

Multi-Scale Fully Convolutional Network for Fast Face Detection

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Motivation. Image pyramid is a common strategy in detecting objects with different scales in an image. The computation of features at every scale of a finely-sampled image pyramid is the computational bottleneck of many modern face detectors.

Contributions. In this paper, we propose a new architecture of fully convolutional network framework for fast face detection. In our detector, face models at different scales are trained end-to-end and simultaneously. And more importantly, different scale models share the same convolutional feature maps. During testing, only images at octave-spaced scale intervals need to be processed by our detector. And faces of different scales between two consecutive octaves can be detected by multi-scale models in our system. This makes our detector very efficient and can run about 100 FPS on a GPU for VGA images. Meanwhile, our detector shows superior performance over most of state-of-the-art ones [1] [2] [3] on three challenging benchmarks, including Fddb, AFW, and PASCAL faces, shown in Fig. 1-3.

- [1] Lichao Huang, Yi Yang, Yafeng Deng, and Yinan Yu. Densebox: Unifying landmark localization with end to end object detection. *arXiv*, 2015.
- [2] Haoxiang Li, Zhe Lin, Xiaohui Shen, Jonathan Brandt, and Gang Hua. A convolutional neural network cascade for face detection. In *CVPR*, pages 5325–5334, 2015.
- [3] Shuo Yang, Ping Luo, Chen-Change Loy, and Xiaoou Tang. From facial parts responses to face detection: A deep learning approach. In *ICCV*, pages 3676–3684, 2015.

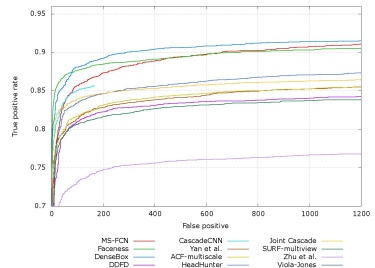


Figure 1: Results on the Fddb dataset.

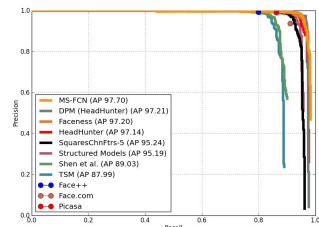


Figure 2: Results on the AFW dataset.

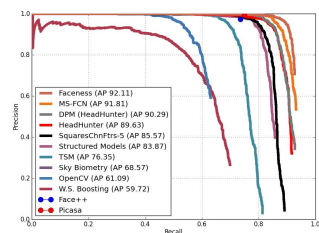


Figure 3: Results on Pascal faces dataset.