AMRITA VISHWA VIDYAPEETHAM

FACE RECOGNITION USING FACENET

Based on a research paper “FaceNet: A Unified Embedding for Face Recognition and Clustering” written by three Google employees published on 17-06-2015.

BY:

M.L.V.Raghuram	CSE17067
Sarath chandra.M	CSE17072
Shobanadri.M.M	CSE17076
Rishi .S	CSE17113
Venkata Raju.D	CSE17532

INTRODUCTION

- After all the advancements in the field of Computer Vision, implementing face verification and recognition efficiently at scale presents serious challenges to current approaches.This project presents an unified system for face verification, recognition and clustering.
- Deep convolutional networks are used to produce Euclidean 128-D embedding per image using a triplet- based loss function.
- Based on the learnings from these embeddings the fore mentioned tasks can be performed using techniques like thresholding (verification), KNN-classification (recognition) , and agglomerative clustering (clustering).

CHALLENGES AND RESEARCH GAP

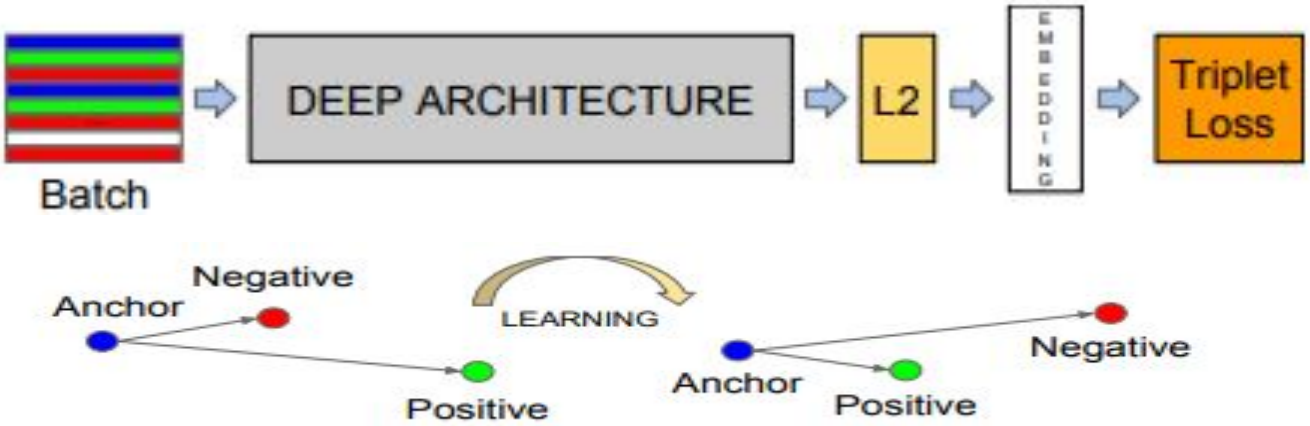
The project is purely data driven which learns its representation directly from the pixels of the face unlike other projects [1,2] that employ deep networks.

A large dataset of labelled faces is used to attain the appropriate invariances to pose, illumination, and other variational conditions rather than depending on the engineered features.

The deep network core architectures can be employed using a lot of researches done before, like Zeiler & Fergus [3] model, Inception model of Szegedy [4] which can reduce the number of FLOPS required for comparable performance, and other works [5].

There are a plethora of works for face verification and recognition done like by Zhenyao [6] that warps faces into canonical frontal view, Taigman [7] which uses a multi-stage approach that aligns faces to a general 3D shape model and others [8].

Proposed Methodology



A network that consists of a batch input layer and a deep CNN followed by L_2 normalization, which results in the face embedding followed by the triplet loss during the training. The triplet loss minimizes the distance between an anchor and a positive, both of which have the same identity and then maximizes the distance between the anchor and the negative of the different identity.

$$distance(A,P) - distance(A,N) + margin < 0$$

Implementation

- Deep Convolutional Networks
- Triplet Loss
- Triplet Selection
- Datasets(Illumination CMU Multipie) and Evaluation

Improvements and Modifications

- There is an improved triplet loss function proposed by IBM which can be used to increase the efficiency of the model.
- A dataset consisting of a limited pose and illumination levels is used for training, so that better observations can be made during the testing.

Literature Survey

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[7] Y. Taigman, M. Yang, M. Ranzato, and L. Wolf. Deepface: Closing the gap to human-level performance in face verification. In IEEE Conf. on CVPR, 2014. 1, 2, 5, 7, 8, 9

[8] Y. Sun, X. Wang, and X. Tang. Deep learning face representation by joint identification-verification. CoRR, abs/1406.4773, 2014. 1, 2, 3

INDIVIDUAL CONTRIBUTIONS

NAME	CONTRIBUTION
RAGHURAM	EMBEDDING AND EVALUATION
SARATH	EMBEDDING AND ANALYSIS
SHOBANADRI	COLLECTING AND PREPARING THE DATASET, CREATING TRIPLETS
RISHI	IMPLEMENTING TRIPLET LOSS FUNCTION
VENKATARAJU	CNN