International Journal of Latest Trends in Engineering and Technology
Special Issue SACAIM 2017, pp. 322-325
e-ISSN:2278-621X

STUDY IN IMAGE PROCESSING AGE ESTIMATION TECHNIQUES

Amitha K A[1] & Akheel Sreenivas[2]

Abstract-Human age estimation is extremely intriguing test today moreover. The conjecture of age in view of various procedures and by human, itself is fundamentally the same as now. The real difficulties for machine based age estimation are as yet alive. Difficulties are uncontrolled condition, diverse light settings, variation posturing and articulation, maturing impacts and way of life. Human age estimation began with craniofacial development has now come to the condition where challenges are changing into open doors for creating of utilizations. While acknowledgment of most facial varieties, for example, character, appearance and sex, has been broadly examined, programmed age estimation has once in a while been investigated. In this paper, we present an age estimation method that joins Support Vector Machine (SVM) and Support Vector Regression (SVR) in Active Appearance Models
Keywords: Age, Estimation, Active Appearance Models, Support Vector Regression

1. INTRODUCTION

Age and sexual orientation assume fundamental parts in social collaborations. Dialects hold distinctive greetings and language structure strategy for men or ladies, and every now and again disparate vocabularies are utilized while tending to older folks contrasted with Young individuals. Notwithstanding the fundamental parts, these qualities play in our everyday lives, the ability to naturally assess them decisively and dependably from confront pictures is still a long way from addressing the necessities of business applications [1].The assurance of the age of a man from a computerized photography is a fascinating issue. It involves a comprehension of the human maturing process, the biomechanical factors that impact the general examples of maturing that the quirky idea of maturing, which is apparent in the facial maturing contrasts of indistinguishable twins. In this paper, we pick a few surely understood strategies, for example, KNN, SVM, and neural systems, to tackle age estimation issue with database of MORPH [4]. The database has 38533 pictures, and 3004 of them are been prepare set to prepare our element separating calculation. In the later area, we will depict how to take care of the age estimation issue in SVR calculation.

2. ARCHITECTURE ON IMAGE PROCESSING AGE ESTIMATION

In spite of our attention here on age amass grouping as opposed to exact age estimation (i.e., age relapse), the review beneath incorporates techniques intended for either assignment. Early strategies for age estimation depend on ascertaining proportions between various estimations of facial highlights. When facial highlights (e.g. eyes, nose, mouth, jaw, and so forth.) are limited and their sizes and separations measured, proportions between them are figured and utilized for arranging the face into various age classes as per hand-made principles.

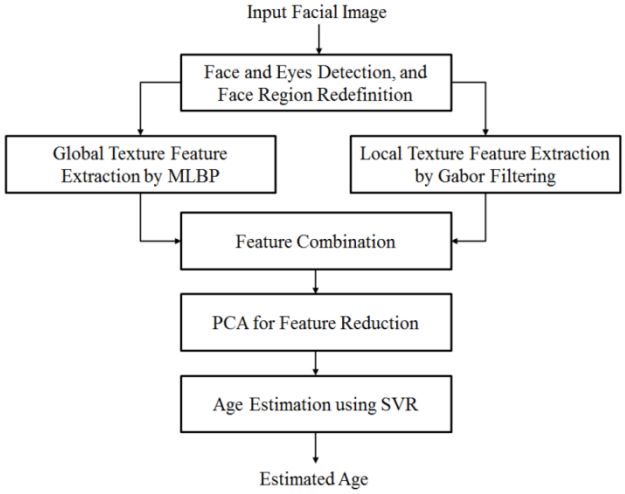


Figure 1: Age Estimation

[1] MCA V Semester, St Aloysius College, AIMIT, Mangaluru, Karnataka, India
[2] MCA V Semester, St Aloysius College, AIMIT, Mangaluru, Karnataka, India

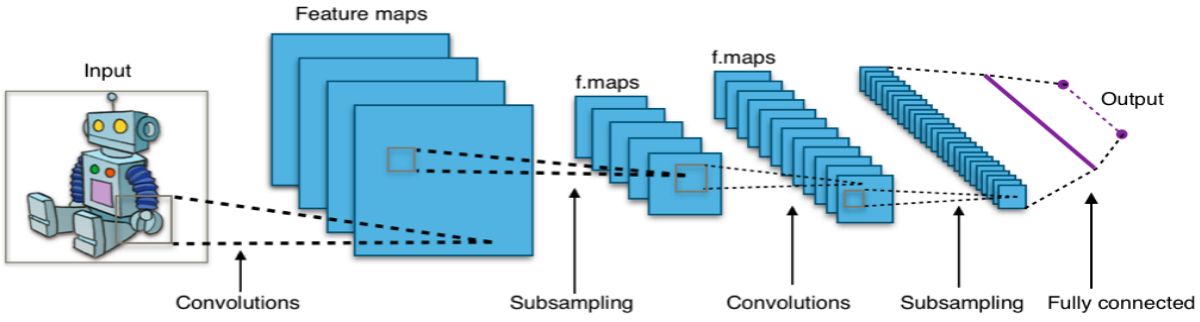
The symmetry was built up as a dynamic element in fake vision. They demonstrated that the symmetry is an essential component and could be utilized for appearance estimation utilizing face picture. Furthermore, they asserted that the human face is generally showed up symmetrically. In another investigation, the symmetrical property of protest's parts was utilized to recognize the objects.[2] Based on these examinations [2],we endeavour to extricate a solid picture highlight for human age estimation issue from symmetrical face. For this reason, we initially play out an in-plane revolution methodology to repay the in-plane pivot of face and make the face district shows up fit as a fiddle. Notwithstanding that, we utilize the MLBP include extraction strategy to extricate the picture includes by isolating the face area into symmetrical sub-squares and linking the separated highlights of all sub-pieces together. Utilizing that technique, we can separate the picture includes that show up in neighbourhood symmetrical sub-squares. Thusly, the picture highlights are gotten from worldwide symmetrical face area, as well as the neighbourhood symmetrical sub-hinders on confront.

The general technique of our age estimation strategy is portrayed in Figure 1. As appeared in the figure, the proposed technique utilizes SVR to manufacture an age estimation show in light of the extricated age include. As such, the MLBP-based element extraction strategy is utilized to acquire the worldwide surface component, though Gabor separating is utilized to extricate the nearby wrinkle highlight. With the two sorts of removed highlights, we shape the last element by joining the two. From that point onward, we utilize PCA strategy to lessen the measurement of highlights. At long last, the highlights after PCA are utilized as the SVR contribution for evaluating age. Accordingly, with a specific end goal to lessen the measurement of the extricated age include and acquire the ideal highlights, we recently apply the PCA technique on the connected highlights previously assessing the age utilizing SVR. Utilizing PCA technique, the measurement of the age includes is decreased, and the execution of the estimation framework is improved. The ideal number of Eigen-vectors by PCA is resolved with the preparation information by which the littlest age estimation blunder is acquired.

3. MODEL DESCRIPTION

3.1 Convolution neural networks

In machine taking in, a convolution neural network (CNN, or ConvNet) is a class of profound, nourish forward counterfeit neural systems that has effectively been connected to breaking down visual symbolism. They have applications in picture and video acknowledgment, recommender frameworks and common dialect handling. Convolution layers apply a convolution operation to the information, passing the outcome to the following layer. The convolution imitates the reaction of an individual neuron to visual jolts. Every convolution neuron forms information just for its open field. Tiling enables CNNs to endure interpretation of the info picture (e.g. interpretation, revolution, point of view distortion. Although completely connected feed forward neural systems can be utilized to learn includes and additionally group information, it isn't commonsense to apply this engineering to pictures. A high number of neurons would be necessary [even in a shallow (inverse of profound) design. The convolution operation conveys an answer for this issue as it lessens the quantity of free parameters, enabling the system to be more profound with less parameter. In different words, it settle the vanishing or detonating angles issue in preparing conventional multi-layer neural systems with many layers by utilizing back proliferation.



3.2 Active appearance model

A dynamic appearance demonstrates (AAM) is a PC vision calculation for coordinating a factual model of protest shape and appearance to another picture. They are worked amid a preparation stage. An arrangement of pictures, together with directions of points of interest that show up in the greater part of the pictures, is given to the preparation chief. The model was first presented by Edwards, Cootes and Taylor with regards to confront investigation at the third International Conference on Face and Gesture Recognition, 1998. Coots, Edwards and Taylor additionally portrayed the approach as a general strategy in PC vision at the European Conference on Computer Vision around the same time. The approach is generally utilized for coordinating and following appearances and for elucidation. The calculation utilizes the contrast between the present gauge of appearance and the objective picture to drive an improvement procedure. By exploiting the minimum squares systems, it can match to new pictures quickly. It is identified with the dynamic shape show (ASM). One disservice of ASM is that it just uses

shape imperatives (together with some data about the picture structure close to the points of interest), and does not exploit all the accessible data – the surface over the objective question. This can be demonstrated utilizing an AAM.

3.3 Support Vector Machine (SVM)

RST (Rough Set Theory) give a brief overview of the basics of SVMs for binary classification. Then, we explain how this technique can be expanded to deal with the regression problem. Given N training points $(x_1,y_1),(x_2,y_2),...,(x_N,y_N)$ with $x_i \in R^n$ and $y_i \in \{-1,1\}$,i = 1,...,N and suppose these points are linearly separable; we have to end a set of Ns support vectors s_i; (Ns N) , coefficient weights i, constant bi and the linear decision surface, as in Eq. 1 below, such that the distance to the support vectors is maximized:

$$\mathbf{w}\mathbf{x} + \mathbf{b} = 0 \qquad (1)$$

Where

$$\mathbf{w} = \sum_{i=1}^{N_s} \alpha_i y_i s_i. \qquad (2)$$

SVMs can be expanded to become nonlinear decision surfaces by rst using a mapping to map these points to some other Euclidian space H, that is linearly separable with a given regularization parameter C > 0; f : Rn 7!Hg and by determining a kernel function K, where K = (xi) (xj). Then, the nonlinear decision surface is defined as:

$$\sum_{i=1}^{N_s} \alpha_i y_i K(s_i, x) + b = 0 \qquad (3)$$

Where αi and bi are the optimal solution of a Quadratic Programming (QP) as follows:

$$\begin{aligned} \min_{\mathbf{w},\mathbf{b},\zeta} \quad & \frac{1}{2}\|\mathbf{w}\|^2 + C\sum_{i=1}^{N_s}\zeta_i \\ subject\ to \quad & y_i(\mathbf{w}x_i + mathbfb) \geq 1 - \zeta_i \\ & \zeta_i \geq 0 \end{aligned} \qquad (4)$$

3.4 Support Vector Regression (SVR)

The goal of the SVR problem [5] is to build a hyper plane close to as many of the training points as possible. Given N training points (x1,y1),(x2,y2),...,(xN,yN) with xi∈Rn and yi∈R,i=1,...,N, we have to construct the hyper plane and values of w and b. In ϵ−SV regression, our goal is to find a function f(x) that has at most ϵ deviation from the actually obtained targets yi for all the training data, and at the same time is as flat as possible. This is:

$$|y_i(\mathbf{w}x_i + \mathbf{b})|_\epsilon = \begin{cases} 0, & if\ |y_i(\mathbf{w}x_i + \mathbf{b})| \leq \epsilon \\ |y_i(\mathbf{w}x_i + \mathbf{b})| - \epsilon, & otherwise \end{cases} \qquad (5)$$

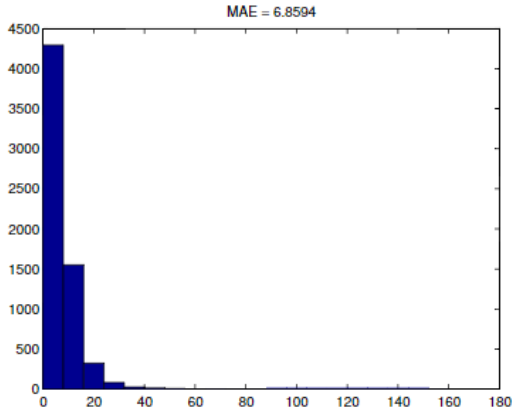
The value of ϵ is selected by the user, and the trade-off between finding a hyper-plane with a good regression performance is controlled via the given regularization parameter C. The QP problem associated with SVR is described as follows:

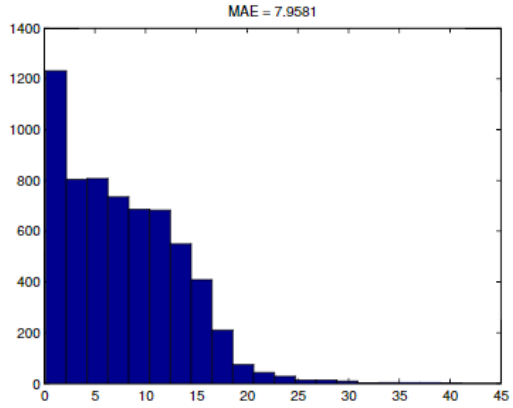
$$\begin{aligned} \min_{\mathbf{w},\mathbf{b},\zeta,\zeta^*} \quad & \frac{1}{2}\|\mathbf{w}\|^2 + C\sum_{i=1}^{N_s}(\zeta_i + \zeta_i^*) \\ subject\ to \quad & y_i - (\mathbf{w}x_i + \mathbf{b}) \leq \epsilon + \zeta_i \\ & -y_i + (\mathbf{w}x_i + \mathbf{b}) \leq \epsilon + \zeta_i^* \\ & \zeta_i \geq 0, \zeta_i^* \geq 0 \end{aligned} \tag{6}$$

In practice ,we use the lib svm to train our SVR model and select two kernels :Gaussian RBF kernel (Eq.7) and Polynomial kernel (Eq. 8) For comparison with default parameters settings.

$$K(x_i, x_j) = e^{-\frac{1}{2\sigma^2}\|x_i - y_j\|^2} \tag{7}$$

$$K(x_i, x_j) = (\gamma x_i^T x_j + r)^d \tag{8}$$





4. CONCLUSION

In this report, we use SVR model to solve an age estimation problem. In this paper we chosen two well known age estimation algorithms they are SVR and SVM .In our simulations show that SVR model with polynomial kernels got result of MAE= 6.86.Our Future work involve developing an automatic landmark detection algorithm, try to include more meaningful features for age estimation process, increase our training set examples and try to build a universal age estimator that can be a plug in for search engines, social networks and adaptive e-learning systems.

5. REFERENCES

[1] Xin Geng, Zhi-Hua Zhou, and Kate Smith-Miles. Automatic age estimation based on facial aging patterns. Pattern Analysis and Machine Intelligence, IEEE Transactions on, 29(12):2234{2240, 2007.

[2] Khoa Luu, Karl Ricanek, Tien D Bui, and Ching Y Suen. Age estimation using active appear-ance models and support vector machine regression. In Biometrics: Theory, Applications, and Systems, 2009. BTAS'09. IEEE 3rd International Conference on, pages 1{5. IEEE, 2009.

[3] Iain Matthews and Simon Baker. Active appearance models revisited. International Journal of Computer Vision, 60(2):135{164, 2004.

[4] Karl Ricanek and Tamirat Tesafaye. Morph: A longitudinal image database of normal adult age-progression. In Automatic Face and Gesture Recognition, 2006. FGR 2006. 7th International Conference on, pages 341{345. IEEE, 2006.

[5] Alex J Smola and Bernhard Sch•olkopf. A tutorial on support vector regression. Statistics and computing, 14(3):199{222, 2004.

[6] Georgios Tzimiropoulos and Maja Pantic. Optimization problems for fast aam tting in-the-wild. In Computer Vision (ICCV), 2013 IEEE International Conference on, pages 593{600. IEEE, 2013.