

A survey on Facial Expression Recognition

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Abstract- Facial Expression Recognition is emerging field to recognize emotion of human beings by various method, i.e. Eigen faces, Local Gray Code Pattern (LGCP), Kernel Canonical Correlation Analysis (KCCA), Hidden Markov Model (HMM), Support Vector Machines (SVM), Bilinear Models (BM), 2D + 3D active appearance model (AAM), Bayesian Networks (BN), artificial neural network (ANN), K-nearest neighbor (KNN), Different technique were implemented in face recognition all having their respective pros and cons. A new method compressive sensing using sparse representation classifier is used to find FER and give accurate result, more sparsity ratio and recognition rate. Within this report, we go over how the deal with recognition dilemma is actually sorted out applying sparse portrayal while using feel connected with the compressive sensing idea.

Index Terms- Hidden Markov Model, Bayesian Networks, Support Vector Machine, Active appearance Model, Local Gray Code Pattern, Kernel Canonical Correlation Analysis.

1. INTRODUCTION

The expression is the basic solution to express human emotions throughout the everyday interaction with others. Recent psychology research offers available the item many expressive means of human display emotions are throughout facial expressions. Your current facial expression has added impact compared to your current verbal section of the message even though communication. Automatic facial expression provides increasingly attracted much attention due because of its mouse clicks applications to be able to human-computer interaction, facts driven animation, online video indexing, etc. An automatic facial expression recognition technique made of two main parts: facial feature extraction in addition to facial expression classification. Facial feature extraction phase extract a great set regarding right has from original face images for describing faces. Two people associated with techniques to be able to extract facial provides tend to be found: geometric-based ways and appearance based methods. Inside geometric feature extraction system, your own shape and area of several facial components tends to be considered. Ones geometry-based methods call for accurate along with reliable facial feature detection, which is to be other in order to achieve throughout true night out applications. Reverse seen with the appearance-based methods, image filters are usually applied for you to either the complete face aesthetic known In the same way holistic representation as well as a few catered region of a face aesthetic known Just as analytic representation to help extract appearance.

2. FACIAL EXPRESSION RECOGNITION: A LITERATURE SURVEY

2.1 Local Gray Code Pattern (LGCP): A Robust Feature Descriptor for Facial Expression Recognition

Mohammad Shahidul Islam [1]: In this paper provides local facial feature descriptor, Local Gray signal Pattern (LGCP), regarding facial expression identification with contrast to be able to widely adopted Local Binary pattern. Local Gray code Pattern (LGCP) characterizes both ones texture IN ADDITION TO contrast facts connected with facial components. your LGCP descriptor is actually considered making use of local gray color intensity differences from a good local 3x3 pixels location weighted by it is corresponding TF (term frequency). It's got considered extended Cohn-Kanade expression (CK+) dataset along with Japanese Female Facial Expression (JAFPE) dataset having a Multiclass assistance Vector Machine (LIBSVM) to evaluate the proposed method.

2.2 Facial Expression Recognition Using Kernel Canonical Correlation Analysis (KCCA)

Winning Zheng, Xiaoyan Zhou, Cairong Zou, and Li Zhao [2]: In this paper, your facial expression detection problem making use of kernel canonical correlation analysis (KCCA). They manually locate 34 landmark simple steps by each facial image subsequently convert these kind of geometric simple steps straight into the labeled graph (LG) vector while using the Gabor wavelet transformation method to represent your facial features. Alternatively intended for each training facial image, the semantic ratings describing your current easy expressions are generally combined straight into a

six-dimensional semantic expression vector. Learning your correlation between your own LG vectors along with the semantic expression vector is usually carried out coming from KCCA. According to the particular correlation, they estimate ones associated semantic expression vector of any issued test graphic subsequently function your current expression classification. As outlined by the actual estimated semantic expression vector. Moreover, they in addition propose the improved KCCA algorithm in order to tackle your current singularity problem of a Grammatrix. Your current experimental results to the Japanese female facial expression database plus the Ekman's "Pictures Involving Facial Affect" database.

Drawback: - These kinds of semantic expression vectors convey relatively less uncomplicated expression information. Thus, they will probably not present better results. Any time consumed with regard to quantitatively predicting every one of the six to eight simple expressions[2].

2.3 Automatic Facial Expression Recognition Using Facial Animation Parameters and Multistream HMMs

Petar S. Aleksic, and Aggelos K. Katsaggelos [3]: In this paper, they produce a great automatic multistream HMM facial expression identification System in addition to explore its performance. Your current proposed process has facial animation parameters (faps), supported by the MPEG-4 standard. In the same way regarding facial expression classification. Specifically, your faps describing your own movement of your outer-lip contours in addition to eyebrows tend to be consumed. In the same way observations. Experiments usually are 1st done making use of single-stream HMMs under quite a few other scenarios, employing outer-lip and also eyebrow faps individually in addition to jointly. The multistream HMM approach is usually proposed pertaining to introducing facial expression along with FAP group dependent stream reliability weights. Your current stream weights are generally determined based to the facial expression i. D. Results considered. While FAP streams usually are utilized individually. Ones proposed multistream HMM facial expression system, that employs stream reliability weights, achieves relative reduction of the facial expression identification error associated with 44% compared to your current single-stream HMM system.

Drawbacks: - In this technique identification rate can be only 66% in addition to noise error is actually high as compared to some other technique. your reliability regarding audio points might be determined. In line with acoustic noise in addition to range of particulars obtain with them[3].

2.4 Dynamics of Facial Expression: Recognition of Facial Actions and Their Temporal Segments from Face Profile Image Sequences

Maja Pantic, and Ioannis Patras[4]: In this paper they provide a method intended for automatic recognition regarding facial action models (AUs) along with it's temporal devices by long, profile-view face visible sequences. They exploit particle filtering to track 15 facial simple steps in the input face-profile sequence, in addition to the introduce facial-action-dynamics detection through continuous online video media input utilizing temporal rules. your own algorithm works both automatic segmentation of a input movie directly into facial expressions pictured along with detection regarding temporal segments (i.e., onset, apex, offset) of 27 AUs occurring alone or perhaps with a great combination with the input face-profile video.

Drawbacks: - Recognition rate involving 87% is usually completed only. the particular paper provides a good uncomplicated understanding involving. How you can achieve automatic identification of AUs and also the temporal segments within a face-profile aesthetic sequence [4].

2.5 Recognition of Facial Expressions and Measurement of Levels of Interest From Video

Mohammed Yeasin, Baptiste Bulot, and Rajeev Sharma [5]:

In this paper, implements a two-stage classification approach That recognizes six universal facial expressions proposed in, via earlier unseen observations of facial expressions in addition to computes "levels involving interest." Levels of interest were computed through mapping facial expressions in to 3-D affect space and combining inside motion activities. In regards to the apex frame. Pragmatic findings suggests your current temporal signature derived by the observations coming from concatenating the output of linear classifiers with frame level is usually robust compared to your own raw representation of an optical flow applying continuous HMMs. Experiments within laboratory information (Cohn-Kanade) show 90.9% (using five-fold cross validation) detection accuracy with 488 video sequences such as 97 subjects. numerous experiments, namely, emotion elicitation along with analyzes involving TV broadcast, has become conducted with further facts sets containing variability pertaining to lighting conditions, subjects (different age group, gender as well as ethnicity), as well as expressions (showing expression while talking). your emotion elicitation experiment revealed your current limitations of an classifier with handling spontaneous reactions in addition to are in addition helpful in evaluating your current interest levels. Just like ones ground truth

particulars are gathered. Sequences collected through TV broadcasts exposed your current model in order to varied test facts with respect on the signing Conditions along with diversity regarding identify presented towards the classifier.

2.6 Facial Expression Recognition in Image Sequences Using Geometric Deformation Features and Support Vector Machines

Irene Kotsia and Ioannis Pitas [6]: In this paper, 2 novel methods for facial expression identification inside facial graphic sequences are usually presented. anyone offers to manually area some involving Candid grid nodes in order to face landmarks depicted on the first frame of a graphic sequence under examination. your current grid-tracking and deformation method used, As outlined by deformable models, tracks your current grid with consecutive video frames a lot more than time, Just as ones facial expression evolves, until your current frame It corresponds on the largest facial expression intensity. your geometrical displacement of certain harvested Candid nodes, defined In the same way your current difference of any node coordinates between your first and also the biggest facial expression intensity frame, is considered as a possible input for you to a novel multiclass assistance Vector Machine (SVM) program of classifiers that are supposed to know either your current six basic facial expressions as well as a good set involving picked Facial Action devices (FAUs).

2.7 Bilinear Models for 3-D Face and Facial Expression Recognition

Iordanis Mpipieris, Sotiris Malassiotis, and Michael G. Strintzis [7]: In this paper, they explore bilinear products intended for jointly giving an answer to 3-D face along with facial expression recognition. a great elastically deformable model algorithm That establishes correspondence among a good set of faces is usually proposed first subsequently bilinear devices The idea decouple ones username in addition to facial expression points are generally constructed. Fitting these models to unknown faces makes it possible for us all in order to function face detection invariant to help facial expressions and also facial expression identification within unknown identity. the quantitative evaluation of an proposed system will be conducted towards the publicly viewable BU-3DFE face database in comparison with my own previous work from face identification as well as other state-of-the-art algorithms pertaining to facial expression recognition. Experimental results demonstrate an overall total 90.5% facial expression identification rate and an 86% rank-1 face detection rate.

Drawback: The problem is twofold: in the course of training, your bilinear model cannot recognize your

current precise identity-expression manifold, implying errors with bilinear parameters' estimation. During testing, expression manipulation is applied on a good slightly (or quite) different face. The actual error is actually further amplified coming from inaccurate bilinear parameters, leading to help a distorted facial surface [7].

2.8 Pose-Robust Facial Expression Recognition Using View-Based 2D + 3D AAM

Jaewon Sung and Daijin Kim[8]: In this paper, proposes an pose-robust face tracking and also facial expression id program having a view-based 2D + 3D active appearance model (AAM) That extends ones 2D + 3D AAM towards the view-based approach, where sole independent face model can be used regarding a crafted watch AS WELL AS a correct face model can be picked out due to the input face image. The extensions have been conducted within several aspects. First, we employ principal component analysis within missing details to construct ones 2D + 3D AAM for its missing data for the posed face images. Second, we produce the effective model selection program The item immediately benefits your own estimated pose angle because of the 2D + 3D AAM, that will makes face tracking pose-robust along with feature extraction intended for facial expression identification accurate. Third, they propose a great double-layered generalized discriminate analysis (GDA) pertaining to facial expression recognition. Experimental results show your following: 1) ones face tracking by the view-based 2D + 3D AAM, that will functionalities multiple face equipment inside single face model per each view, is usually additional robust to pose change than The item coming from a integrated 2D + 3D AAM, of which functionalities a good integrated face model regarding many three views; 2) your double-layered GDA extracts good features regarding facial expression recognition; along with 3) your own view-based 2D+ 3D AAM outperforms some other existing products at pose-varying facial expression recognition.

2.9 Image Ratio Features for Facial Expression Recognition Application

Mingli Song, Dacheng Tao, Zicheng Liu, Xuelong Li, Senior and Mengchu Zhou [9]: In this paper, Video-based facial expression identification is really a challenging problem inside computer vision along with human-computer interaction. for you to target your problem, texture has has become extracted as well as widely used, since the they can capture image intensity changes raised from skin deformation. However, existing texture possesses encounter Conditions throughout albedo in addition to lighting variations. For you to solve both problems, they propose a new texture feature called

visual ratio features. Compared with previous proposed texture features, e.g., high gradient component features, graphic ratio has tend to be extra robust to albedo and also lighting variations. within addition, to be able to additional improve facial expression id accuracy In line with visible ratio features, they combine image ratio offers within facial animation parameters (FAPs), in which describe your current geometric motions connected with facial feature points. your performance evaluation is based for the Carnegie Mellon University Cohn-Kanade database, their database, and also the Japanese Female Facial Expression database. Experimental results show which the proposed visible ratio feature can be added robust for you to albedo as well as lighting variations, and the combination of visible ratio possesses along with FAPs outperforms each feature alone. inside addition, they study asymmetric facial expressions In accordance with their particular facial expression database in addition to demonstrate your own better performance regarding our combined expression recognition system.

2.10 Facial Expression Recognition Using Facial Movement Features

Ligang Zhang, and Dian Tjondronegoro[10]: In this paper, proposes a good approach to solve the actual limitation using “salient” distance features, which are considered through extracting patch-based 3D Gabor features, selecting your own “salient” patches, in addition to performing patch matching operations. the experimental results demonstrate high appropriate identification rate (CRR), crucial performance improvements for the bank account involving facial element as well as muscle movements, promising results under face registration errors, along with fast processing time. Comparison through the state-of-the-art performance confirms the proposed approach achieves your own highest CRR towards JAFFE database in addition to can be among your current top performers on the Cohn-Kanade (CK) database.

2.11 Meta-Analysis of the First Facial Expression Recognition Challenge

Michel F. Valstar, Marc Mehu, Bihan Jiang, Maja Pantic, and Klaus Scherer [11]: In this paper, presents a meta-analysis of your 1st most of these challenge in automatic id connected with facial expressions, held while in your IEEE conference on Face and also Gesture identification 2011. That details your challenge data, evaluation protocol, plus the results accomplished throughout 3 sub challenges: AU id along with classification involving facial expression imagery with regards to a number of discrete emotion categories. They additionally summarize ones lessons learned along with reflect towards the future of an field

connected with facial expression detection in general in addition to in possible future challenges with particular.

2.12 Facial Expression Recognition in the Encrypted Domain Based on Local Fisher Discriminant Analysis

Yogachandran Rahulamathavan, Raphael C.-W. Phan, Jonathon A. Chambers, and David J. Parish[12]: In this paper, proposes the system It addresses your own challenge involving performing facial expression id As soon as the test aesthetic is usually on the encrypted domain. It is a first known result the idea operates facial expression i. d. at the encrypted domain. these kinds of an technique solves your current problem of needing to trust servers because test aesthetic intended for facial expression recognition can remain throughout encrypted form from most times without needing any kind of decryption, even through your current expression recognition process. its experimental results in popular JAFFE as well as MUG facial expression databases demonstrate This recognition rate associated with up to help 95.24 percent can be completed even at the encrypted domain. They have proposed the way of work facial expression detection from images at the encrypted domain, According to local FLDA. Experiments on JAFFE and MUG facial expression database showed that this recognition rates of your proposed encrypted domain method usually are your same Equally the individual with the plain no encrypted domain. Yet your own benefit with its encrypted domain measures is The item images need not be revealed unnecessarily Just like they may remain throughout encrypted form with all times, even during expression identification process

2.13 Simultaneous Facial Feature Tracking and Facial Expression Recognition

Yongqiang Li, Shangfei Wang, Yongping Zhao, and Qiang Ji[13]: In this paper, they proposed a good hierarchical framework According to Dynamic Bayesian Network for simultaneous facial feature tracking and facial expression recognition. via systematically representing in addition to modeling inter relationships among additional levels involving facial activities, plus the temporal evolution information, ones proposed model completed critical improvement with regard to both facial feature tracking and AU recognition, compared to state of an art methods. with regard to six to eight basic expressions recognition, MY result is actually not As good As The idea regarding state of any art 1For work, they calculate the average F1 measure of a same 13 AUs In the same way recognized with this paper, even though intended for run , they calculate the average F1measure of an same 15

AUs Just as acknowledged with the actual paper. Methods, considering that they did not use any kind of measurement directly pertaining to expression, plus the global expression is straight inferred through AU in addition to facial feature point measurements and also coming from its relationships. your current improvements with regard to facial feature simple measures and AUs come mainly from combining the facial action model by the image measurements. Specifically, your erroneous facial feature measurements and also the AU measurements is actually compensated through the model's build-in relationships among some other levels of facial activities, and also the build-in temporal relationships. since the my personal model systematically captures along with combines your current prior knowledge because of the aesthetic measurements, inside improved image-based computer vision technology, the program can achieve greater results in little changes towards model. within your paper, they evaluate the model from posed expression databases from frontal view images.

3. PROBLEM DEFINITION

After study of following paper found drawbacks: In SVM, It is sensitive to noise. It only considers two classes. In Bilinear Model, Increasing the flexibility. Reduce the parameters. Used in generative models like density estimation and use in classification. In 2D+3D AAM, Sensitive to image noise, heavy computation load. In Bayesian Networks, typically require initial knowledge of may probabilities quality and extent of prior knowledge play an important role. Significant computational cost (NP Hard Task). Unexpected prospect of an event is not taken care of.

4. CONCLUSION

There are various offering application associated with confront acceptance in the domain associated with measures, user consumer electronics in addition to net and so on. While using the progress associated with receptors in addition to algorithms, this performance associated with confront acceptance may be significantly superior lately. But confront acceptance even now confronts the battle associated with several substantial intra class variations including illumination, getting older in addition to offer and so on. A single sensible solution to try this variation might be for you to url this hole between register trial along with the test trial simply by several styles. You'll find 3 critical highlights of face phrase – geometric-feature structured, physical appearance feature-based in addition to the two geometric in addition to physical appearance feature-based methods. It offers deemed lengthy Cohn-Kanade

phrase (CK+) dataset in conjunction with Japanese Women Make up Expression (JAFPE) dataset employed to examine following previously mentioned recommended approach.

In this document, we devoted to several Experience Identification Process in addition to present an easy survey upon which.

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