Support Vector Machine Based Face Sketch Systhesis

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Abstract – This is a face photo retrieval system using sketch drawings by transforming photo image into sketch. A Bayesian framework used for face sketch synthesis provides a common properties and intrinsic difference in different models through systematic interpretation. Digital entertainment and law enforcement used by face sketch synthesis. The synthesis performance is improved by separating shape and texture information in a face photo and them conducting transformation on them respectively. Face sketch synthesis method further proposed by Bayesian framework. In this proposed method can be solved efficiently by denoising problem.

Index Terms – Face hallucination, Face recognition, Face Sketch Synthesis, Image Quality Assessment.

1. INTRODUCTION

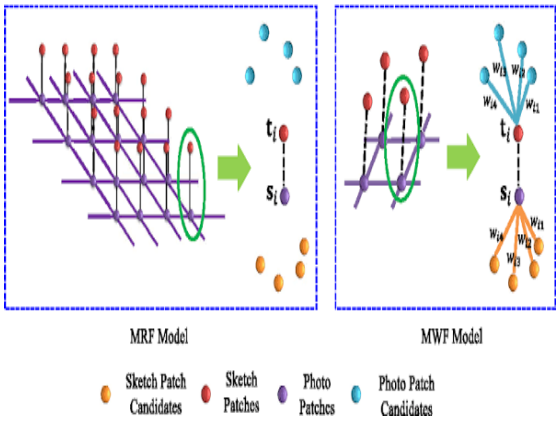
Digital entertainment and Law enforcement widely used by Face Sketch Synthesis (FSS).The Face Sketch Synthesis method containing face photo sketch pairs in the training dataset. The target sketch is generated from the sketches in the training dataset. The reconstructions of the test photo using photos in the training dataset were computed by linear combination coefficients.

The test photo is first projected onto the training photos and utilized to linearly combine the training sketches to obtain the target sketches by projection coefficients. The classical manifold learning method by the idea of Locally Linear Embedding (LLE).The test photo and training sketch photos are firstly divided into some patches with some overlap between adjacent patches. The K nearest photo sketches in the training dataset is performed by K-NN search. The process obtained by K sketch patches corresponding to the selected photo patches. The K nearest photo patches linearly. The target sketch patches are used by reconstruction weights. Finally the target sketch patches are arranged with overlap area averaged. Spatial Sketch Denoising (SSD) introduces blurring or noise in the result.

It determines sparse representation theory used to number of nearest neighbour benefits. The dependency relation between neighbouring pixels described by embedded hidden Markov models. This method works on a pixel level, it has large computational cost. The input image is a query image of any format is given as an input from the test database. The process mainly for selecting some appropriate neighbours by Neighbour selection model. Database consists of lots of images with their sketch pairs. The computation of linear coefficients for synthesis is focused by Weight computation model. The Bayesian framework for face sketch synthesis, initially considered M face sketch photo pairs included in a training dataset. The both Neighbour selection model and Weight computation model in spatial neighbouring constraint in cooperates by the face sketch synthesis model.

Markov Random Field (MRF) based method, the spatial neighbouring constraint only for the neighbour selection model and neglects the Weight computation model. The face that only single 'best' candidate is selected to synthesis the target sketch leads to face deformation the neighbour selection model with spatial neighbouring constraint. The linear weight combination into the original MRF model introduced by Markov Weight Fields (MWF).Both neighbour selection model and weight computation model are optimized separately. The belief propagation is optimized by Neighbour selection model. The Markov property decomposed large scale problem into many sub quadratic problems optimized by Weight computation model. The both MRF and MWF combine the Bayesian method. The neighbour selection model by MRF and the weight computation model by MWF.

The neighbour selection model used for selecting some appropriate neighbours and the computation of linear combination coefficients for synthesis focused by Weight computation model. Face sketch synthesis methods provides a systematic interpretation.



2. RELATED WORKS

Simple yet effective face sketch synthesis method. Sparse neighbour selection model used by face sketch synthesis. It is simpler than all other null space method and saves the computational cost. But it formulates face sketch synthesis as an image denoising problem.

Alternate imaging modalities such as infrared image to a photograph or sketch to a photograph. This framework proposed by the both probe and gallery images represented in terms of nonlinear similarities. Excellence performance in the recognition system. But it does not perform with illuminated images.

The face sketch synthesis method using inductive learning based model. The face photo converted into sketch. A new face reconstructed from training samples. But the transformation between photo and sketch can be approximated as a linear process.

The infrared image and optical face image they are captured by different devices. The users organize the photo collection and make it easier to search for a particular photo. The use of face sketch recognition for biometric authentication. It is simpler than all other null space method and low computational cost. But the algorithm extracts more feature for face alone.

The paper local binary patters are used. Minimize the difference between from same person and maximize the difference between from different people. Provides excellence performance in the recognition system. Improve performance in challenging problem

This system comprises pseudo sketch synthesis and face recognition. Local linear preserving of geometry between photo and sketch images based by the pseudo sketch synthesis. The discriminant analysis recognizes the probe sketch from the synthesized sketch. Good performance for face sketch recognition. But accuracy of the method can still be improved.

It combines both similarity between different image patches and prior knowledge to synthesize face sketch synthesis. The test photo sketch search its nearest neighbours in the whole training photo patches with sparse coefficients. The transformation between photo and sketch can be high accuracy. But support some form of images.

In this paper represent subspace learning framework to solve challenge problem of coupling the two types of face images and matching between them. Multi feature based optimization model is introduced by this face sketch synthesis. Improves performance and reduces the computational expenses. But the system only works for two modalities. Multiple representations to represent an image patch by this face sketch photo synthesis. The Markov network used by the interactive neighbouring image patches. Good performance in forensic science and improve performance in other field.

The heterogeneous face recognition used to matching face images from different sources. The spatial compatibility between neighbouring image patches into consideration. Markov network are employed to represent heterogeneous images. It is higher accuracy and Lower pattern accuracy.

3. PROPOSED MODELING

The synthesis performance improved by separating shape and texture information in a face photo and conducting transformation. The synthesized pseudo sketch used to recognize the probing sketch by the Bayesian classifier. Consider M-face sketch photo pairs including training dataset for the face sketch synthesis by Bayesian framework. A d-dimensional vector where d=p2 is divided into N overlapping p x p patches for each image. The face sketch synthesis methods are unified for the proposed Bayesian model as it incorporates spatial neighbouring constraint in both the models of neighbour selection model and weight computation model, which is not the case with any other type of previous FSS methods.

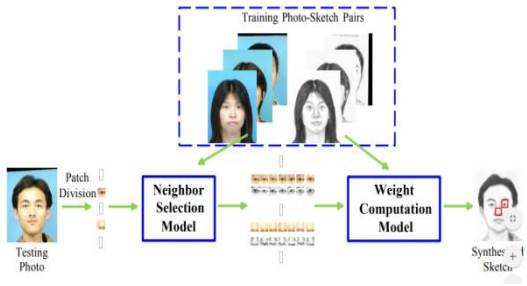


Fig: Architecture of Bayesian face sketch synthesis method neighbour selection model

The spatial neighbouring constraint only for the neighbour selection model and neglects same for the weight computation model based on the neighbour selection model. The single "best" candidate select from K candidates by MRF based methods. The K-NN search based method and sparse neighbour selection based methods are representative methods for the Face Sketch Synthesis. The fact that only the single best candidate is select to synthesis the target sketch due to face deformation in neighbour selection model with spatial neighbouring constraint by MRF based method. The spatial neighbouring constraint into neighbour selection model also takes by proposed Bayesian method but both neighbour selection model and weight computation model due to without face deformation.

weight computation model

The weight computation model to regularize the weight computation by the spatial neighbouring constraint. The linear

weight combination into the original MRF model introduced by Markov Weight Fields. The training dataset collects some sketch patches. The best candidate select from this dataset. A new sketch patch can interpolate by MWF method that does not exist in the training dataset. Weight computation model only selects the best candidate sketch patches by MRF method. K-NN search implemented MWF method by the neighbour selection model. Neighbour selection model used for MRF model and Weight computation model used for MWF model.

Bayesian face sketch synthesis

The spatial neighbouring constraint both in neighbour selection model and weight computation model taken by Bayesian face sketch synthesis. The face sketch synthesis success achieved by Markov networks based model. Both the neighbour selection model and weight computation model are optimized separately. The belief propagation is optimized by the neighbour selection model. The Markov property is decomposed the large scale problem into many sub quadratic problems benefited by weight computation model. The MRF and MWF combined by proposed Bayesian method.

4. RESULTS AND ANALYSIS

The effectiveness of the proposed method validated by this experimental section(subjective perception and objective evaluation).The visual quality of synthesized face sketches referred by subjective perception and Image quality assessment(IQA) referred by objective evaluation.

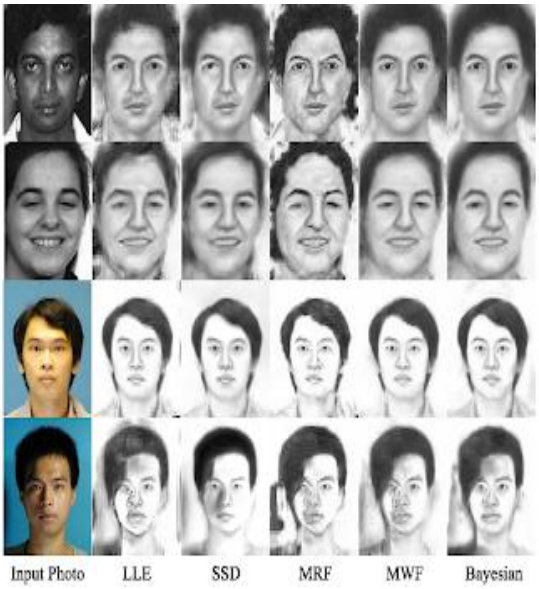
A. experimental settings

The experiments are conducted by public dataset. Chinese University of Hong Kong (CHUK) face sketch(CUFS) synthesis consists of three sub datasets are the CHUK student dataset, the AR dataset and the XM2VTS dataset. These datasets are randomly select photo sketch pairs from the training dataset.

The effectiveness of the proposed method have four state of the art face sketch synthesis methods. Locally Linear Embedding based method (LLE), Markov Random field(MRF)based method, Markov Weighted Field(MWF)based method and Spatial Sketch Denoising (SSD)based method. The proposed method represent by the Bayesian. The combination of MRF and MWF method represents the Bayesian face sketch synthesis.LLE method are based on our own implementation that result has less noise and blurring than the original method.

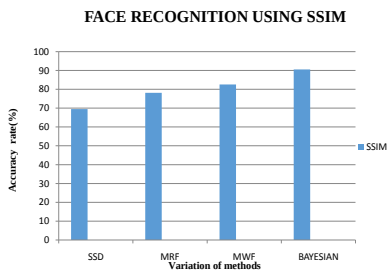
B. face sketch synthesis

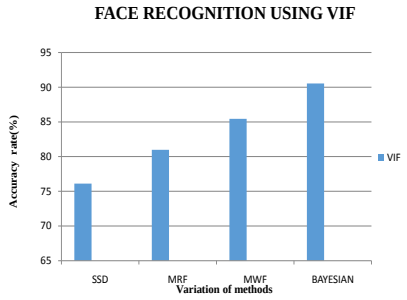
The synthesized face sketch used in CUFS datasets. Result of the face sketch synthesis LLE, SSD, MRF, MWF and the proposed Bayesian method respectively. The facial appearance and its easy task perform face sketch synthesis. Faces in this dataset have large appearance variations. The MRF method cannot find the best appropriate patch for each testing patch. The linear combination of K candidate patches can be seen from the result of LLE method, MWF method, SSD method and the proposed Bayesian method. The MRF method and the proposed Bayesian method takes the spatial neighbouring constraint into neighbour selection model.SSD methods remove the denoising problem from the input image. The MWF method compute the weight of the photo sketch pairs in the face sketch synthesis. The both MRF and MWF method combined the result of Bayesian Face Sketch Synthesis.



C. face recognition

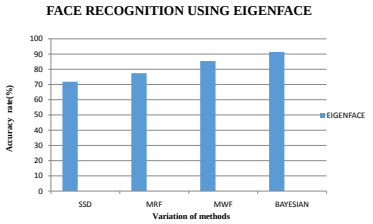
The probe image and synthesized sketches taken as the gallery dataset by using sketch drawings. Face recognition used Eigen face and Null space Linear Discriminant Analysis (NLDA).The best recognition accuracy is achieved by Eigen face and NLDA. Bayesian method achieves the best performance interms of both Eigen face and NLDA face recognition methods. The effectiveness of the proposed method and 75.48% accuracy can be achieved with the NLDA method.

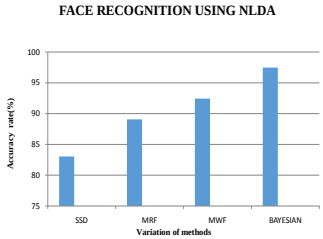




D. time complexity

The most similar patch is searched by every training photo and K photo patches are taken as the candidates. The time complexity of this neighbour selection process is O (cp^2 M N) where c denotes the number of candidates, p is the patch size, M is the number of patches in each image and N is the number of training sketch photo pairs. The best synthesis performance achieved in time consuming among state of art methods by proposed Bayesian method.





5. CONCLUSION

A Bayesian framework for face sketch synthesis is composed of two parts such as neighbour selection model and weight computation model. We find that select single 'best' candidate for each patch independently by using neighbour selection model. The dependency between adjacent image patches and it result is blurring. The spatial neighbouring constraint used to remove noise from an image taken by Bayesian face sketch synthesis method The proposed Bayesian face sketch synthesis illustrate the qualitative and quantitative in this experiments. In future, we would further improve the proposed method and design robust face sketch synthesis methods towards face variations in the spirit of works.

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