OpenForensics: Large-Scale Challenging Dataset For Multi-Face Forgery Detection And Segmentation In-The-Wild

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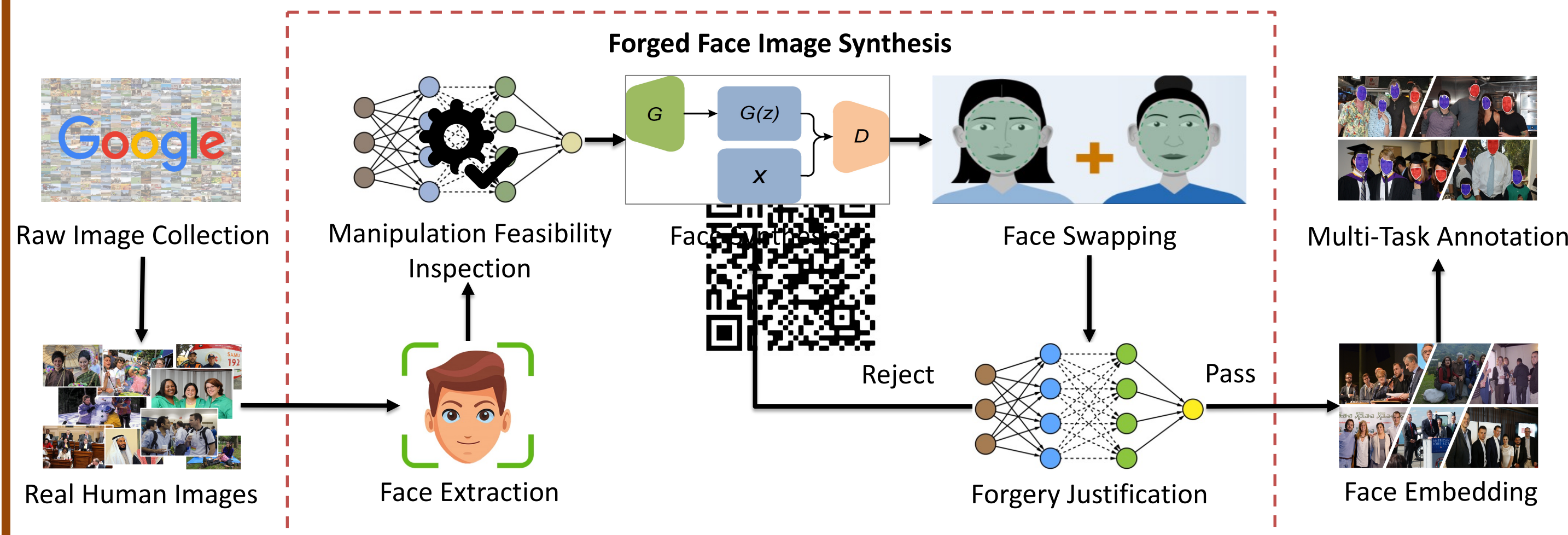
https://sites.google.com/view/ltnghia/research/openforensics

Introduction

It is extremely difficult to point out forged faces among many faces in natural scenes.

Dataset Generation

- Our GAN-based generation framework can synthesize infinite human identities for multi-face swapping

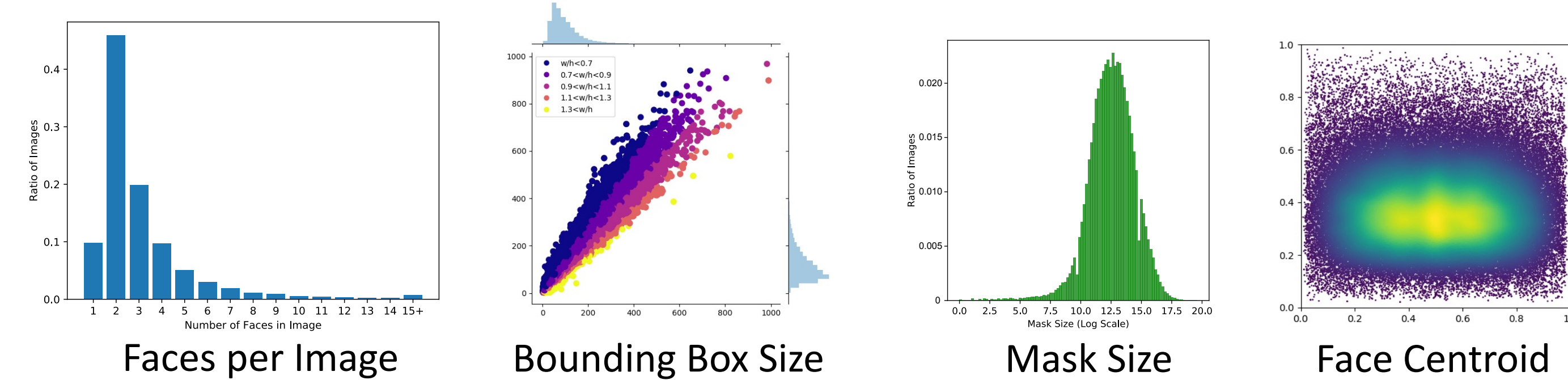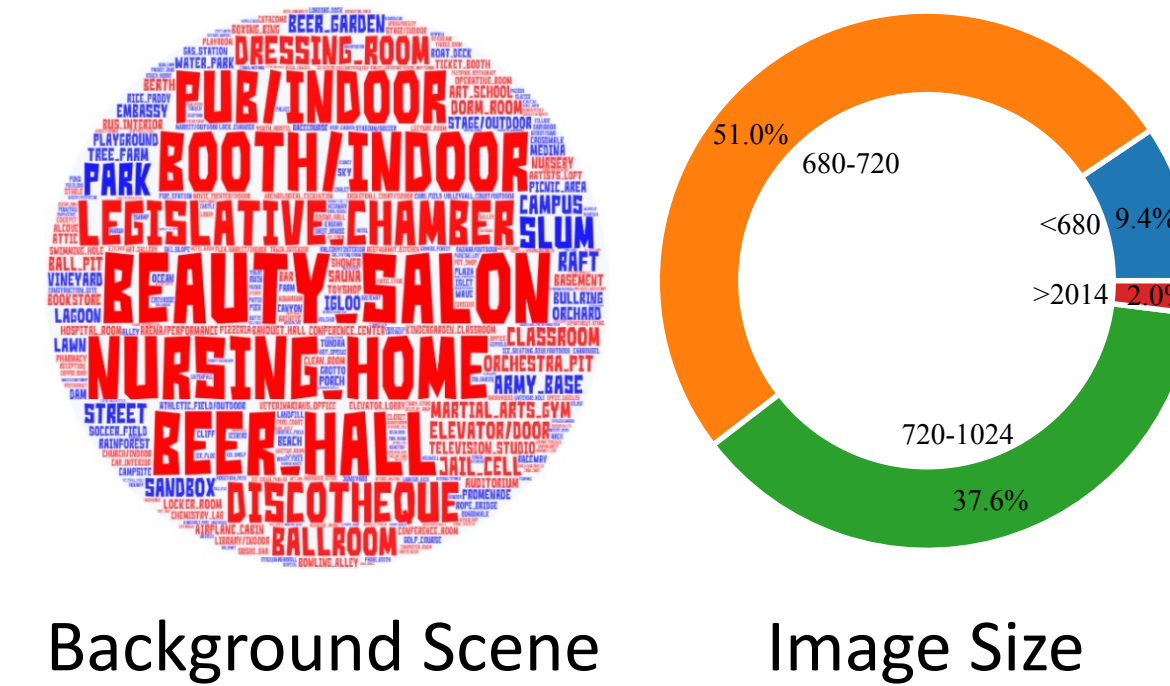Raw Image Collection → Real Human Images → Face Extraction → Manipulation Feasibility Inspection → Forged Face Image Synthesis → Face Swapping → Forgery Justification (Reject / Pass) → Face Embedding → Multi-Task Annotation

- Generated faces:
- Multi-task annotation:
- Test-Challenge set with data augmentation:

Dataset Analysis

Subset	#Images	#Faces
Train	44,122	151,364
Val	7,308	15,352
Test-Dev	18,895	49,750
Test-Challenge	45,000	117,670
Total	115,325	334,136

Background Scene

Image Size
51.0% 680-720, <680 9.4%, >2014, 720-1024 37.6%

Faces per Image   Bounding Box Size   Mask Size   Face Centroid

Benchmark Evaluation

a) Forgery Detection   b) Forgery Segmentation

Legend: MaskRCNN, MSRCNN, RetinaMask, YOLACT, YOLACT++, CenterMask, BlendMask, PolarMask, MEInst, CondInst, SOLO, SOLO2, Test-Dev Set, Test-Challenge Set
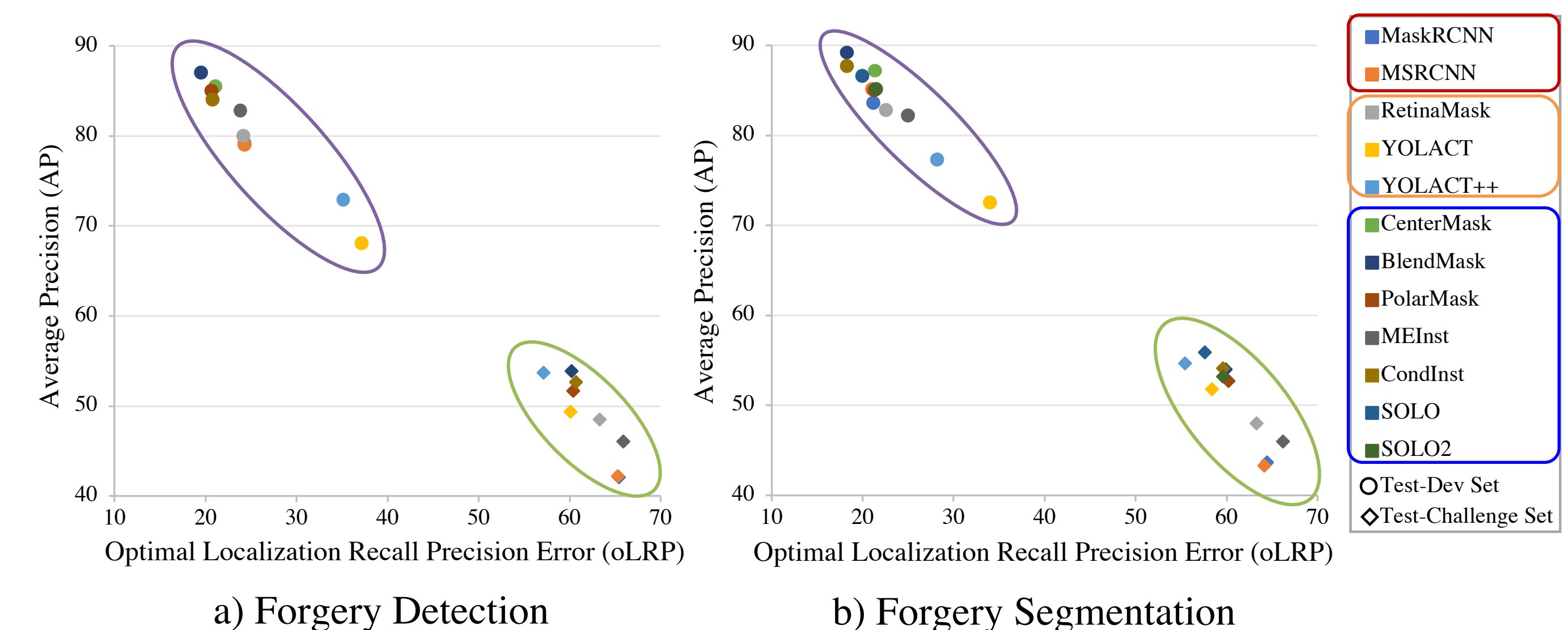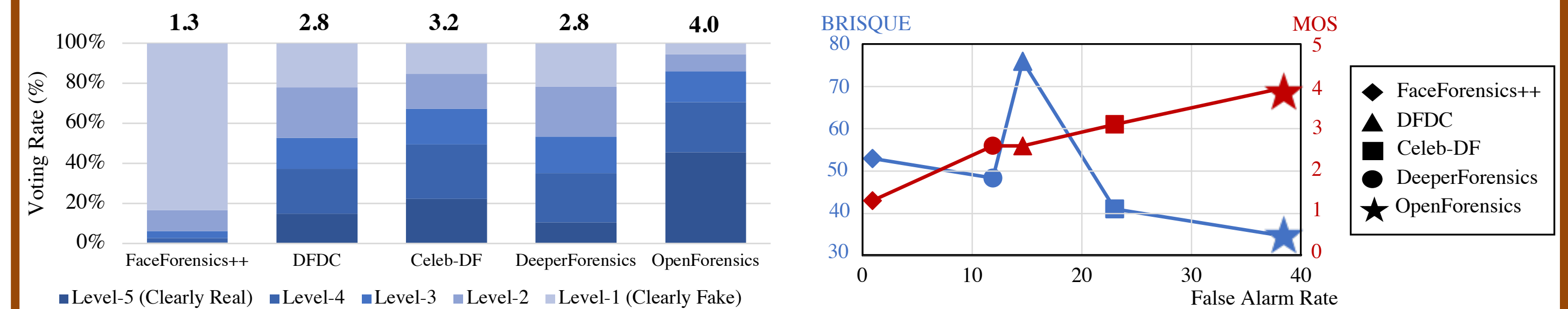
- ❖ Deep learning leading algorithms cannot yet effectively solve real-world challenges (Top-1: AP <60)
- ❖ **Multi-face forgery detection and segmentation in-the-wild is still far from been solved, leaving large room for improvement**

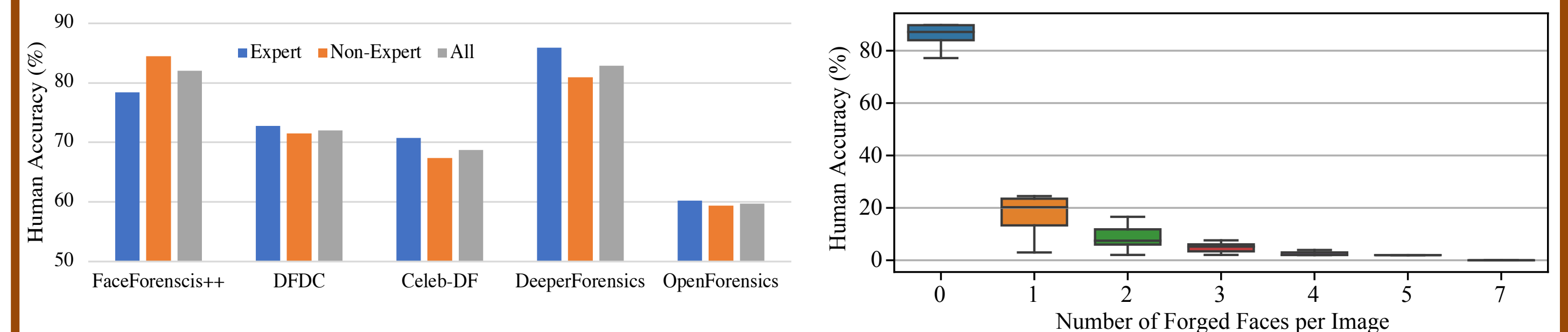## User Study

- 200 participants (80 experts and 120 non-experts)
- 3,000 images (5 datasets) was used in experiments

Distribution of realistic score

Correlation between visual property and human performance

Human performance in face forgery recognition

Human performance in multi-face forgery detection

- ❖ OpenForensics can trick human yield the highest justification error and lowest accuracy.
- ❖ More fake faces cause more missed detection

Conclusion

- Address new tasks of massive face forgery in-the-wild
- Present new image dataset to promote tasks of multi-face forgery detection and segmentation
- Provide benchmark suite for tasks of multi-face forgery detection and segmentation