

CRFace: Confidence Ranker for Model-Agnostic Face Detection Refinement

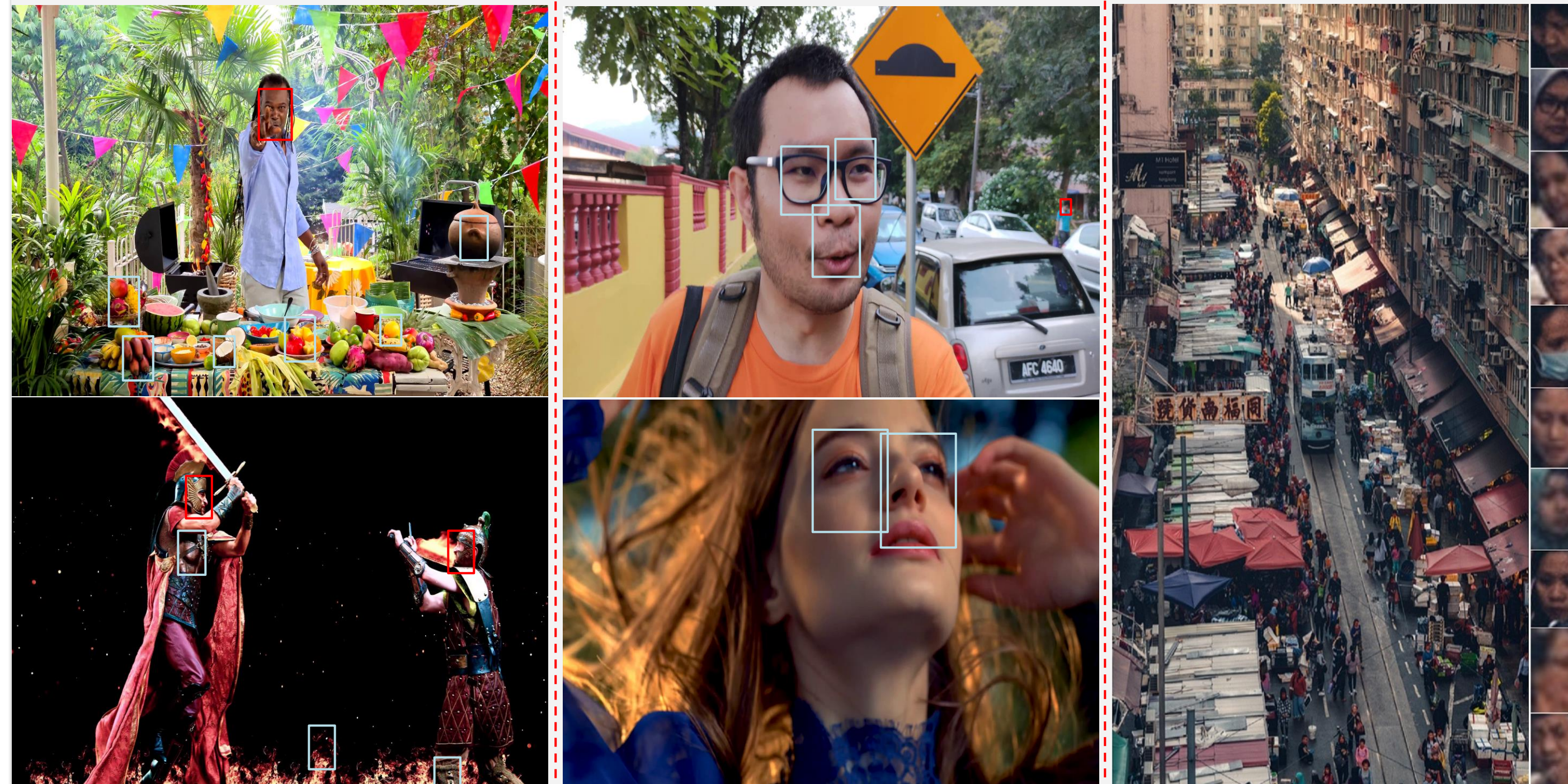
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1. Introduction

Many smartphones can record video in 8k resolution, but many of the existing face detectors still fail due to 3 main issues.



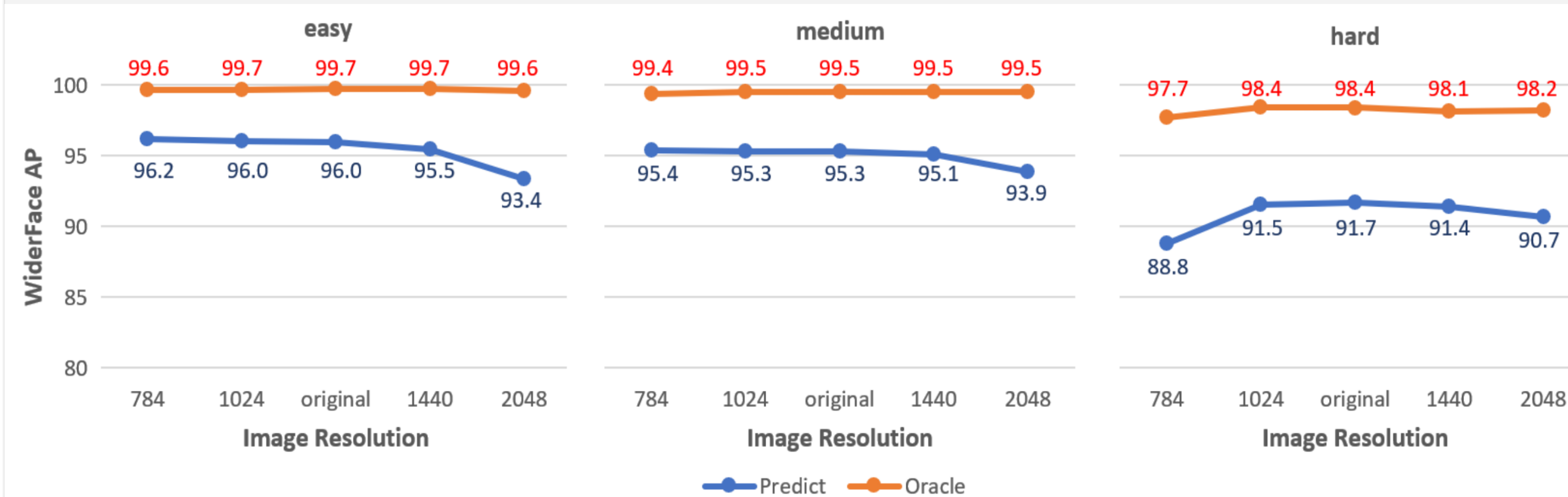
False Positive

Large Face

Small Face

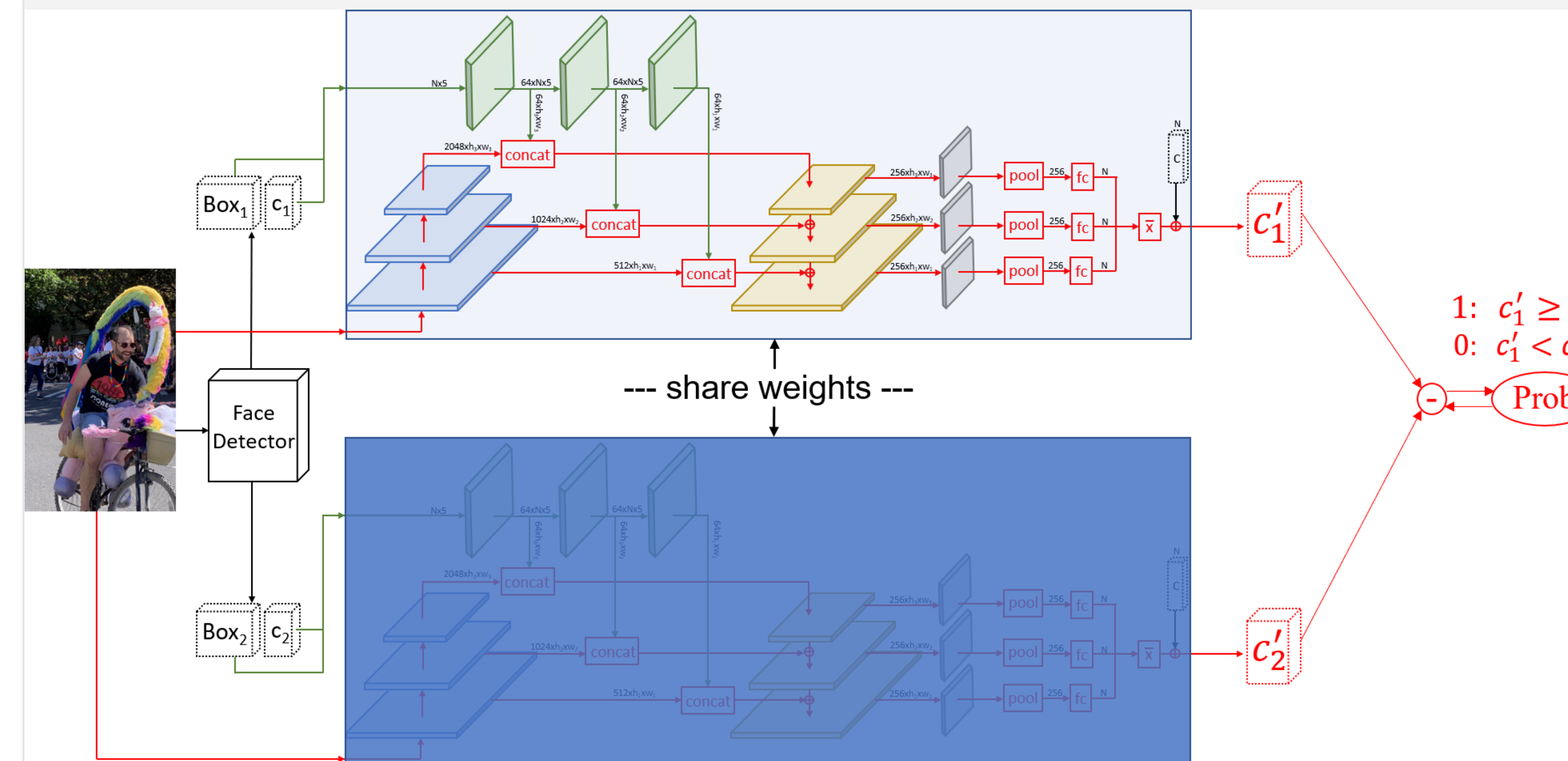
2. Oracle Confidence

We analyze the failure and found that most correct box locations exist, but the confidences are low. Replacing them with oracle confidence (IoU between predicted and ground truth box) increases AP marginally.



3. Method

We propose to learn to refine confidence in supervised learning between predicted and oracle confidence. We take image and face detection's output as input then output new confidence. We use pairwise ranking loss.



4. Importance of Ranking Loss

We show that regression loss can move the confidence distribution closer to the oracle confidence, but fails to preserve the order, unlike ranking loss. Only the order of confidence is important in NMS.



5. Results on WiderFace

We show the model-agnostic property on 3 backbones and we can estimate multi-scale's AP with up to 12x speedup. Unlike multi-scale that usually run 10 times (5 scales, 2 flips), we only run once.

Model	Scale	AP (%)			Speed (ms)
		Easy	Med	Hard	
RetinaFace	single	95.2	94.5	84.3	52
	multi	96.4	95.5	90.3	1048
	rank	96.1	95.3	88.7	107
HAMBox	single	95.1	94.2	89.1	70
	multi	96.2	95.3	90.9	1383
	rank	96.1	95.4	91.7	126
HRNet	single	95.8	95.2	91.5	91
	multi	96.9	96.1	92.1	1886
	rank	96.9	96.2	92.7	149

6. Results on 8k Test Set

Our method allows training on 8k resolution to further improve AP.

