Instance	Overlap	Duration	Action type
MPII Cooking	65	45	5,609	0.1%	11.1 m	kitchens
EPIC-Kitchens	4,025	700	89,979	28.1%	3.1 s	
FineGym V1.0	530	303	32,697	0.0%	1.7 s	sports
THUMOS14	20	413	6,316	17.5%	4.3 s	
ActivityNet	200	19,994	23,064	0.0%	49.2 s	daily events
HACS Segment	200	49,485	122,304	0.0%	33.2 s	
FineAction (Ours)	106	16,732	103,324	11.5%	7.1 s	

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FineAction: Statistics

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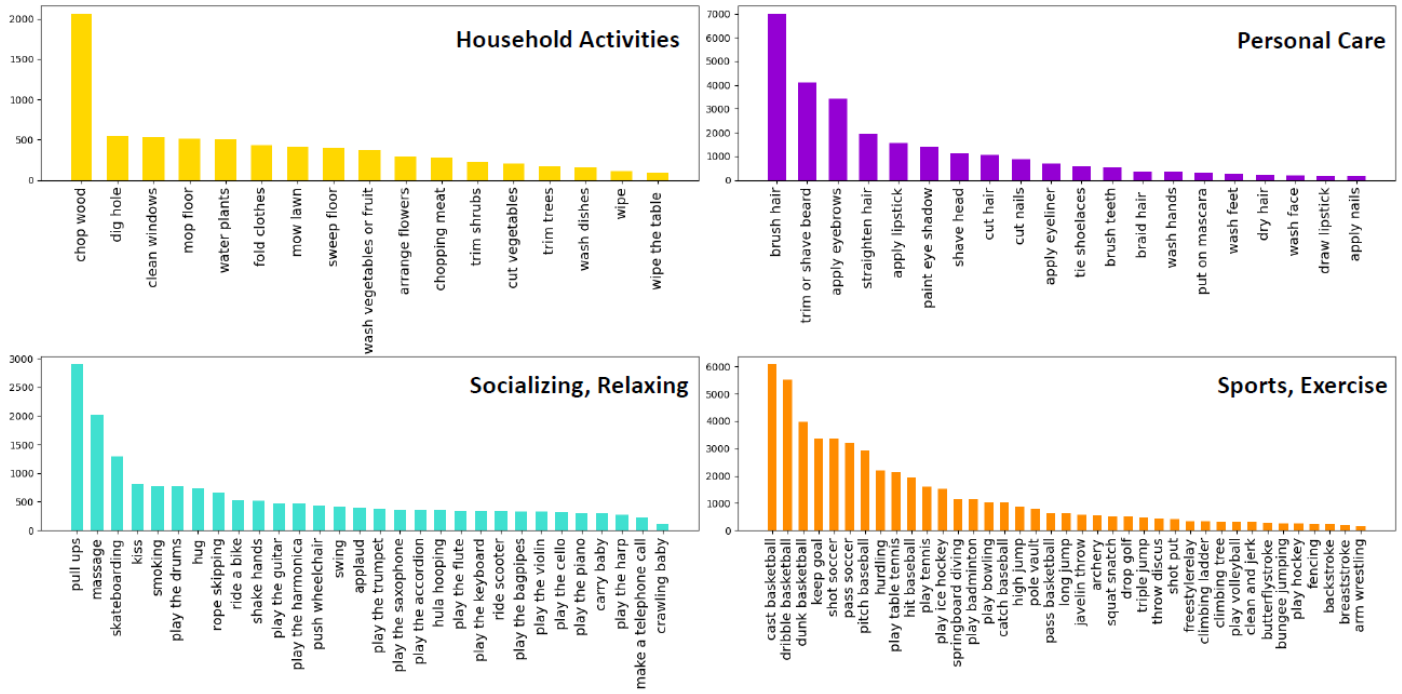
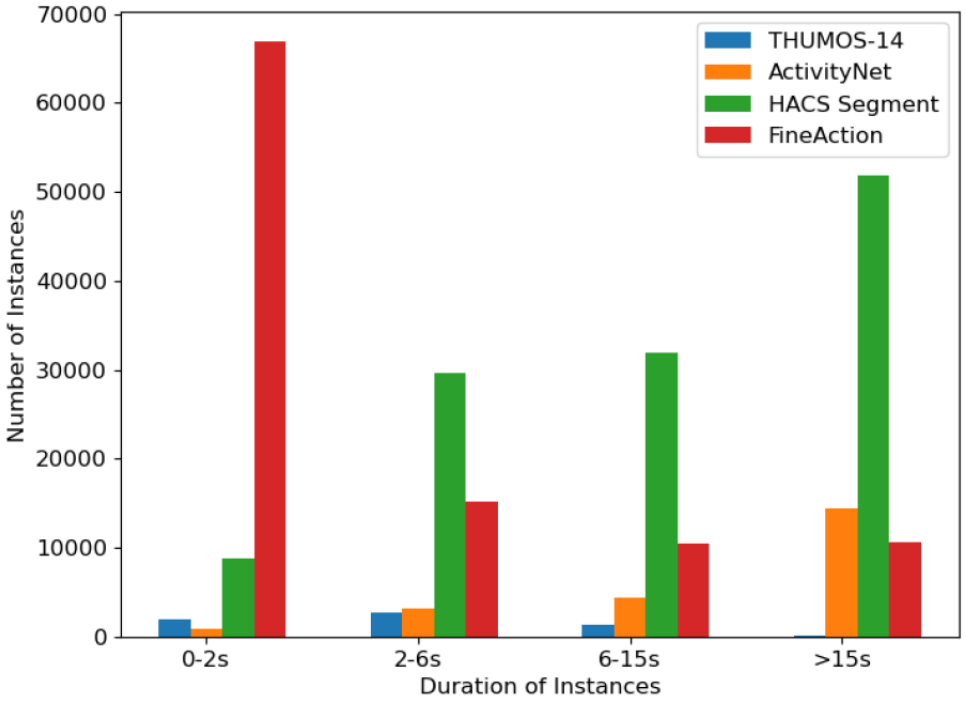
❑ Instance distribution



❑ Instance duration



FineAction: Experiment

❑ SOAT methods on FineAction

Method	Modality	Action Proposal Generation				Temporal Action Localization			
		AR@5	AR@10	AR@100	AUC	mAP@0.50	mAP@0.75	mAP@0.95	Avg.mAP
BMN	RGB	8.62	11.20	22.74	17.49	12.56	7.49	2.62	7.86
	Flow	9.85	12.72	24.18	18.94	14.49	8.92	3.19	9.23
	RGB+Flow	9.99	12.84	24.34	19.19	14.44	8.92	3.12	9.25
DBG	RGB	6.82	9.01	21.26	15.48	8.57	5.01	1.93	5.31
	Flow	8.27	10.90	23.37	17.70	11.03	6.95	2.70	7.20
	RGB+Flow	7.82	10.45	23.07	17.24	10.65	6.43	2.50	6.75
G-TAD	RGB	7.96	10.45	20.86	16.06	10.88	6.52	2.19	6.87
	Flow	8.87	11.60	22.01	17.09	12.58	8.18	2.56	8.26
	RGB+Flow	9.02	11.83	22.60	17.65	13.74	8.83	3.06	9.06

Dataset	AR@100	Classifier	mAP@0.5
THUMOS14	47.7	UNet	38.8
ActivityNet-1.3	75.0	TSN	50.1
HACS Segment	70.9	SlowFast	52.5
FineAction	24.3	TSN	14.4

FineAction: Experiment

❑ Different feature length

Length	AR@5	AR@10	AR@100	AUC
100	9.99	12.84	24.34	19.19
150	10.56	13.99	26.89	21.06
200	10.69	14.41	28.57	22.16
250	11.11	14.81	29.56	22.94

❑ Different duration instances

Instance Duration	0-2 s	2-5 s	5-10 s	>10 s
AR@100	7.46	32.58	51.24	71.73

❑ Top-3 worst & Top-3 best

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

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FineAction: Analysis

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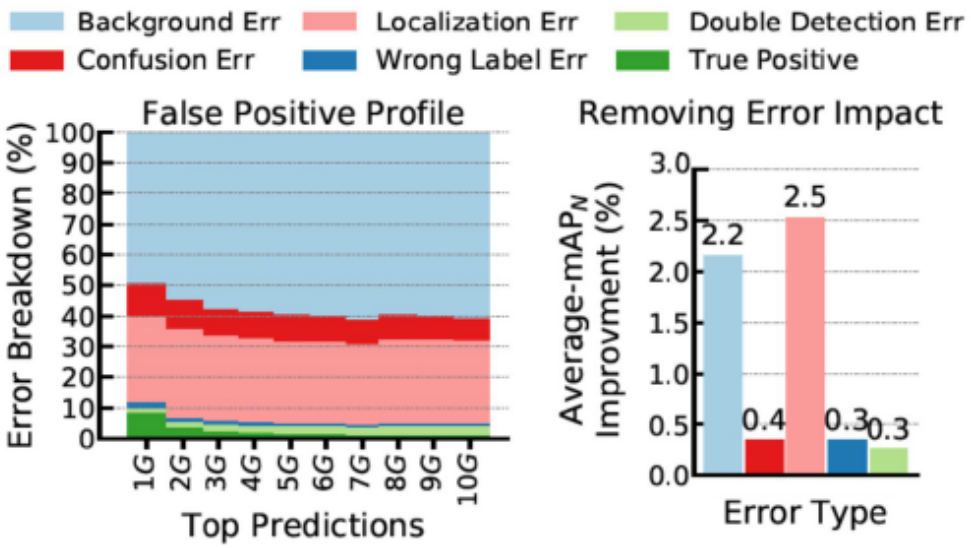
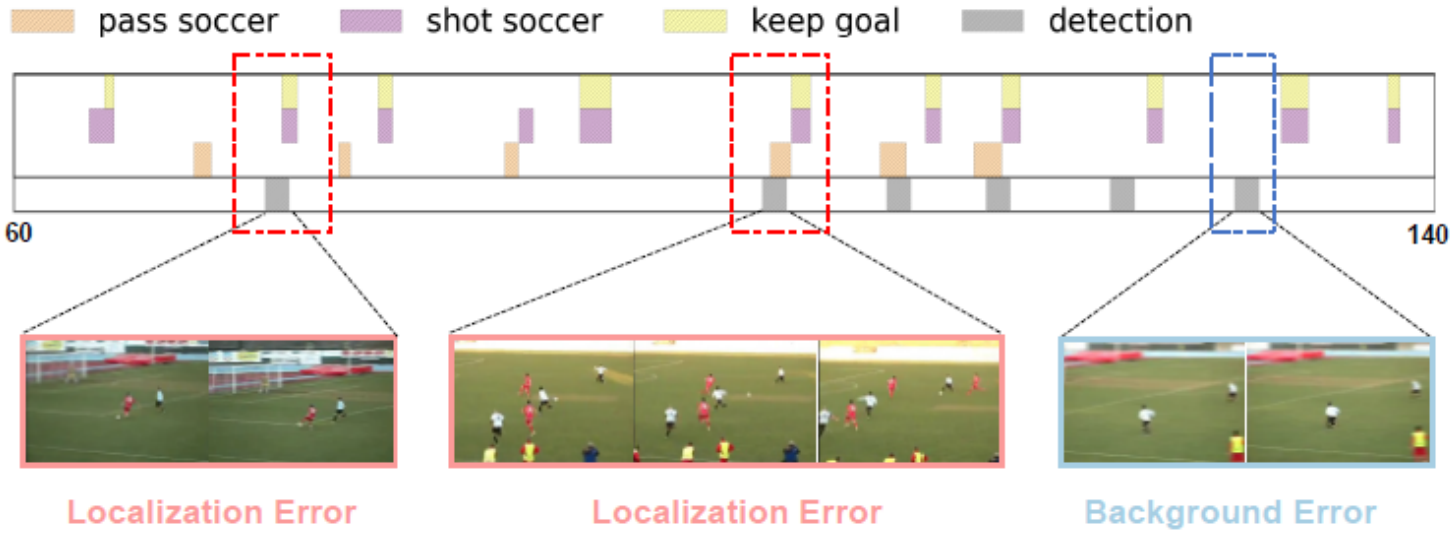
❑ Error analysis



(a) Error Analysis.

❑ Error visualization



(b) Visualization of Typical Errors.

Part 2

FineAction Competition

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Competition: FineAction Track

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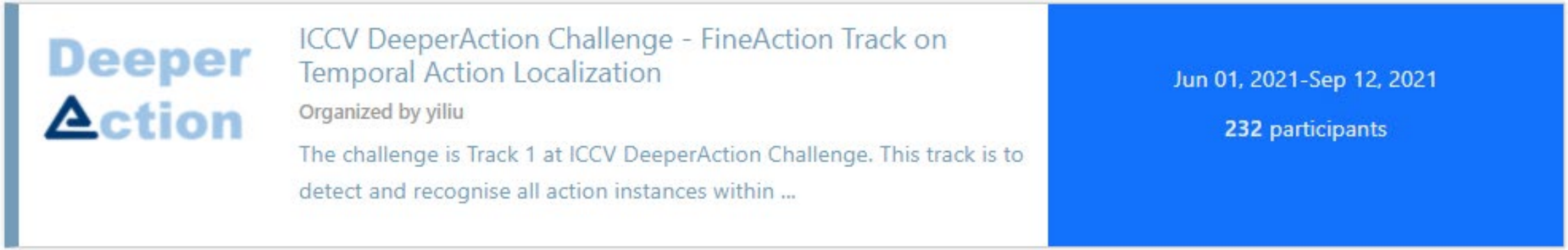
https://competitions.codalab.org/competitions/32363



- **Validation phase:** 2021.06.01-2021.09.01
- **Testing phase:** 2021.09.01-2021.09.12

FineAction Track: Evaluation

❑ 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].

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FineAction Track: Statistics

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- Valid Participants : 228
- Valid Teams: 18 + 14 (Company, University, Institute)

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FineAction Track: Results

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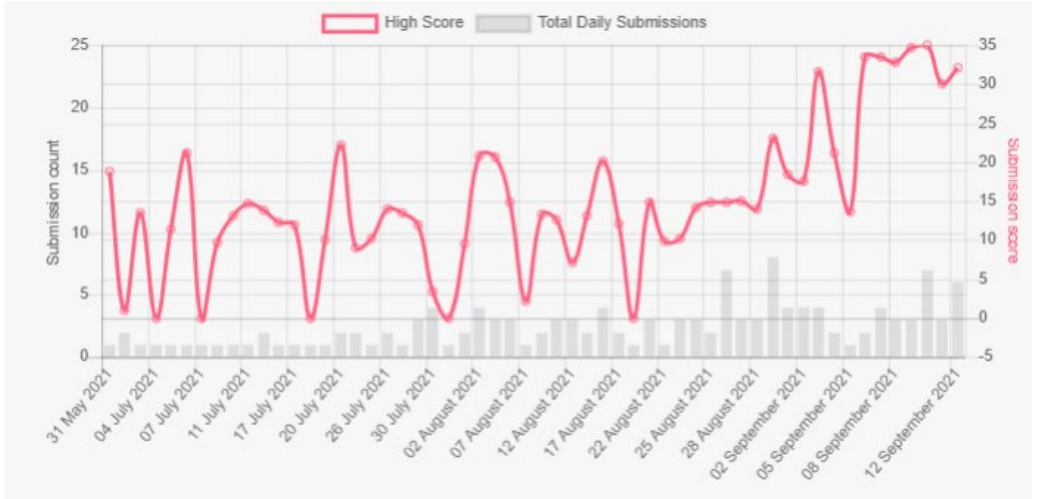
❑ Valid Submission: 95 (Val Phase) + 42 (Test Phase)

Test Set (Mean Average Precision - mAP)													
#	User	Entries	Date of Last Entry	mAP@0.50 ▲	mAP@0.55 ▲	mAP@0.60 ▲	mAP@0.65 ▲	mAP@0.70 ▲	mAP@0.75 ▲	mAP@0.80 ▲	mAP@0.85 ▲	mAP@0.90 ▲	mAP@0.95 ▲	Avg.mAP ▲
1	Dahua_001	10	09/10/21	35.044	32.999	30.599	28.390	26.055	23.348	20.494	17.277	12.707	6.607	23.352 (1)
2	DeepakSridhar	1	09/03/21	20.244	18.854	17.581	16.055	14.305	12.697	11.043	9.059	6.774	3.615	13.023 (2)
3	foolwood	2	09/12/21	19.446	18.050	16.659	15.254	13.845	12.048	10.470	8.775	6.628	4.002	12.518 (3)



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1st Place Winner

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Learning Efficient Feature Representation for Temporal Action Localization

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2nd Place Winner

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An Empirical Study of Feature Representation for Actionness based Temporal Action Localization

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CHINESE ACADEMY OF SCIENCES

Over & Thank you !

Homepage: https://deeperaction.github.io/fineaction/