**Face Detection Using AWS**

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**1.**

**INTRODUCTION**

## 1.1 Introductory Remarks

* 1. Image analysis has been an important factor in today’s era. We need to analyse images in various fields like forensics, multimedia management, video retrieval, biometric identification, audio-visual speech recognition. Facial analysis is one important part of image recognition. It is used by humans for many different tasks. Humans recognize other people from their faces, their appearance (young or old), their gender (male or female) ,etc. We can also even recognize a person as sad, happy, nervous , tried, is telling truth or not. Many public clouds provides us with various services. One famous service of AWS cloud platform is Amazon Recognition.
  2. Aws Amazon rekognition service provides us with various features. We can analyze image on the basis of various factor using this service. We can detect the objects, scenes , faces , text extraction ,celebrity recognition , and inappropriate content in the images. It also allows us to compare and search faces. This Amazon Rekognition service is built using deep neural networks models for detection and labelling of thousands of objects and the scenes present in the image. This service is considered to be part of the Amazon Artificial Intelligence (AI) family of services. Amazon AI is built with the help of deep learning to understand images better and built conversational text and speech interfaces.

Our system will do the detection faces. It will tell the number of faces in the image.

## 2.

**LITERATURE SURVEY AND REVIEW**

**2.1 Literature Summary**

Face detection is a fundamental and important problem in computer vision and pattern recognition, which has been widely studied over the past few decades. Face detection is one of the important key steps towards many subsequent face-related applications, such as face verification [1,2], face recognition [3–5], and face clustering [5], etc. Following the pioneering work of Viola Jones object detection framework [6,7], numerous methods have been proposed for face detection in the past decade. Early research studies in the literature were mainly focused on extracting different types of hand-crafted features with domain experts in computer

vision, and training effective classifiers for detection and recognition with traditional machine learning algorithms. Such approaches are limited in that they often require computer vision experts in crafting effective features and each individual component is optimized separately, making the whole detection pipeline often suboptimal.

## 2.2 Literature Review

1. This paper proposes to learn a set of high-level feature representations through deep learning, referred to as Deep hidden ID entity features (DeepID), for face verification. We argue that DeepID can be effectively learned through challenging multi-class face identification tasks, whilst they can be generalized to other tasks (such as verification) and new identities unseen in the training set.
2. In modern face recognition, the conventional pipeline consists of four stages: detect => align => represent => classify. We revisit both the alignment step and the representation step by employing explicit 3D face modeling in order to apply a piecewise affine transformation, and derive a face representation from a nine-layer deep neural network. This deep network involves more than 120 million parameters using several locally connected layers without weight sharing, rather than the standard convolutional layers.
3. Despite significant recent advances in the field of face recognition , implementing face verification and recognition efficiently at scale presents serious challenges to current approaches. In this paper we present a system, called FaceNet, that directly learns a mapping from face images to a compact Euclidean space

where distances directly correspond to a measure offace similarity. Once this space has been produced, tasks such as face recognition, verification and clustering can be easily implemented using standard techniques with FaceNet embeddings asfeature vectors.

1. This paper describes a face detection framework that is capable of processing images extremely rapidly while achieving high detection rates. There are three key contributions. The first is the introduction of a new image representation called the “Integral Image” which allows the features used by our detector to be computed very quickly.
2. In this paper, we propose a simple and scalable detection algorithm that improves mean average precision (mAP) by more than 30% relative to the previous best result on VOC 2012 -- achieving a mAP of 53.3%. Our approach combines two key insights: (1) one can apply high-capacity convolutional neural networks (CNNs) to bottom-up region proposals in order to localize and segment objects and (2) when labeled training data is scarce, supervised pre-training for an auxiliary task, followed by domain-specific fine-tuning, yields a significant performance boost.
3. In this paper, they propose a method to address challenges in unconstrained face detection, such as arbitrary pose variations and occlusions. First, a new image feature called Normalized Pixel Difference (NPD) is proposed. NPD feature is computed as the difference to sum ratio between two pixel values, inspired by the Weber Fraction in experimental psychology. The new feature is scale invariant, bounded, and is able to reconstruct the original image. Second, we propose a deep quadratic tree to learn the optimal subset of NPD features and their combinations,

so that complex face manifolds can be partitioned by the learned rules.

1. This paper presents a novel learning framework for training boosting cascade based object detector from large scale dataset. The framework is derived from the well-known Viola-Jones (VJ) framework but distinguished by three key differences. First, the proposed framework adopts multi-dimensional SURF features instead of single dimensional Haar features to describe local patches.
2. We propose a method to address challenges in unconstrained face detection, such as arbitrary pose variations and occlusions. First, a new image feature called Normalized Pixel Difference (NPD) is proposed. NPD feature is computed as the difference to sum ratio between two pixel values, inspired by the Weber Fraction in experimental psychology. The new feature is scale invariant, bounded, and is able to reconstruct the original image.
3. Face detection is one of the most studied topics in the computer vision community. Much of the progresses have been made by the availability of face detection benchmark datasets. We show that there is a gap between current facedetection performance and the real world requirements. To facilitate future face detection research, we introduce the WIDER FACE dataset1, which is 10 times larger than existing datasets
4. Deeper neural networks are more difficult to train. We present a residual learning framework to ease the training of networks that are substantially deeper than those used previously. We explicitly reformulate the layers as learning residual functions with reference to the layer inputs, instead of learning unreferenced functions. We provide comprehensive empirical evidence showing that these residual networks are easier to optimize, and can gain accuracy from considerably increased depth.
5. Face representation is a crucial step of face detection system. In this paper, we present a fast face detection algorithm based on representation learnt using convolutional neural network (CNN) so as to explicitly capture various latent facial features. Firstly, in order to improve the speed of detection in the system, we train an Adaboost background filter which can remove the background most quickly. Secondly, we use the CNN to extract more distinctive features for those face and non-face patterns that have not been filtered by Adaboost.
6. We then present a system which learns to detect multi-view faces using FloatBoost. The system uses a coarse-to-fine, simple-to-complex architecture called detector-pyramid. FloatBoost learns the component detectors in the pyramid and yields similar or higher classification accuracy than AdaBoost with a smaller number of weak classifiers.
7. In this paper, a novel method for identifying and recognizing people who hide their identity by covering face using scarves has been proposed. Recognition is done by using a pre-trained Convolutional Neural Network (Alex-Net Model) for facial feature extraction which is followed by a multi-class Support Vector Machine (SVM) algorithm for performing the classification task.
8. Here, we generalize the concept of *f* arge-scale memory study. First, we find that memorability is an intrinsic feature of a face photograph— across observers some faces are consistently more remembered or forgotten than others—indicating that memorability can be used for measuring, predicting, and manipulating subsequent memories. Second, we determine the role that 20 personality, social, and memory-related traits play in face memorability.
9. In this paper, we advocate evaluations at the million scale (LFW includes only 13K photos of 5K people). To this end, we have assembled the MegaFace dataset and created the first MegaFace challenge. Our dataset includes One Million photos that capture more than 690K different individuals.

## 3.

**SYSTEM DESIGN**

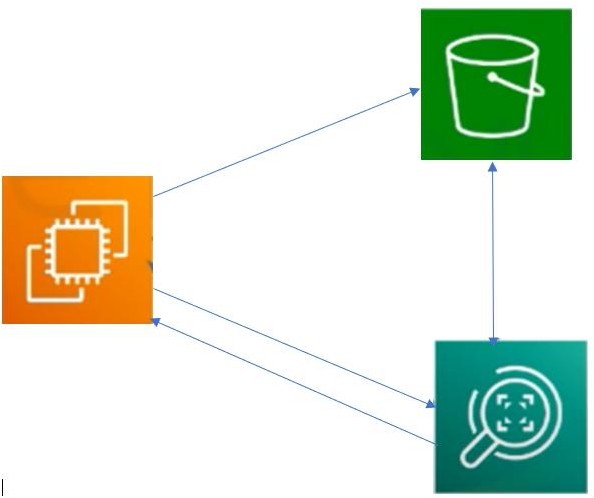
This system Is doing the detection of faces and tell the user the number of Faces in the image.

## Steps followed:

* + 1. Create an aws account.
    2. Navigate to services and select EC2 for creating the virtual machine.
    3. Create the keys for authentication purpose.
    4. Launch the instance.
    5. Select s3 from services.
    6. Create the bucket.
    7. Now use putty to connect with linux server created.
    8. Install php.
    9. Download the image
    10. Create php file.
    11. Execute the code

**3.2. Framework:** 1.create ec2 instance 2. create s3 bucket

3. Integrate ec2, s3 bucket ,and amazon rekognition.



S3 Bucket

1

3

2

Ec2 Service

3

Face Detection

Service

## 4.

## SYSTEM IMPLEMENTATION

* 1. **Code:**

This system is implemented using php code:

<?php

// error\_reporting(0);

require\_once( DIR . '/vendor/autoload.php'); use Aws\S3\S3Client;

use Aws\Rekognition\RekognitionClient;

$bucket = 'awsbucket12345';

$keyname = 's.jpg';

$s3 = new S3Client([

'region' => 'us-east-2',

'version' => '2006-03-01',

'signature' => 'v4'

]);

try {

// Upload data.

$result = $s3->putObject([

'Bucket' => $bucket, 'Key' => $keyname,

'SourceFile' => DIR . "/$keyname", 'ACL' => 'public-read-write'

])

// Print the URL to the object.

$imageUrl = $result['ObjectURL']; if($imageUrl) {

echo "Image upload done... Here is the URL: " . $imageUrl;

$rekognition = new RekognitionClient([ 'region' => 'us-east-2',

'version' => 'latest',

]);

$result = $rekognition->detectFaces([ 'Attributes' => ['DEFAULT'], 'Image' => [

'S3Object' => [

'Bucket' => $bucket, 'Name' => $keyname,

'Key' => $keyname,

],

],

]);

echo "Totally there are " . count($result["FaceDetails"]) . " faces";

}

} catch (Exception $e) {

echo $e->getMessage() . PHP\_EOL;

}

## 4.2 Test Results

After running the above given php code we get the output with the total number of faces in the image. In our image total of 9 faces are detected.

## 5.

## RESULTS AND DISCUSSION

* 1. **Output**



This output shows the detection of faces in our image that there are 9 images in the image.

## 5.2 Discussions

The above output shows the presence of 9 faces in our selected image. Using the process we can do the gender detection, age detection ,text detection in the image. This aws amazon rekognition service built using deep learning is proved to be powerful and helpful in various fields because of its detection capabilities.

## 6.

## CONCLUSION

We concluded that facial detection is an important factor and it can be done using aws services . This study also shows that aws public cloud is very useful and versatile cloud that provides us with many useful services. By using the Amazon rekognition service we can analyse image by various other factors also like we can detect the text in the image or can get the detailed information of famous personalities. Further in future work, we can use other parts of this service for detection of other factors like old or young, happy or sad etc. This can be used in various fields like image processing or forensic study also.

# 7.

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