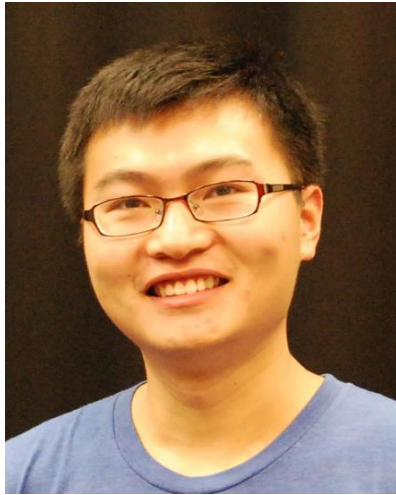


IMAGENET Large Scale Visual Recognition Challenge (ILSVRC) 2017

Overview



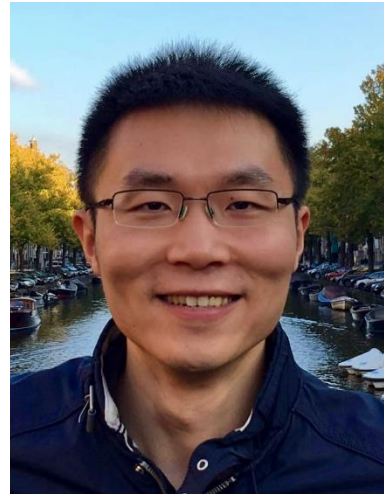
Eunbyung Park
UNC Chapel Hill



Wei Liu
UNC Chapel Hill



Olga Russakovsky
CMU/Princeton



Jia Deng
Univ. of Michigan



Fei-Fei Li
Stanford

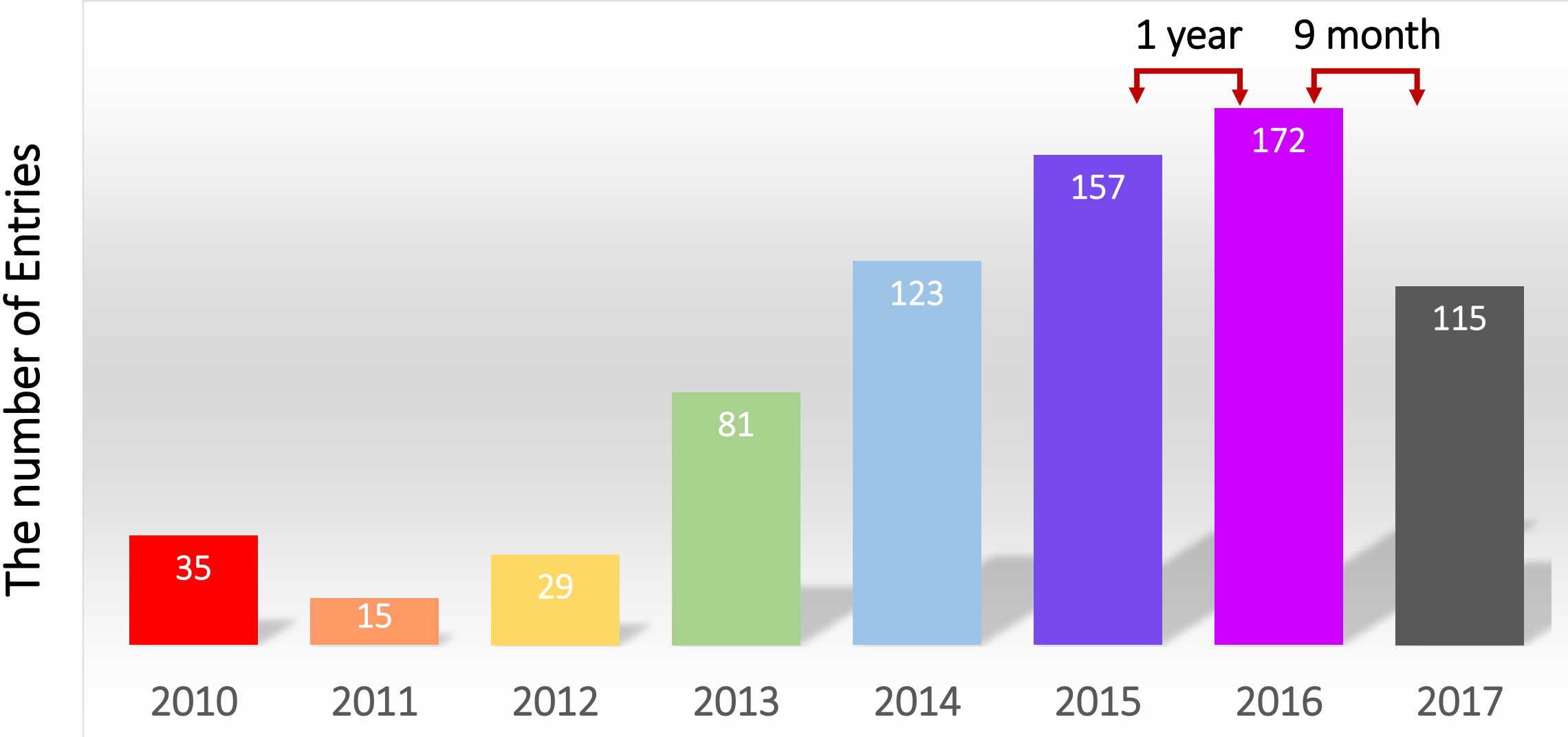


Alex Berg
UNC Chapel Hill

Agenda

1. Participation over the years
2. LOC+CLS Task – Results
3. DET Task– Results
4. VID Task – Results

Participation in ILSVRC over the years



ILSVRC Image Classification (CLS) Task

Steel drum



1000 object classes

1,431,167 images

CLS-LOC

ILSVRC Image Classification (CLS) Task

Steel drum



Output:
Scale
T-shirt
Steel drum
Drumstick
Mud turtle



Output:
Scale
T-shirt
Giant panda
Drumstick
Mud turtle



$$\text{Error} = \frac{1}{100,000} \sum_{100,000 \text{ images}} 1[\text{incorrect on image } i]$$

ILSVRC Image Localization (LOC) Task

Steel drum



ILSVRC Image Localization (LOC) Task

Steel drum



Correct



Bad localization



Bad classification



ILSVRC Image Localization (LOC) Task

Steel drum

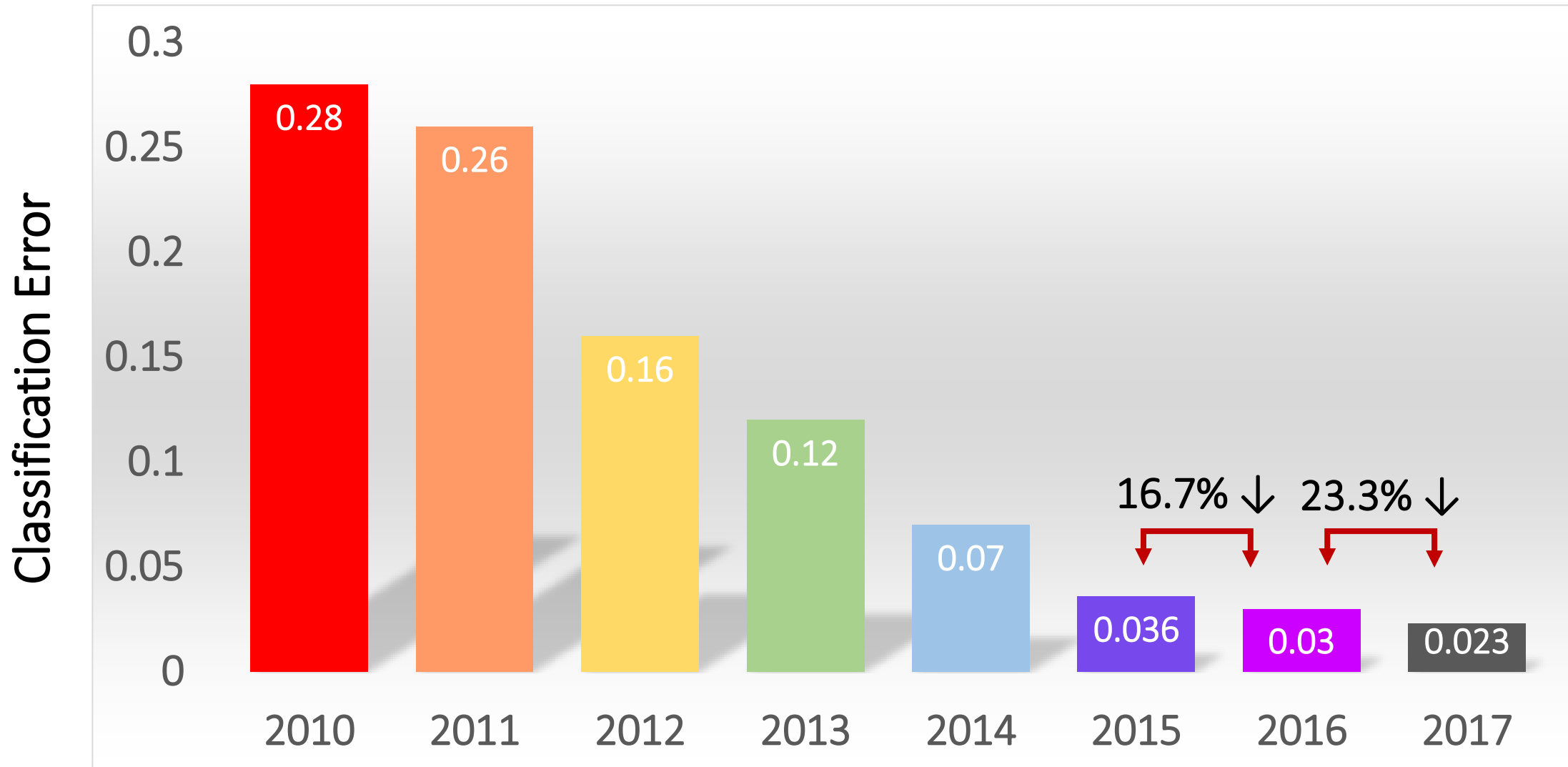


Correct

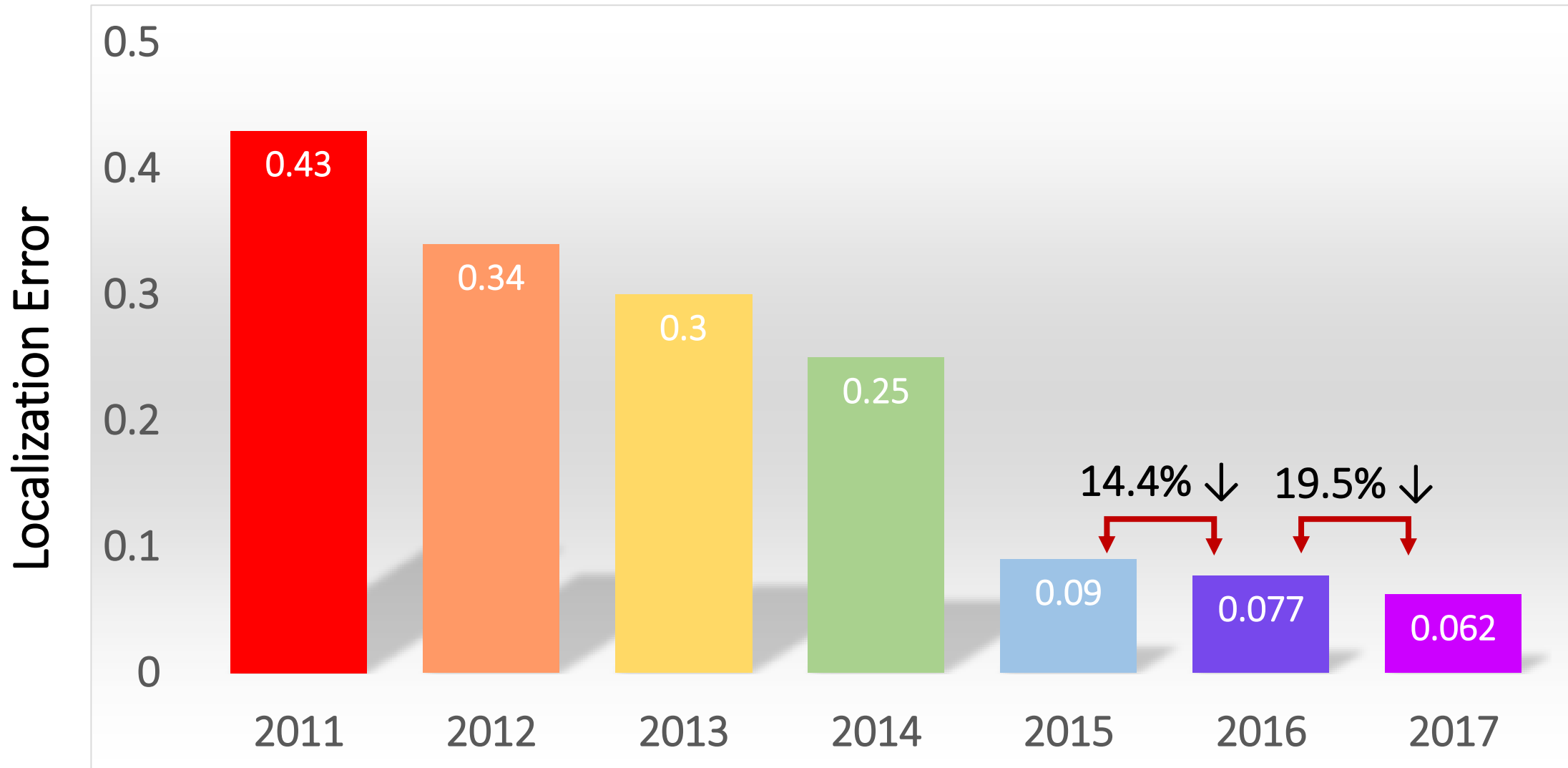


$$\text{Error} = \frac{1}{100,000} \sum_{100,000 \text{ images}} 1[\text{incorrect on image } i]$$

Classification Results (CLS)



Localization Results (LOC)



ILSVRC2017 CLS Results - 'Provided' Data

Team Name	Error(%)
WMW	0.0225
Trimps-Soushen	0.0248
NUS-Qihoo_DPNs	0.0274
BDAT	0.0296

WMW

Jie Hu¹ , Li Shen² , Gang Sun¹

1. Momenta

2. University of Oxford

Trimps-Soushen

Xiaoteng Zhang, Zhengyan Ding, Jianying Zhou, Jie Shao, Lin Mei

The Third Research Institute of the Ministry of Public Security, P.R. China.

ILSVRC2017 CLS Results - 'External' Data

Team Name	Error(%)
NUS-Qihoo_DPNs	0.0271
BDAT	0.0300

NUS-Qihoo_DPNs

Yunpeng Chen¹, Huaxin Xiao¹, Jianan Li¹,
Xuecheng Nie¹, Xiaojie Jin¹, Jianshu Li¹,
Jiashi Feng¹, Jian Dong², Shuicheng Yan²

1. NUS - National University of Singapore

2. Qihoo 360

BDAT

Hui Shuai¹, Zhenbo Yu¹, Qingshan Liu¹,
Xiaotong Yuan¹, Kaihua Zhang¹, Yisheng
Zhu¹, Guangcan Liu¹, Jing Yang¹, Yuxiang
Zhou², Jiankang Deng²

*1. Nanjing University of Information
Science & Technology*

2. Imperial College London

ILSVRC2017 LOC Results - 'Provided' Data

Team Name	Error(%)
NUS-Qihoo_DPNs	0.0623
Trimps-Soushen	0.0650
BDAT	0.0814
SIIT_KAIST-SKT	0.1290

NUS-Qihoo_DPNs

Yunpeng Chen¹, Huaxin Xiao¹, Jianan Li¹,
Xuecheng Nie¹, Xiaojie Jin¹, Jianshu Li¹,
Jiashi Feng¹, Jian Dong², Shuicheng Yan²

1. NUS - National University of Singapore

2. Qihoo 360

Trimps-Soushen

Xiaoteng Zhang, Zhengyan Ding, Jianying
Zhou, Jie Shao, Lin Mei

*The Third Research Institute of the
Ministry of Public Security, P.R. China.*

ILSVRC2017 LOC Results - 'External' Data

Team Name	Error(%)
NUS-Qihoo_DPNs	0.0619
BDAT	0.0875

NUS-Qihoo_DPNs

Yunpeng Chen¹, Huaxin Xiao¹, Jianan Li¹,
Xuecheng Nie¹, Xiaojie Jin¹, Jianshu Li¹,
Jiashi Feng¹, Jian Dong², Shuicheng Yan²

1. NUS - National University of Singapore

2. Qihoo 360

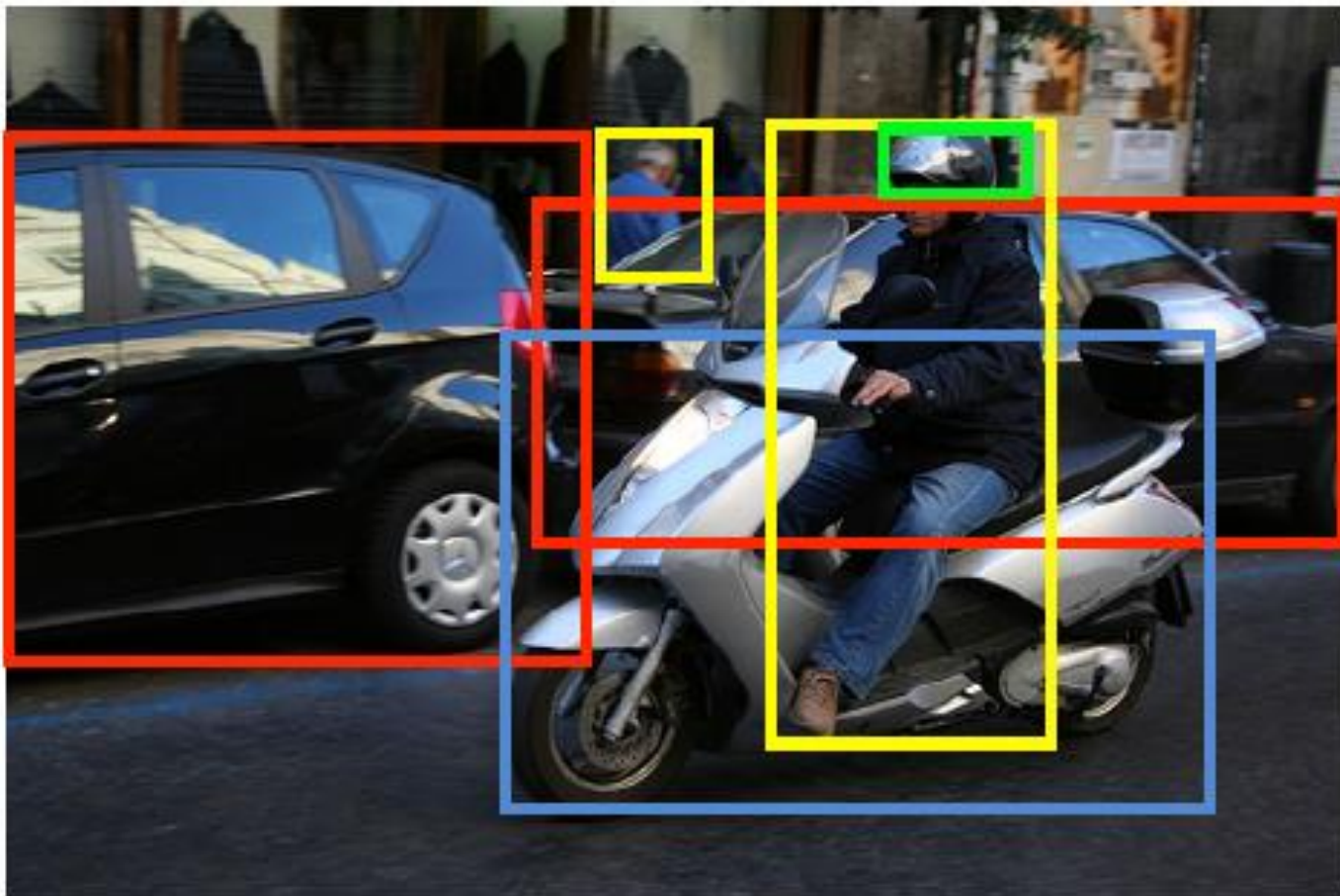
BDAT

Hui Shuai¹, Zhenbo Yu¹, Qingshan Liu¹,
Xiaotong Yuan¹, Kaihua Zhang¹, Yisheng
Zhu¹, Guangcan Liu¹, Jing Yang¹, Yuxiang
Zhou², Jiankang Deng²

*1. Nanjing University of Information
Science & Technology*

2. Imperial College London

ILSVRC Object Detection (DET) Task



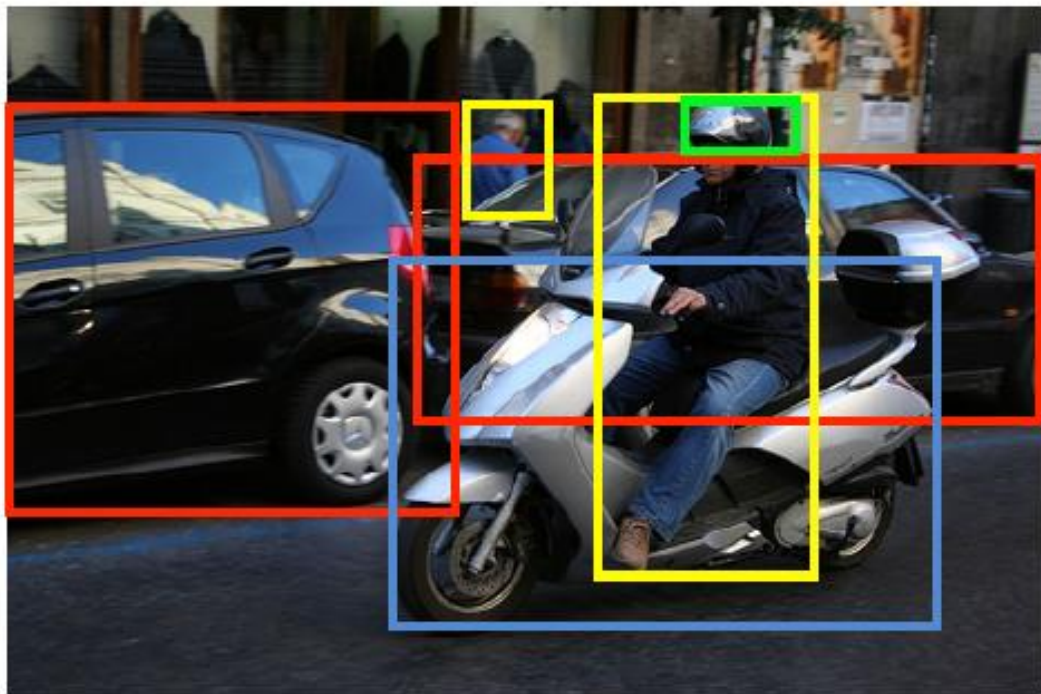
Person
Car
Motorcycle
Helmet

200 object classes

578,482 images

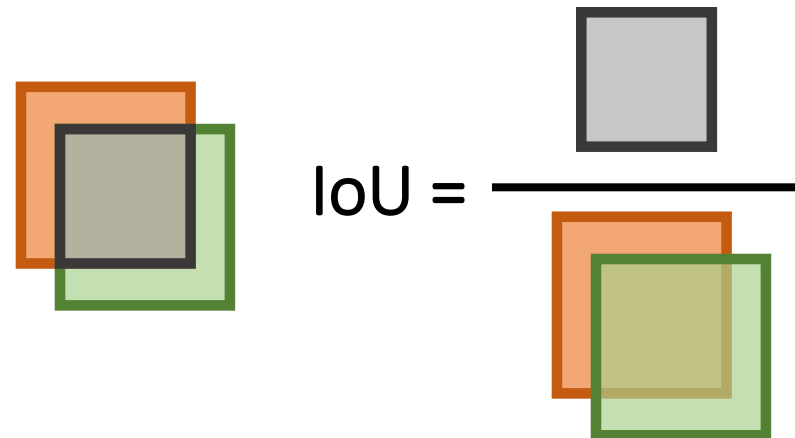
DET

ILSVRC Object Detection (DET) Task



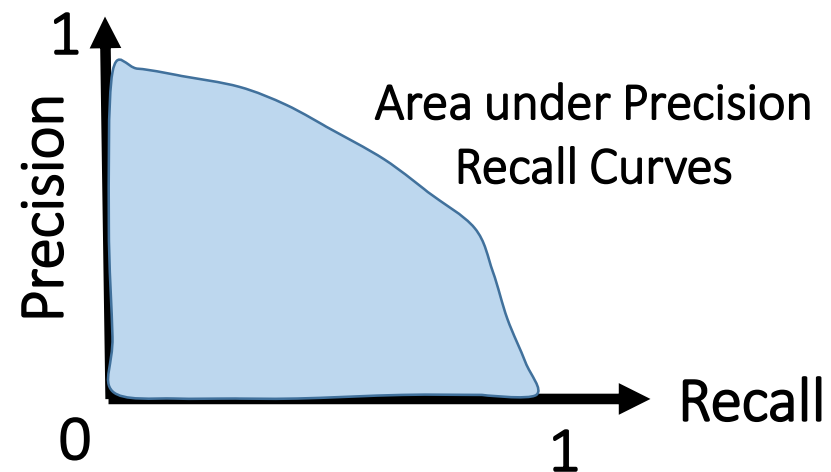
Person
Car
Motorcycle
Helmet

Boxes are correct if IoU > 0.5

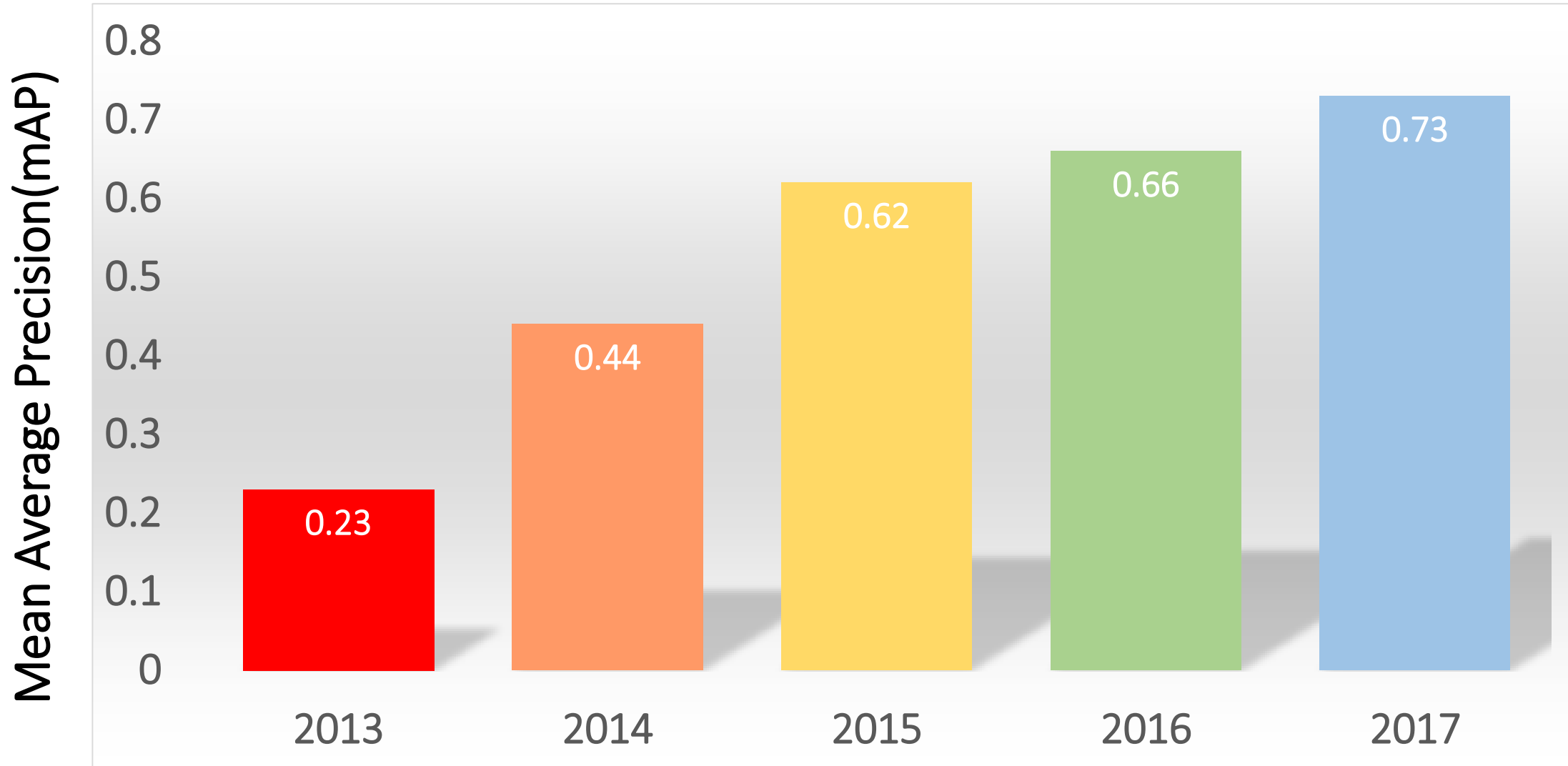


This year: 5,500 new test images with bounding boxes fully annotated

Average Precision



Detection Results (DET)



ILSVRC2017 DET Results - 'Provided' Data

Team Name	#category won	mAP(%)
BDAT	85	0.732
NUS-Qihoo_DPNs	9	0.657
VIST	10	0.593
KAISTNIA_ETRI	1	0.610

BDAT

Hui Shuai¹, Zhenbo Yu¹, Qingshan Liu¹, Xiaotong Yuan¹, Kaihua Zhang¹, Yisheng Zhu¹, Guangcan Liu¹, Jing Yang¹, Yuxiang Zhou², Jiankang Deng²

1. *Nanjing University of Information Science & Technology*

2. *Imperial College London*

NUS-Qihoo_DPNs

Yunpeng Chen¹, Huaxin Xiao¹, Jianan Li¹, Xuecheng Nie¹, Xiaojie Jin¹, Jianshu Li¹, Jiashi Feng¹, Jian Dong², Shuicheng Yan²

1. *NUS - National University of Singapore*

2. *Qihoo 360*

ILSVRC2017 DET Results - 'External' Data

Team Name	#category won	mAP(%)
BDAT	128	0.732
NUS-Qihoo_DPNs	14	0.658

BDAT

Hui Shuai¹, Zhenbo Yu¹, Qingshan Liu¹, Xiaotong Yuan¹, Kaihua Zhang¹, Yisheng Zhu¹, Guangcan Liu¹, Jing Yang¹, Yuxiang Zhou², Jiankang Deng²

1. Nanjing University of Information Science & Technology

2. Imperial College London

NUS-Qihoo_DPNs

Yunpeng Chen¹, Huaxin Xiao¹, Jianan Li¹, Xuecheng Nie¹, Xiaojie Jin¹, Jianshu Li¹, Jiashi Feng¹, Jian Dong², Shuicheng Yan²

1. NUS - National University of Singapore

2. Qihoo 360

Object Detection from Video(VID) Task

Fully annotated 30 object classes across 7,314 snippets



Allows evaluation of generic object detection
in cluttered videos at scale

Object Detection from Video(VID) Task

Evaluation modeled after PASCAL VOC:



This year: 1,036 new snippets distributed into train, val, test set.

- Algorithms outputs a list of bounding box detections with confidences
- A detection is considered correct if intersection over union(IoU) overlap with ground truth > 0.5
- Evaluated by average precision per object class
- Winner of challenge is the team that wins the most object categories

Object Detection from Video(VID) Task

Evaluation taking tracking into account:

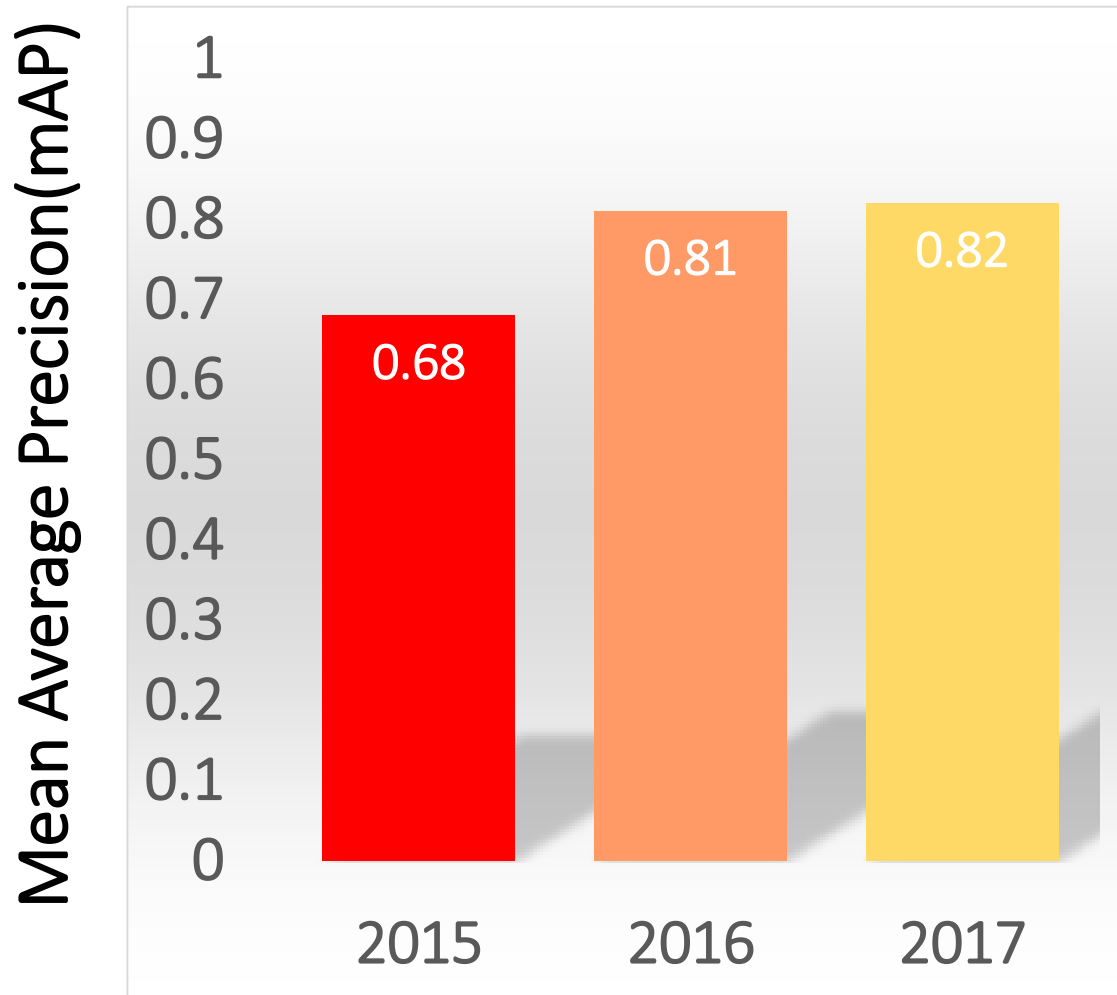


This year: 1,036 new snippets distributed into train, val, test set.

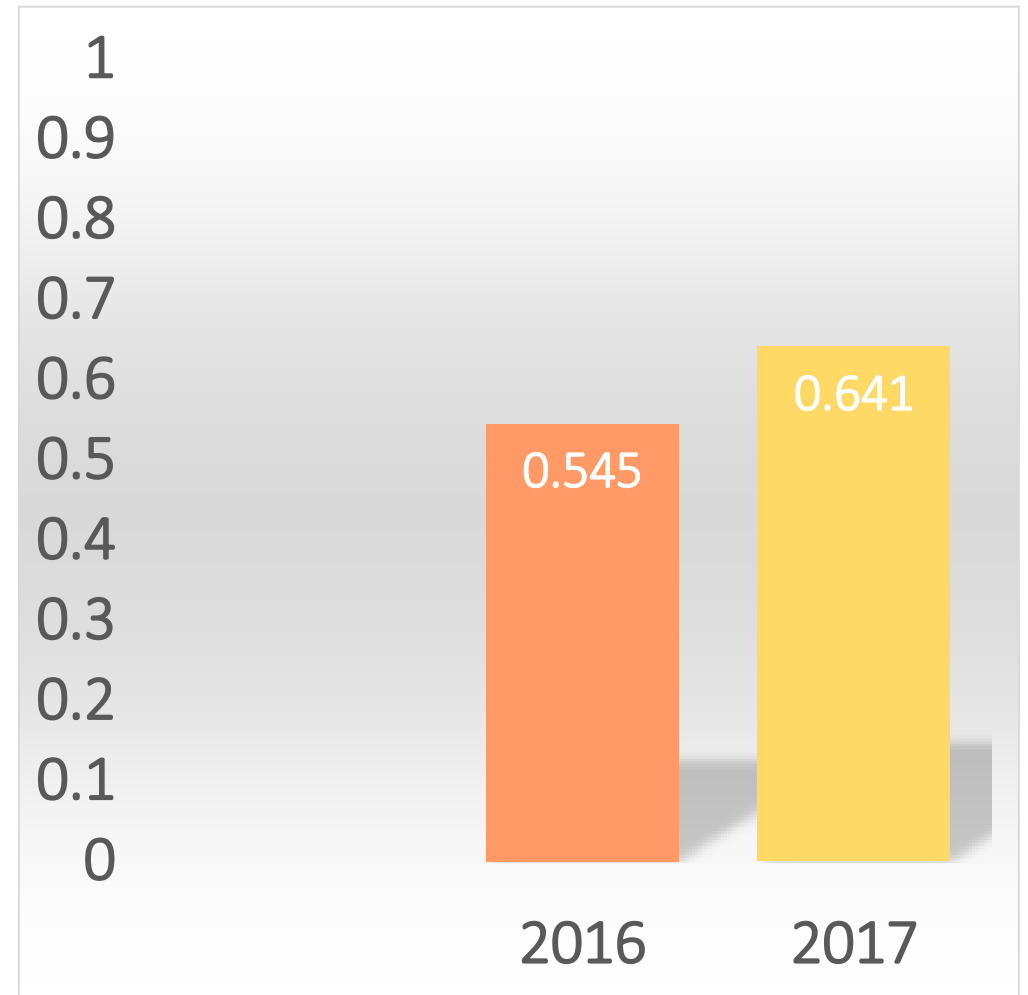
- Algorithms outputs a list of bounding box detections with confidences and tracklet ID.
- Tracklets are sorted by the mean confidence.
- A tracklet is considered correct if intersection over union(IoU) overlap with ground truth tracklet > 0.5 .
- Evaluation by average precision per class. Final score is an average over different thresholds.
- Winner of challenge is the team that has highest score.

Video Detection Results (VID)

W/O Tracking



W/ Tracking



ILSVRC2017 VID Results - 'Provided' Data

Team Name	#category won	mAP(%)	mAP(%) tracking
IC&USYD	15	0.817	0.641
NUS-Qihoo-UIUC_DPNs (VID)	3	0.758	0.545
THU-CAS	0	0.730	0.512

IC&USYD

Jiankang Deng¹, Yuxiang Zhou¹,
Baosheng Yu², Zhe Chen², Stefanos
Zafeiriou¹, Dacheng Tao²,

1. Imperial College London

2. University of Sydney

NUS-Qihoo-UIUC_DPNs(VID)

Yunchao Wei¹, Mengdan Zhang¹, Jianan
Li¹, Yunpeng Chen¹, Jiashi Feng¹, Jian
Dong², Shuicheng Yan², Honghui Shi³

1. National University of Singapore

2. Qihoo 360

3. University of Illinois Urbana-Champaign

ILSVRC2017 VID Results - 'External' Data

Team Name	#category won	mAP(%)	mAP(%) tracking
IC&USYD	24	0.820	0.643
NUS-Qihoo-UIUC_DPNs (VID)	3	0.761	0.550

IC&USYD

Jiankang Deng¹, Yuxiang Zhou¹,
Baosheng Yu², Zhe Chen², Stefanos
Zafeiriou¹, Dacheng Tao²

1. Imperial College London

2. University of Sydney

NUS-Qihoo-UIUC_DPNs(VID)

Yunchao Wei¹, Mengdan Zhang¹, Jianan
Li¹, Yunpeng Chen¹, Jiashi Feng¹, Jian
Dong², Shuicheng Yan², Honghui Shi³

1. National University of Singapore

2. Qihoo 360

3. University of Illinois Urbana-Champaign

Coming Presentations!

1. Jie Hu(Team: WMW, Momenta): *Squeeze-and-Excitation Networks*
2. Yunpeng Chen(Team: NUS-Qihoo_DPNs, NUS): *Dual Path Networks and its Applications*
3. **Short presentations of winning entries:** NUS-Qihoo-UIUC_DPNs (VID), DeepView(ETRI), MIL_UT, SIIT_KAIST-SKT, KAISTNIA_ETRI