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Recognizing faces from videos using Clustering, Re-ranking & Fusion

Video Based Face Recognization

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Abstract—In Today's World, availability of large intra-personal variations in video and limited information content in still images, video-based face recognition became a Powerful mechanisms. Unlike still face images, videos provide abundant & more detail information that can be leveraged to address as enhance the face recognition performance. Variations in pose, illumination and expression as well as enhanced the face recognition performance. Our Project presents a video-based face recognition algorithm that computes a discriminative video signature as an ordered list of still face images from a large dictionary. we are using ,A 3-stage approach is proposed for optimizing ranked lists across multiple video frames and fusing them into a single composite ordered list to compute the video signature. This signature involves intra-personal variations and facilitates in matching two videos with large variations. For matching two videos, an open CV Algorithm is used, which uses the ranking of images in the video signature as well as the usefulness of images in characterizing the individual in the video.

Keywords- Cluster, DCG, Face recognition, Fusion, Re-rank, Surveillance, Video

I. INTRODUCTION

In terms of face recognition, the amount of data collected by surveillance cameras every day is probably more than the size of all the publicly available face image databases combined. One primary purpose of collecting the data from surveillance cameras is to detect any unwanted activity during the act or at least enables to analyse the events and may be determine the person(s) of interest after the act. Therefore, widespread use of video cameras for surveillance and security applications have stirred extensive research interest in video based face recognition. A majority of the literature is on matching still images and face recognition from videos is relatively less explored. Recognizing the individuals appearing in videos has both advantages and disadvantages compared to still face matching. Since the acquisition in videos is unconstrained, the presence of co-vitiate such as pose, illumination, and expression is significantly more as well as the information available in a video is generally more than the information available for matching two still images.

II. Related Research

- **Set Based**

The survey on video based face recognition by Barret al.categorizes existing approaches as set based and sequence based approaches. Set based approaches utilize the abundance and variety of observations in a video to achieve resilience to sub-optimal capture conditions. The approaches that model image sets as distributions use the between-distribution similarity to match two image sets. However, the performance of such approaches depends on the parameter estimation of the under and manifolds is also proposed where matching between two image sets is performed by measuring similarity between the input and reference subspaces/manifolds.

- **Sequence Based**

Sequence based approaches explicitly utilize the temporal information for improved face recognition. To utilize the temporal information, Zhou had proposed to use a joint posterior probability distribution of motion vector and identity variable estimated using sequence importance sampling. Some of the approaches that model the temporal information with Hidden Markov Models (HMM) are also proposed.

III. PROBLEM DEFINITION

1) **Clustering**

The main idea behind clustering is to congregate images in a ranked list into different clusters where each cluster represents a particular viewing condition i.e. a specific pose, illumination or expression.

2) **Re-ranking**

A ranked list is an ordered list of face images retrieved from the dictionary where the face image with the highest similarity is positioned at the top of the list.

3) **Fusion**

The final composite ranked list of a video is generated by ordering all the images in dictionary such that the image with maximum adjusted similarity score (SS) is positioned at the top of the list.

IV. PROJECT PLAN

Project plan involves the following steps:

First step is to collect Video data-set of Videos from Internet. Then According to our Project to match two videos we had followed the steps like cluster, re-rank, fusion.

Clustering: We had made the frames of both videos.

Re-ranking: We had found top closest images from the frames.

Fusion: Then the Final & most important task is combine top closest images, which will satisfy our requirement.

1.1. Dictionary based Video face Reorganization

Recent Survey in face recognition have shown that generating image signatures based on a dictionary is more efficient for matching images across large variations than direct comparison between two images. In this survey, video based face recognition is addressed by computing a video signature using a dictionary of still face images. This algorithm congregates abundant information present in multiple video frames to generate a discriminative video signature. It facilitates in characterizing an individual as it embeds the information in the form of a ranked list of images under similar intrapersonal settings from the dictionary.

1.2. Matching the Composite Ranked Lists

To match two videos, their composite ranked lists obtained after clustering based re-ranking and fusion are compared. Each document in the ranked list is arranged based on its similarity to the input query and also has a relevance score provided by a domain lead or the user. It uses both these attributes i.e. rank and relevance to compare two ranked lists. The relevance in our case is the usefulness of a dictionary image in characterizing the individual in a video.

V. COMPUTING RANKED LISTS

Let V be the video of an individual consists of n frames where each frame represents the temporal variations of the individual.Face region from each frame is detected and processed. Three Face regions corresponding to different frames across a video are represented as {F1, F2,……., Fn}. To create a ranked lists, comparision is carried out.In which, each frame is compared with all the images in the dictionary. So the dictionary consists of a large number of images and each video has multiple frames; it is neccessary to compute the ranked list in an efficient manner. Linear discriminant analysis (LDA), a level-1 feature, is used to generate a ranked list by congregating images from the dictionary that are similar to the input frame. A linear discriminant function is learnt from the dictionary images that captures the varieties in illumination, pose & expression. The linear discriminant function learns these variations and retrieves images from the dictionary that are similar to the input video frame i.e. images with similar illumination, pose & expression.

VI. Algorithm

OpenCV is free open-source library intended for use in image processing, computer vision and machine learning areas. It have a huge amount of different algorithms, but in this topic i will

compare their existing feature detectors. At this moment OpenCV has stable 2.2 version and following types of descriptors: Fast, GoodFeaturesToTrack, Mser, Star, Sift, Surf. And few Adapters over detectors: GridAdapted, PyramidAdapted, DynamicAdapted. In this article noticed above detectors will be compared by speed, quality and repeatability in different lighting and scale.

The new FaceRecognizer is a global constructor that allows Eigen, Fisher, and LBPH classifiers to be used together. The class combines common method calls between the classifiers. The constructor for each classifier type is as follows:

FaceRecognizer recognizer = new EigenFaceRecognizer(num_components, threshold);
FaceRecognizer recognizer = new FisherFaceRecognizer(num_components, threshold);
FaceRecognizer recognizer = new LBPHFaceRecognizer(radius, neighbors, grid_x, grid_y, threshold);

VII. System Design

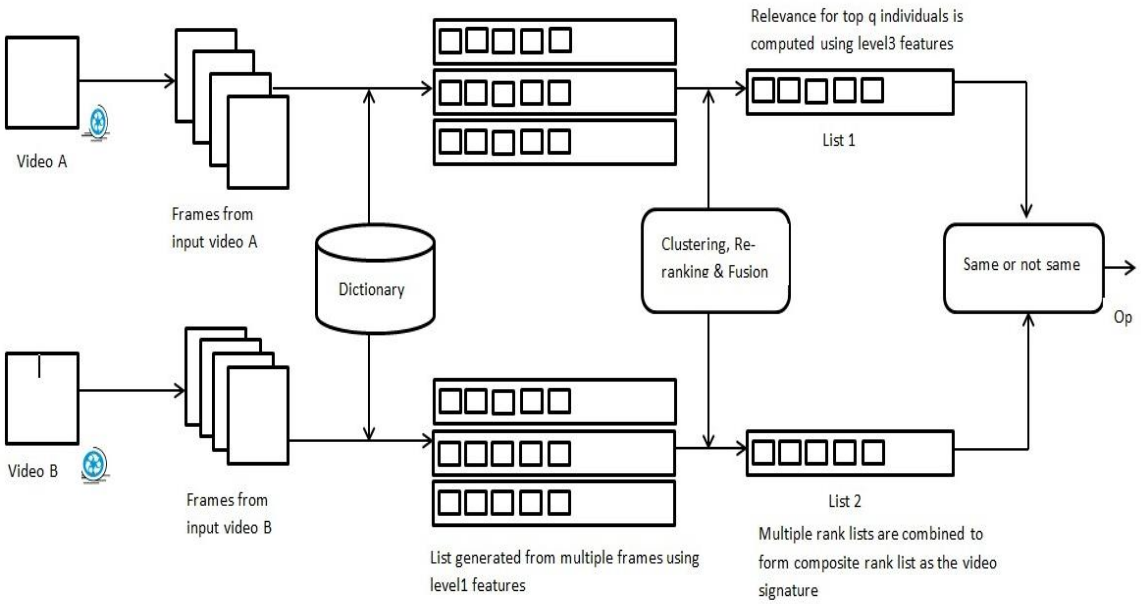

Fig 1: Overview of Video based Face Recognization System

VIII. CONCLUSION

The proposed video based face recognition algorithm is based on the observation that a discriminative video signature can be generated by combining the abundant information available across multiple frames of a video. The algorithm starts with generating a ranked list for every frame in the video using computationally efficient features. Multiple ranked lists across the frames are then optimized using clustering based re-ranking and final fused together to generate the video signature.The video signature thus embeds large intrapersonal variations across multiple frames which significantly improves the recognition performance. Finally, two video signatures (ordered ranked lists) are compared using Open CV Algorithm that utilizes both ranking and relevance of images in the signature. This research thus transforms the problem of video based face recognition into comparing two ordered lists of images.

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