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# Unconstrained Face Recognition

**Rahimzadeh Arashloo Shervin**



## **Unconstrained Face Recognition:**

**Unconstrained Face Recognition** Shaohua Kevin Zhou, Rama Chellappa, Wenyi Zhao, 2006-10-11 Face recognition has been actively studied over the past decade and continues to be a big research challenge Just recently researchers have begun to investigate face recognition under unconstrained conditions Unconstrained Face Recognition provides a comprehensive review of this biometric especially face recognition from video assembling a collection of novel approaches that are able to recognize human faces under various unconstrained situations The underlying basis of these approaches is that unlike conventional face recognition algorithms they exploit the inherent characteristics of the unconstrained situation and thus improve the recognition performance when compared with conventional algorithms Unconstrained Face Recognition is structured to meet the needs of a professional audience of researchers and practitioners in industry This volume is also suitable for advanced level students in computer science *Unconstrained Face Recognition* Shaohua Kevin

Zhou, Ramalingam Chellappa, Wenyi Zhao, 2008-11-01 Face recognition has been actively studied over the past decade and continues to be a big research challenge Just recently researchers have begun to investigate face recognition under unconstrained conditions Unconstrained Face Recognition provides a comprehensive review of this biometric especially face recognition from video assembling a collection of novel approaches that are able to recognize human faces under various unconstrained situations The underlying basis of these approaches is that unlike conventional face recognition algorithms they exploit the inherent characteristics of the unconstrained situation and thus improve the recognition performance when compared with conventional algorithms Unconstrained Face Recognition is structured to meet the needs of a professional audience of researchers and practitioners in industry This volume is also suitable for advanced level students in computer science Towards a Solution of Unconstrained Face Recognition Archana Sapkota, 2013 **Unconstrained Face**

**Recognition**, 2004 **Unconstrained Face Recognition with Occlusions** Xingjie Wei, 2014 *Towards a Robust Unconstrained Face Recognition Pipeline with Deep Neural Networks* Yichun Shi, 2021 Face recognition is a classic problem in the field of computer vision and pattern recognition due to its wide applications in real world problems such as access control identity verification physical security surveillance etc Recent progress in deep learning techniques and the access to large scale face databases has lead to a significant improvement of face recognition accuracy under constrained and semi constrained scenarios Deep neural networks are shown to surpass human performance on Labeled Face in the Wild LFW which consists of celebrity photos captured in the wild However in many applications e g surveillance videos where we cannot assume that the presented face is under controlled variations the performance of current DNN based methods drop significantly The main challenges in such an unconstrained face recognition problem include but are not limited to lack of labeled data robust face normalization discriminative representation learning and the ambiguity of facial features caused by information loss In this thesis we propose a set of methods that attempt to address the above challenges in unconstrained

face recognition systems Starting from a classic deep face recognition pipeline we review how each step in this pipeline could fail on low quality uncontrolled input faces what kind of solutions have been studied before and then introduce our proposed methods The various methods proposed in this thesis are independent but compatible with each other Experiment on several challenging benchmarks e g IJB C and IJB S show that the proposed methods are able to improve the robustness and reliability of deep unconstrained face recognition systems Our solution achieves state of the art performance i e 95 0% TAR FAR 0 001% on IJB C dataset and 61 98% Rank1 retrieval rate on the surveillance to booking protocol of IJB S dataset

*Weakly Supervised Learning for Unconstrained Face Processing* Gary B. Huang,2012 Machine face recognition has traditionally been studied under the assumption of a carefully controlled image acquisition process By controlling image acquisition variation due to factors such as pose lighting and background can be either largely eliminated or specifically limited to a study over a discrete number of possibilities Applications of face recognition have had mixed success when deployed in conditions where the assumption of controlled image acquisition no longer holds This dissertation focuses on this unconstrained face recognition problem where face images exhibit the same amount of variability that one would encounter in everyday life We formalize unconstrained face recognition as a binary pair matching problem verification and present a data set for benchmarking performance on the unconstrained face verification task We observe that it is comparatively much easier to obtain many examples of unlabeled face images than face images that have been labeled with identity or other higher level information such as the position of the eyes and other facial features We thus focus on improving unconstrained face verification by leveraging the information present in this source of weakly supervised data We first show how unlabeled face images can be used to perform unsupervised face alignment thereby reducing variability in pose and improving verification accuracy Next we demonstrate how deep learning can be used to perform unsupervised feature discovery providing additional image representations that can be combined with representations from standard hand crafted image descriptors to further improve recognition performance Finally we combine unsupervised feature learning with joint face alignment leading to an unsupervised alignment system that achieves gains in recognition performance matching that achieved by supervised alignment

**Towards Unconstrained Face Recognition Using 3D Face Model** Zahid Riaz,M. Saquib Sarfraz,Michael Beetz,2011

**Adapting Grab Features for Unconstrained Face Recognition** Ethan Rudd,2014

*Development of a Deep Learning Scheme for Unconstrained Face Recognition* Marwa Yousif Hassan Said,2016

*Brief van Henriette Margaretha Otten-Kattenburg (1896-1974) aan Wilhelmus Johannes Maria Antonius Asselbergs (1903-1968)*,1946

*Face Recognition in Unconstrained Videos with Matched Background Similarity* Itay Maoz,2012

Scale-aware Multi-path Deep Neural Networks for Unconstrained Face Detection Yuguang Liu,2017 Unconstrained face detection is the task of robustly finding and locating faces in an image subject to possible variations in facial scale blur pose illumination occlusion and facial expression It is a critical first step towards a host of modern surveillance applications including but not

limited to face verification face recognition face tracking and human computer interaction Though much progress has been made in unconstrained face detection during the past decade the majority of work focuses on improving the detection robustness on variations caused by blur pose illumination occlusion and facial expression Facial scale despite its immense influence on face detection accuracy has received much less attention than have the above factors This is partially due to the fact that most traditional face detection benchmark datasets tend to collect faces of relatively large size and with modest scale variation Nonetheless in real world applications such as surveillance systems it is imperative to possess an equal ability to detect both big faces close to camera and tiny ones far away from the camera at the same time To the best of our knowledge no published face detection algorithm can detect a face as large as 1000 x 1000 pixels while simultaneously detecting another one as small as 10 x 10 pixels within a single image with similarly high accuracy We introduce a Multi Path Face Detection Network MP FDN to filter an image for simultaneously proposing and verifying different sized faces in parallel paths This is the first time that faces across a large span of scales are detected by a single network with forked detection paths More importantly the division of the paths are not handcrafted but totally based on the scale sensitivity inherent in the convolutional networks that was also discovered in this thesis for the first time MP FDN consists of two stages The first stage is a Multi Path Face Proposal Network MP FPN that suggests faces at three different scale ranges This design is based on our observation that the hierarchical multi scale layers of deep convolutional networks ConvNet can inherently represent face patterns at multiple scales In particular low level ConvNet layers are more sensitive to tiny faces while high level ConvNet layers are more discriminative to big faces To this end MP FPN utilizes three parallel outputs of the convolutional feature maps to simultaneously predict small medium and large candidate face regions respectively The second stage is a Multi Path Face Verification Network MP FVN that further eliminates false positives while including false negatives MP FVN utilizes the same three parallel paths as MP FPN For each detection path it pools features from both a face candidate region provided by MP FPN and a larger contextual region surrounding the face candidate region These facial and contextual features are then concatenated to provide a more accurate faceness probability to the face candidate Note that the network structure and hyper parameters of MP FPN and MP FVN are completely based on controlled experiments rather than being handcrafted To testify to the performance of MP FDN on the basis its ability to perform face detection we conducted comprehensive experiments on two challenging public face detection benchmark datasets WIDER FACE and FDDB datasets MP FDN consistently achieves better than the state of the art performance on both of them Specifically on the most challenging so called hard partition of WIDER FACE test set that contains faces as small as about 9 pixels and as large as more than 1000 pixels in height MP FDN outperforms the former best result by 9.8% for the Average Precision This demonstrates that MP FDN is a viable and accurate face detector for unconstrained face detection especially in the case of large scale variations

**Real Time Face Recognition in Unconstrained Environment** Md Manjurul Ahsan,2018

Towards Unconstrained Face Recognition from Image Sequences A. J. Howell, Hilary Buxton, 1996 Abstract This paper presents experiments using Radial Basis Function RBF networks to tackle the unconstrained face recognition problem using low resolution video information Input representations that mimic the effects of receptive field functions found at various stages of the human vision system were used with RBF networks that learnt to classify and generalise over different views of each person to be recognised In particular Difference of Gaussian DoG filtering and Gabor wavelet analysis are compared for face recognition from an image sequence RBF techniques are shown to provide excellent levels of performance where the view varies and we discuss how to relax constraints on data capture and improve preprocessing to obtain an effective scheme for real time unconstrained face recognition Towards Automatic Face Recognition in Unconstrained Scenarios, 2008

**Unconstrained-Pose 2D Face Recognition** Rahimzadeh Arashloo Shervin, 2015-07-24 The book presents a 2D face recognition system using Markov random field matching methodology for establishing dense correspondences between a pair of images in the presence of pose changes and self occlusion The proposed method which exploits both shape and texture differences between images achieves very competitive performance compared to the current approaches The algorithm bypasses the need for geometric pre processing of face images By virtue of the matching methodology embedded in the algorithm the proposed approach can cope with moderate translation in and out of plane rotation scaling and perspective effects Also by employing a graphical model based approach the proposed system circumvents the need for non frontal images being available for training a pose invariant face recognition system In contrast to the state of the art approaches based on 3D models the approach operates on 2D images and bypasses the need for 3D face training data and avoids the vagaries of 3D face model to 2D face image fitting **Face Recognition and Verification in Unconstrained**

**Environments** Huimin Guo, 2012 *Computer Vision - ACCV 2016* Shang-Hong Lai, Vincent Lepetit, Ko Nishino, Yoichi Sato, 2017-03-10 The five volume set LNCS 10111 10115 constitutes the thoroughly refereed post conference proceedings of the 13th Asian Conference on Computer Vision ACCV 2016 held in Taipei Taiwan in November 2016 The total of 143 contributions presented in these volumes was carefully reviewed and selected from 479 submissions The papers are organized in topical sections on Segmentation and Classification Segmentation and Semantic Segmentation Dictionary Learning Retrieval and Clustering Deep Learning People Tracking and Action Recognition People and Actions Faces Computational Photography Face and Gestures Image Alignment Computational Photography and Image Processing Language and Video 3D Computer Vision Image Attributes Language and Recognition Video Understanding and 3D Vision

The Essential Guide to Image Processing Alan C. Bovik, 2009-07-08 A complete introduction to the basic and intermediate concepts of image processing from the leading people in the field Up to date content including statistical modeling of natural anisotropic diffusion image quality and the latest developments in JPEG 2000 This comprehensive and state of the art approach to image processing gives engineers and students a thorough introduction and includes full coverage of key

applications image watermarking fingerprint recognition face recognition and iris recognition and medical imaging This book combines basic image processing techniques with some of the most advanced procedures Introductory chapters dedicated to general principles are presented alongside detailed application orientated ones As a result it is suitably adapted for different classes of readers ranging from Master to PhD students and beyond Prof Jean Philippe Thiran EPFL Lausanne Switzerland Al Bovik s compendium proceeds systematically from fundamentals to today s research frontiers Professor Bovik himself a highly respected leader in the field has invited an all star team of contributors Students researchers and practitioners of image processing alike should benefit from the Essential Guide Prof Bernd Girod Stanford University USA This book is informative easy to read with plenty of examples and allows great flexibility in tailoring a course on image processing or analysis Prof Pamela Cosman University of California San Diego USA A complete and modern introduction to the basic and intermediate concepts of image processing edited and written by the leading people in the field An essential reference for all types of engineers working on image processing applications Up to date content including statistical modelling of natural anisotropic diffusion image quality and the latest developments in JPEG 2000

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