重磅！2K图像90FPS，中科院开源轻量级通用人脸检测器

论文链接：https://arxiv.org/abs/1904.10633
代码： https://github.com/YonghaoHe/A-Light-and-Fast-Face-Detector-for-Edge-Devices
演示：
https://github.com/becauseofAI/MobileFace
https://github.com/becauseofAI/HelloFace

论文简介

LFFD: A Light and Fast Face Detector for Edge Devices

Yonghao He*[1,2], Dezhong Xu*[1], Lifang Wu[1], Meng Jian[1], Shiming Xiang[2], and Chunhong Pan[2]

[1]Faculty of Information Technology, Beijing University of Technology
[2]National Laboratory of Pattern Recognition, Institute of Automation, Chinese Academy of Sciences

之前极市平台有推过人脸资源的精选GitHub项目 HelloFace：人脸资源精选（代表性工作、最新研究、论文、代码等），而今天要给大家推荐的是一篇最新的单类目标检测论文
LFFD: A Light and Fast Face Detector for Edge Devices。这篇论文为北京工业大学与中科院自动化所团队共同著作，提出了一个实用的通用型人脸检测器LFFD，能够实现2K甚至4K图像的实时检测。

论文亮点

1. 是一项兼具创新性、突破性和实用性的目标检测工作，在单类目标检测上做到了极致，能极致**平衡准确率与速度**
2. 基于Anchor-Free思想，提出了**感受野就是自然的锚框**（Receptive Field Is Natural Anchor）
3. 在未作任何优化情况下就实现了“**2K图像输入的实时检测**”
4. **网络极其简单，可以在任何平台上快速部署**，已经完成人脸的检测，正在延展到其他的类别，如人头、行人、车辆等

实验结果展示及对比

- WIDER FACE val set 准确率

Method	Easy Set	Medium Set	Hard Set
DSFD	0.949(0.966)	0.936(0.957)	0.850(0.904)
PyramidBox	0.937(0.961)	0.927(0.950)	0.867(0.889)
S3FD	0.923(0.937)	0.907(0.924)	0.822(0.852)
SSH	0.921(0.931)	0.907(0.921)	0.702(0.845)
FaceBoxes	0.840	0.766	0.395
FaceBoxes3.2×	0.798	0.802	0.715
LFFD	0.910	0.881	0.780

- WIDER FACE test data 准确率

Method	Easy Set	Medium Set	Hard Set
DSFD	0.947(0.960)	0.934(0.953)	0.845(0.900)
PyramidBox	0.926(0.956)	0.920(0.946)	0.862(0.887)
S3FD	0.917(0.928)	0.904(0.913)	0.821(0.840)
SSH	0.919(0.927)	0.903(0.915)	0.705(0.844)
FaceBoxes	0.839	0.763	0.396
FaceBoxes3.2×	0.791	0.794	0.715
LFFD	0.896	0.865	0.770

- FDDB上准确率

Method	Disc ROC curves score
DFSD	0.984
PyramidBox	0.982
S3FD	0.981
SSH	0.977
FaceBoxes3.2×	0.905
FaceBoxes	0.960
LFFD	0.973

- NVIDIA GTX TITAN Xp (MXNet+CUDA 9.0+CUDNN7.1)速度对比

Resolution->	640×480	1280×720	1920×1080	3840×2160
DSFD	78.08ms(12.81 FPS)	187.78ms(5.33 FPS)	392.82ms(2.55 FPS)	1562.50ms(0.64 FPS)
PyramidBox	50.51ms(19.08 FPS)	143.34ms(6.98 FPS)	331.93ms(3.01 FPS)	1344.07ms(0.74 FPS)
S3FD	21.75ms(45.95 FPS)	55.73ms(17.94 FPS)	119.53ms(8.37 FPS)	471.31ms(2.21 FPS)
SSH	22.44ms(44.47 FPS)	55.29ms(18.09 FPS)	118.43ms(8.44 FPS)	463.10ms(2.16 FPS)
FaceBoxes3.2×	6.80ms(147.00 FPS)	12.96ms(77.19 FPS)	25.37ms(39.41 FPS)	111.98ms(8.93 FPS)
LFFD	7.60ms(131.40 FPS)	16.37ms(61.07 FPS)	31.27ms(31.98 FPS)	87.79ms(11.39 FPS)

- NVIDIA TX2 (MXNet+CUDA 9.0+CUDNN7.1)上速度对比

Resolution->	160×120	320×240	640×480
FaceBoxes3.2×	11.20ms(89.29 FPS)	19.62ms(50.97 FPS)	72.74ms(13.75 FPS)
LFFD	7.30ms(136.99 FPS)	19.64ms(50.92 FPS)	64.70ms(15.46 FPS)

- Respberry Pi 3 Model B+ (ncnn)上速度对比

Resolution->	160×120	320×240	640×480
FaceBoxes3.2×	167.20ms(5.98 FPS)	686.19ms(1.46 FPS)	3232.26ms(0.31 FPS)
LFFD	118.45ms(8.44 FPS)	409.19ms(2.44 FPS)	4114.15ms(0.24 FPS)

LFFD推理时长大展示

- 硬件平台：NVIDIA Jetson NANO, CUDA 10.0, CUDNN 7.5.0, TensorRT 5.1.6

Model Version	160×140	320×240	640×480	1280×720
v1	12.94ms(77.26FPS)	33.66ms(29.70FPS)	113.88ms(8.78FPS)	326.91ms(3.06FPS)
v2	10.48ms(95.39FPS)	23.28ms(42.96FPS)	77.56ms(12.89FPS)	222.30ms(4.50FPS)

- **硬件平台：NVIDIA RTX 2080TI, CUDA 10.0, CUDNN 7.4.2, TensorRT 5.1.5.0（推理最优，2K图像达到92.63FPS)**

Model Version	320×240	640×480	1280×720	1920×1080	3840×2160	768
v1	1.33ms(750.16FPS)	2.85ms(350.55FPS)	6.97ms(143.40FPS)	15.10ms(66.22FPS)	59.91ms(16.69FPS)	233.19
v2	1.06ms(946.04FPS)	2.12ms(472.04FPS)	5.02ms(199.10FPS)	10.80ms(92.63FPS)	42.41ms(23.58FPS)	167.25

- 硬件平台：NVIDIA GTX 1060(laptop), CUDA 10.0, CUDNN 7.4.2, TensorRT 5.1.5.0

Model Version	320×240	640×480	1280×720	1920×1080	3840×2160
v1	2.54ms(393.78FPS)	7.28ms(137.28FPS)	20.13ms(49.67FPS)	44.76ms(22.34FPS)	176.54ms(5.66FPS)
v2	1.84ms(544.93FPS)	5.06ms(197.53FPS)	13.97ms(71.60FPS)	30.47ms(32.82FPS)	121.53ms(8.23FPS)

如果跑在更好的硬件平台，4K实时完全无意外了

总结

LFFD效果在速度与准确率平衡上的确是非常不错的，代码已经开源，大家可以去尝试跑跑效果，别忘了去star下这个项目～

-完-

*延伸阅读

- 重磅！13篇基于Anchor free的目标检测方法
- 港中文开源视频动作分析库MMAction，目标检测库算法大更新

△长按关注极市平台

觉得有用麻烦给个在看啦~