

Eigenfaces for Recognition

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Abstract

■ We have developed a near-real-time computer system that can locate and track a subject's head, and then recognize the person by comparing characteristics of the face to those of known individuals. The computational approach taken in this system is motivated by both physiology and information theory, as well as by the practical requirements of near-real-time performance and accuracy. Our approach treats the face recognition problem as an intrinsically two-dimensional (2-D) recognition problem rather than requiring recovery of three-dimensional geometry, taking advantage of the fact that faces are normally upright and thus may be described by a small set of 2-D characteristic views. The system functions by projecting

face images onto a feature space that spans the significant variations among known face images. The significant features are known as "eigenfaces," because they are the eigenvectors (principal components) of the set of faces; they do not necessarily correspond to features such as eyes, ears, and noses. The projection operation characterizes an individual face by a weighted sum of the eigenface features, and so to recognize a particular face it is necessary only to compare these weights to those of known individuals. Some particular advantages of our approach are that it provides for the ability to learn and later recognize new faces in an unsupervised manner, and that it is easy to implement using a neural network architecture. ■

INTRODUCTION

The face is our primary focus of attention in social intercourse, playing a major role in conveying identity and emotion. Although the ability to infer intelligence or character from facial appearance is suspect, the human ability to recognize faces is remarkable. We can recognize thousands of faces learned throughout our lifetime and identify familiar faces at a glance even after years of separation. This skill is quite robust, despite large changes in the visual stimulus due to viewing conditions, expression, aging, and distractions such as glasses or changes in hairstyle or facial hair. As a consequence the visual processing of human faces has fascinated philosophers and scientists for centuries, including figures such as Aristotle and Darwin.

Computational models of face recognition, in particular, are interesting because they can contribute not only to theoretical insights but also to practical applications. Computers that recognize faces could be applied to a wide variety of problems, including criminal identification, security systems, image and film processing, and human-computer interaction. For example, the ability to model a particular face and distinguish it from a large number of stored face models would make it possible to vastly improve criminal identification. Even the ability to merely detect faces, as opposed to recognizing them,

can be important. Detecting faces in photographs, for instance, is an important problem in automating color film development, since the effect of many enhancement and noise reduction techniques depends on the picture content (e.g., faces should not be tinted green, while perhaps grass should).

Unfortunately, developing a computational model of face recognition is quite difficult, because faces are complex, multidimensional, and meaningful visual stimuli. They are a natural class of objects, and stand in stark contrast to sine wave gratings, the "blocks world," and other artificial stimuli used in human and computer vision research (Davies, Ellis, & Shepherd, 1981). Thus unlike most early visual functions, for which we may construct detailed models of retinal or striate activity, face recognition is a very high level task for which computational approaches can currently only suggest broad constraints on the corresponding neural activity.

We therefore focused our research toward developing a sort of early, preattentive pattern recognition capability that does not depend on having three-dimensional information or detailed geometry. Our goal, which we believe we have reached, was to develop a computational model of face recognition that is fast, reasonably simple, and accurate in constrained environments such as an office or a household. In addition the approach is biologically implementable and is in concert with prelimi-

nary findings in the physiology and psychology of face recognition.

The scheme is based on an information theory approach that decomposes face images into a small set of characteristic feature images called "eigenfaces," which may be thought of as the principal components of the initial training set of face images. Recognition is performed by projecting a new image into the subspace spanned by the eigenfaces ("face space") and then classifying the face by comparing its position in face space with the positions of known individuals.

Automatically learning and later recognizing new faces is practical within this framework. Recognition under widely varying conditions is achieved by training on a limited number of characteristic views (e.g., a "straight on" view, a 45° view, and a profile view). The approach has advantages over other face recognition schemes in its speed and simplicity, learning capacity, and insensitivity to small or gradual changes in the face image.

Background and Related Work

Much of the work in computer recognition of faces has focused on detecting individual features such as the eyes, nose, mouth, and head outline, and defining a face model by the position, size, and relationships among these features. Such approaches have proven difficult to extend to multiple views, and have often been quite fragile, requiring a good initial guess to guide them. Research in human strategies of face recognition, moreover, has shown that individual features and their immediate relationships comprise an insufficient representation to account for the performance of adult human face identification (Carey & Diamond, 1977). Nonetheless, this approach to face recognition remains the most popular one in the computer vision literature.

Bledsoe (1966a,b) was the first to attempt semiautomated face recognition with a hybrid human-computer system that classified faces on the basis of fiducial marks entered on photographs by hand. Parameters for the classification were normalized distances and ratios among points such as eye corners, mouth corners, nose tip, and chin point. Later work at Bell Labs (Goldstein, Harmon, & Lesk, 1971; Harmon, 1971) developed a vector of up to 21 features, and recognized faces using standard pattern classification techniques. The chosen features were largely subjective evaluations (e.g., shade of hair, length of ears, lip thickness) made by human subjects, each of which would be quite difficult to automate.

An early paper by Fischler and Elschlager (1973) attempted to measure similar features automatically. They described a linear embedding algorithm that used local feature template matching and a global measure of fit to find and measure facial features. This template matching approach has been continued and improved by the recent work of Yuille, Cohen, and Hallinan (1989) (see

Yuille, this volume). Their strategy is based on "deformable templates," which are parameterized models of the face and its features in which the parameter values are determined by interactions with the image.

Connectionist approaches to face identification seek to capture the configurational, or gestalt-like nature of the task. Kohonen (1989) and Kohonen and Lahtio (1981) describe an associative network with a simple learning algorithm that can recognize (classify) face images and recall a face image from an incomplete or noisy version input to the network. Fleming and Cottrell (1990) extend these ideas using nonlinear units, training the system by backpropagation. Stonham's WISARD system (1986) is a general-purpose pattern recognition device based on neural net principles. It has been applied with some success to binary face images, recognizing both identity and expression. Most connectionist systems dealing with faces (see also Midorikawa, 1988; O'Toole, Millward, & Anderson, 1988) treat the input image as a general 2-D pattern, and can make no explicit use of the configurational properties of a face. Moreover, some of these systems require an inordinate number of training examples to achieve a reasonable level of performance. Only very simple systems have been explored to date, and it is unclear how they will scale to larger problems.

Others have approached automated face recognition by characterizing a face by a set of geometric parameters and performing pattern recognition based on the parameters (e.g., Kaya & Kobayashi, 1972; Cannon, Jones, Campbell, & Morgan, 1986; Craw, Ellis, & Lishman, 1987; Wong, Law, & Tsaug, 1989). Kanade's (1973) face identification system was the first (and still one of the few) systems in which all steps of the recognition process were automated, using a top-down control strategy directed by a generic model of expected feature characteristics. His system calculated a set of facial parameters from a single face image and used a pattern classification technique to match the face from a known set, a purely statistical approach depending primarily on local histogram analysis and absolute gray-scale values.

Recent work by Burt (1988a,b) uses a "smart sensing" approach based on multiresolution template matching. This coarse-to-fine strategy uses a special-purpose computer built to calculate multiresolution pyramid images quickly, and has been demonstrated identifying people in near-real-time. This system works well under limited circumstances, but should suffer from the typical problems of correlation-based matching, including sensitivity to image size and noise. The face models are built by hand from face images.

THE EIGENFACE APPROACH

Much of the previous work on automated face recognition has ignored the issue of just what aspects of the face stimulus are important for identification. This suggested to us that an information theory approach of coding and

decoding face images may give insight into the information content of face images, emphasizing the significant local and global “features.” Such features may or may not be directly related to our intuitive notion of face features such as the eyes, nose, lips, and hair. This may have important implications for the use of identification tools such as Identikit and Photofit (Bruce, 1988).

In the language of information theory, we want to extract the relevant information in a face image, encode it as efficiently as possible, and compare one face encoding with a database of models encoded similarly. A simple approach to extracting the information contained in an image of a face is to somehow capture the variation in a collection of face images, independent of any judgment of features, and use this information to encode and compare individual face images.

In mathematical terms, we wish to find the principal components of the distribution of faces, or the eigenvectors of the covariance matrix of the set of face images, treating an image as a point (or vector) in a very high dimensional space. The eigenvectors are ordered, each one accounting for a different amount of the variation among the face images.

These eigenvectors can be thought of as a set of features that together characterize the variation between face images. Each image location contributes more or less to each eigenvector, so that we can display the eigenvector as a sort of ghostly face which we call an *eigenface*. Some of the faces we studied are illustrated in Figure 1, and the corresponding eigenfaces are shown in Figure 2. Each eigenface deviates from uniform gray where some facial feature differs among the set of training faces; they are a sort of map of the variations between faces.

Each individual face can be represented exactly in terms of a linear combination of the eigenfaces. Each face can also be approximated using only the “best” eigenfaces—those that have the largest eigenvalues, and which therefore account for the most variance within the set of face images. The best M eigenfaces span an M -dimensional subspace—“face space”—of all possible images.

The idea of using eigenfaces was motivated by a technique developed by Sirovich and Kirby (1987) and Kirby and Sirovich (1990) for efficiently representing pictures of faces using principal component analysis. Starting with an ensemble of original face images, they calculated a best coordinate system for image compression, where each coordinate is actually an image that they termed an *eigenpicture*. They argued that, at least in principle, any collection of face images can be approximately reconstructed by storing a small collection of weights for each face and a small set of standard pictures (the eigenpictures). The weights describing each face are found by projecting the face image onto each eigenpicture.

It occurred to us that if a multitude of face images can be reconstructed by weighted sums of a small collection

of characteristic features or eigenpictures, perhaps an efficient way to learn and recognize faces would be to build up the characteristic features by experience over time and recognize particular faces by comparing the feature weights needed to (approximately) reconstruct them with the weights associated with known individuals. Each individual, therefore, would be characterized by the small set of feature or eigenpicture weights needed to describe and reconstruct them—an extremely compact representation when compared with the images themselves.

This approach to face recognition involves the following initialization operations:

1. Acquire an initial set of face images (the training set).
2. Calculate the eigenfaces from the training set, keeping only the M images that correspond to the highest eigenvalues. These M images define the *face space*. As new faces are experienced, the eigenfaces can be updated or recalculated.
3. Calculate the corresponding distribution in M -dimensional weight space for each known individual, by projecting their face images onto the “face space.”

These operations can also be performed from time to time whenever there is free excess computational capacity.

Having initialized the system, the following steps are then used to recognize new face images:

1. Calculate a set of weights based on the input image and the M eigenfaces by projecting the input image onto each of the eigenfaces.
2. Determine if the image is a face at all (whether known or unknown) by checking to see if the image is sufficiently close to “face space.”
3. If it is a face, classify the weight pattern as either a known person or as unknown.
4. (Optional) Update the eigenfaces and/or weight patterns.
5. (Optional) If the same unknown face is seen several times, calculate its characteristic weight pattern and incorporate into the known faces.

Calculating Eigenfaces

Let a face image $I(x,y)$ be a two-dimensional N by N array of (8-bit) intensity values. An image may also be considered as a vector of dimension N^2 , so that a typical image of size 256 by 256 becomes a vector of dimension 65,536, or, equivalently, a point in 65,536-dimensional space. An ensemble of images, then, maps to a collection of points in this huge space.

Images of faces, being similar in overall configuration, will not be randomly distributed in this huge image space and thus can be described by a relatively low dimensional subspace. The main idea of the principal compo-



Figure 1. (a) Face images used as the training set.

nent analysis (or Karhunen–Loeve expansion) is to find the vectors that best account for the distribution of face images within the entire image space. These vectors define the subspace of face images, which we call “face space.” Each vector is of length N^2 , describes an N by N image, and is a linear combination of the original face images. Because these vectors are the eigenvectors of the covariance matrix corresponding to the original face images, and because they are face-like in appearance, we refer to them as “eigenfaces.” Some examples of eigenfaces are shown in Figure 2.

Let the training set of face images be $\Gamma_1, \Gamma_2, \Gamma_3, \dots, \Gamma_M$. The average face of the set is defined by $\Psi = \frac{1}{M} \sum_{n=1}^M \Gamma_n$. Each face differs from the average by the vector $\Phi_i = \Gamma_i - \Psi$. An example training set is shown in Figure 1a, with the average face Ψ shown in Figure 1b. This set of very large vectors is then subject to principal component analysis, which seeks a set of M orthonormal vectors, \mathbf{u}_n , which best describes the distribution of the data. The k th vector, \mathbf{u}_k , is chosen such that

$$\lambda_k = \frac{1}{M} \sum_{n=1}^M (\mathbf{u}_k^T \Phi_n)^2 \quad (1)$$

is a maximum, subject to

$$\mathbf{u}_l^T \mathbf{u}_k = \delta_{lk} = \begin{cases} 1, & \text{if } l = k \\ 0, & \text{otherwise} \end{cases} \quad (2)$$

The vectors \mathbf{u}_k and scalars λ_k are the eigenvectors and eigenvalues, respectively, of the covariance matrix

$$\begin{aligned} C &= \frac{1}{M} \sum_{n=1}^M \Phi_n \Phi_n^T \\ &= A A^T \end{aligned} \quad (3)$$

where the matrix $A = [\Phi_1 \ \Phi_2 \ \dots \ \Phi_M]$. The matrix C , however, is N^2 by N^2 , and determining the N^2 eigenvectors and eigenvalues is an intractable task for typical image sizes. We need a computationally feasible method to find these eigenvectors.

If the number of data points in the image space is less than the dimension of the space ($M < N^2$), there will be only $M - 1$, rather than N^2 , meaningful eigenvectors. (The remaining eigenvectors will have associated eigenvalues of zero.) Fortunately we can solve for the N^2 -dimensional eigenvectors in this case by first solving for the eigenvectors of an M by M matrix—e.g., solving a 16×16 matrix rather than a $16,384 \times 16,384$ matrix—



Figure 1. (b) The average face Ψ .



Figure 2. Seven of the eigenfaces calculated from the input images of Figure 1.

and then taking appropriate linear combinations of the face images Φ_i . Consider the eigenvectors \mathbf{v}_i of $A^T A$ such that

$$A^T A \mathbf{v}_i = \mu_i \mathbf{v}_i \quad (4)$$

Premultiplying both sides by A , we have

$$A A^T A \mathbf{v}_i = \mu_i A \mathbf{v}_i \quad (5)$$

from which we see that $A \mathbf{v}_i$ are the eigenvectors of $C = A A^T$.

Following this analysis, we construct the M by M matrix $L = A^T A$, where $L_{mn} = \Phi_m^T \Phi_n$, and find the M eigenvectors, \mathbf{v}_i , of L . These vectors determine linear combinations of the M training set face images to form the eigenfaces \mathbf{u}_i .

$$\mathbf{u}_l = \sum_{k=1}^M \mathbf{v}_{lk} \Phi_k, \quad l = 1, \dots, M \quad (6)$$

With this analysis the calculations are greatly reduced, from the order of the number of pixels in the images (N^2) to the order of the number of images in the training set (M). In practice, the training set of face images will be relatively small ($M \ll N^2$), and the calculations become quite manageable. The associated eigenvalues allow us to rank the eigenvectors according to their usefulness in characterizing the variation among the images. Figure 2 shows the top seven eigenfaces derived from the input images of Figure 1.

Using Eigenfaces to Classify a Face Image

The eigenface images calculated from the eigenvectors of L span a basis set with which to describe face images. Sirovich and Kirby (1987) evaluated a limited version of this framework on an ensemble of $M = 115$ images of Caucasian males, digitized in a controlled manner, and found that about 40 eigenfaces were sufficient for a very good description of the set of face images. With $M' = 40$ eigenfaces, RMS pixel-by-pixel errors in representing cropped versions of face images were about 2%.

Since the eigenfaces seem adequate for describing face images under very controlled conditions, we decided to investigate their usefulness as a tool for face identification. In practice, a smaller M' is sufficient for identification, since accurate reconstruction of the image is not a requirement. In this framework, identification becomes a pattern recognition task. The eigenfaces span an M' -dimensional subspace of the original N^2 image space. The M' significant eigenvectors of the L matrix are chosen as those with the largest associated eigenvalues. In many of our test cases, based on $M = 16$ face images, $M' = 7$ eigenfaces were used.

A new face image (Γ) is transformed into its eigenface components (projected into "face space") by a simple operation,

$$\omega_k = \mathbf{u}_k^T (\Gamma - \Psi) \quad (7)$$

for $k = 1, \dots, M'$. This describes a set of point-by-point image multiplications and summations, operations performed at approximately frame rate on current image processing hardware. Figure 3 shows an image and its projection into the seven-dimensional face space.

The weights form a vector $\Omega^T = [\omega_1, \omega_2, \dots, \omega_{M'}]$ that describes the contribution of each eigenface in representing the input face image, treating the eigenfaces as a basis set for face images. The vector may then be used

in a standard pattern recognition algorithm to find which of a number of predefined face classes, if any, best describes the face. The simplest method for determining which face class provides the best description of an input face image is to find the face class k that minimizes the Euclidian distance

$$\epsilon_k = \|(\mathbf{\Omega} - \mathbf{\Omega}_k)\|^2 \quad (8)$$

where $\mathbf{\Omega}_k$ is a vector describing the k th face class. The face classes $\mathbf{\Omega}_i$ are calculated by averaging the results of the eigenface representation over a small number of face images (as few as one) of each individual. A face is classified as belonging to class k when the minimum ϵ_k is below some chosen threshold θ_ϵ . Otherwise the face is classified as “unknown,” and optionally used to create a new face class.

Because creating the vector of weights is equivalent to projecting the original face image onto the low-dimensional face space, many images (most of them looking nothing like a face) will project onto a given pattern vector. This is not a problem for the system, however, since the distance ϵ between the image and the face space is simply the squared distance between the mean-adjusted input image $\mathbf{\Phi} = \mathbf{\Gamma} - \mathbf{\Psi}$ and $\mathbf{\Phi}_f = \sum_{i=1}^{M'} \omega_i \mathbf{u}_i$, its projection onto face space:

$$\epsilon^2 = \|\mathbf{\Phi} - \mathbf{\Phi}_f\|^2 \quad (9)$$

Thus there are four possibilities for an input image and its pattern vector: (1) near face space and near a face class, (2) near face space but not near a known face class, (3) distant from face space and near a face class, and (4) distant from face space and not near a known face class.

In the first case, an individual is recognized and identified. In the second case, an unknown individual is present. The last two cases indicate that the image is not a face image. Case three typically shows up as a false positive in most recognition systems; in our framework, however, the false recognition may be detected because of the significant distance between the image and the subspace of expected face images. Figure 4 shows some images and their projections into face space and gives a measure of distance from the face space for each.

Summary of Eigenface Recognition Procedure

To summarize, the eigenfaces approach to face recognition involves the following steps:

1. Collect a set of characteristic face images of the known individuals. This set should include a number of images for each person, with some variation in expression and in the lighting. (Say four images of ten people, so $M = 40$.)
2. Calculate the (40×40) matrix L , find its eigenvectors and eigenvalues, and choose the M' eigenvectors

with the highest associated eigenvalues. (Let $M' = 10$ in this example.)

3. Combine the normalized training set of images according to Eq. (6) to produce the $(M' = 10)$ eigenfaces \mathbf{u}_k .

4. For each known individual, calculate the class vector $\mathbf{\Omega}_k$ by averaging the eigenface pattern vectors $\mathbf{\Omega}$ [from Eq. (8)] calculated from the original (four) images of the individual. Choose a threshold θ_ϵ that defines the maximum allowable distance from any face class, and a threshold θ_ϵ that defines the maximum allowable distance from face space [according to Eq. (9)].

5. For each new face image to be identified, calculate its pattern vector $\mathbf{\Omega}$, the distances ϵ_k to each known class, and the distance ϵ to face space. If the minimum distance $\epsilon_k < \theta_\epsilon$ and the distance $\epsilon < \theta_\epsilon$, classify the input face as the individual associated with class vector $\mathbf{\Omega}_k$. If the minimum distance $\epsilon_k > \theta_\epsilon$ but distance $\epsilon < \theta_\epsilon$, then the image may be classified as “unknown,” and optionally used to begin a new face class.

6. If the new image is classified as a known individual, this image may be added to the original set of familiar face images, and the eigenfaces may be recalculated (steps 1–4). This gives the opportunity to modify the face space as the system encounters more instances of known faces.

In our current system calculation of the eigenfaces is done offline as part of the training. The recognition currently takes about 400 msec running rather inefficiently in Lisp on a Sun4, using face images of size 128×128 . With some special-purpose hardware, the current version could run at close to frame rate (33 msec).

Designing a practical system for face recognition within this framework requires assessing the tradeoffs between generality, required accuracy, and speed. If the face recognition task is restricted to a small set of people (such as the members of a family or a small company), a small set of eigenfaces is adequate to span the faces of interest. If the system is to learn new faces or represent many people, a larger basis set of eigenfaces will be required. The results of Sirovich and Kirby (1987) and Kirby and Sirovich (1990) for coding of face images gives some evidence that even if it were necessary to represent a large segment of the population, the number of eigenfaces needed would still be relatively small.

Locating and Detecting Faces

The analysis in the preceding sections assumes we have a centered face image, the same size as the training images and the eigenfaces. We need some way, then, to locate a face in a scene to do the recognition. We have developed two schemes to locate and/or track faces, using motion detection and manipulation of the images in “face space”.



Figure 3. An original face image and its projection onto the face space defined by the eigenfaces of Figure 2.

Motion Detecting and Head Tracking

People are constantly moving. Even while sitting, we fidget and adjust our body position, nod our heads, look around, and such. In the case of a single person moving in a static environment, a simple motion detection and tracking algorithm, depicted in Figure 5, will locate and track the position of the head. Simple spatiotemporal filtering (e.g., frame differencing) accentuates image locations that change with time, so a moving person “lights up” in the filtered image. If the image “lights up” at all, motion is detected and the presence of a person is postulated.

After thresholding the filtered image to produce a binary motion image, we analyze the “motion blobs” over time to decide if the motion is caused by a person moving and to determine head position. A few simple rules are applied, such as “the head is the small upper blob above a larger blob (the body),” and “head motion must be reasonably slow and contiguous” (heads are not expected to jump around the image erratically). Figure 6 shows an image with the head located, along with the path of the head in the preceding sequence of frames.

The motion image also allows for an estimate of scale. The size of the blob that is assumed to be the moving head determines the size of the subimage to send to the recognition stage. This subimage is rescaled to fit the dimensions of the eigenfaces.

Using “Face Space” to Locate the Face

We can also use knowledge of the face space to locate faces in single images, either as an alternative to locating

faces from motion (e.g., if there is too little motion or many moving objects) or as a method of achieving more precision than is possible by use of motion tracking alone. This method allows us to recognize the presence of faces apart from the task of identifying them.

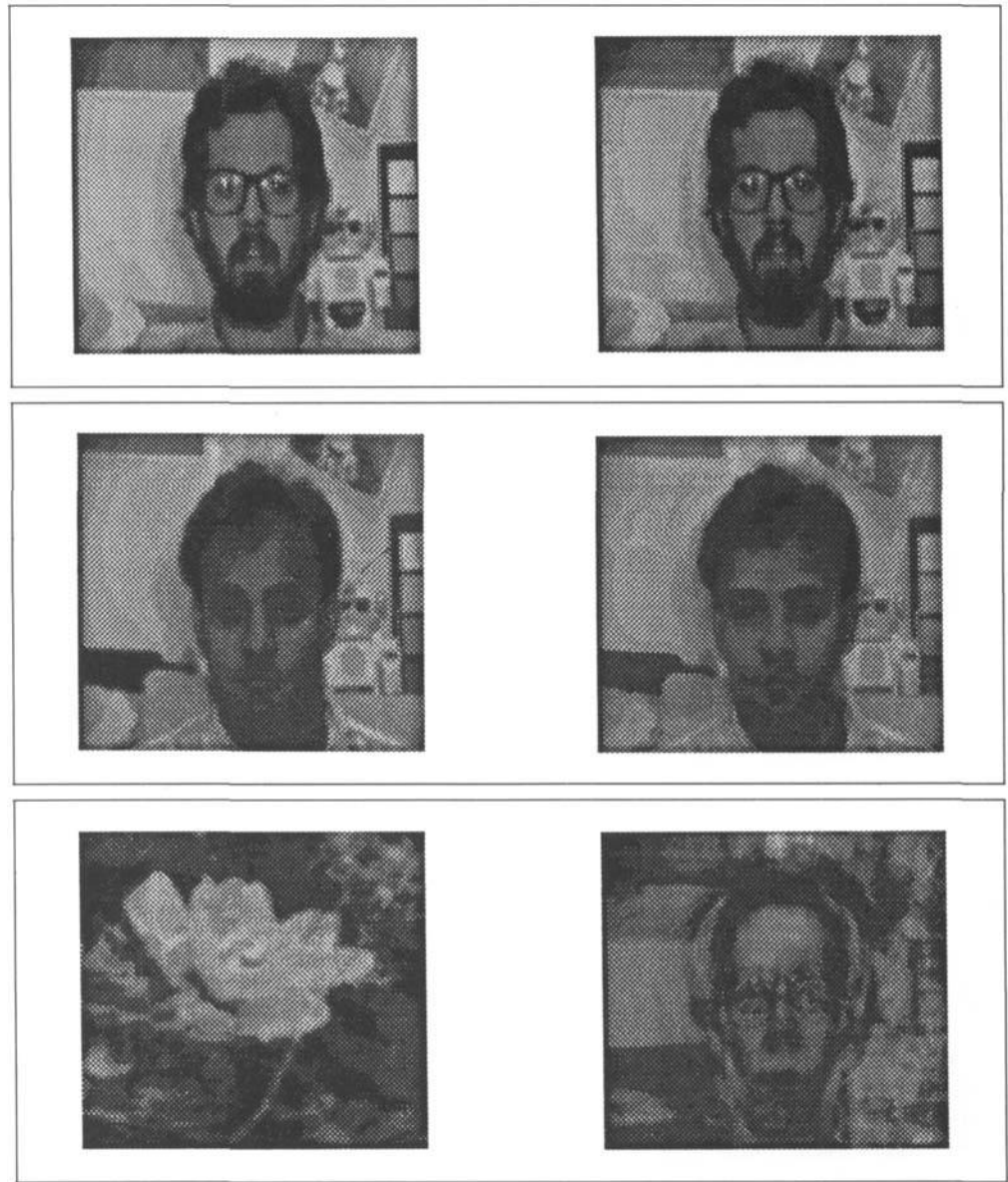
As seen in Figure 4, images of faces do not change radically when projected into the face space, while the projection of nonface images appears quite different. This basic idea is used to detect the presence of faces in a scene: at every location in the image, calculate the distance ϵ between the local subimage and face space. This distance from face space is used as a measure of “faceness,” so the result of calculating the distance from face space at every point in the image is a “face map” $\epsilon(x,y)$. Figure 7 shows an image and its face map—low values (the dark area) indicate the presence of a face.

Unfortunately, direct application of Eq. (9) is rather expensive. We have therefore developed a simpler, more efficient method of calculating the face map $\epsilon(x,y)$, which is described as follows.

To calculate the face map at every pixel of an image $I(x,y)$, we need to project the subimage centered at that pixel onto face space, then subtract the projection from the original. To project a subimage Γ onto face space, we must first subtract the mean image, resulting in $\Phi = \Gamma - \Psi$. With Φ_f being the projection of Φ onto face space, the distance measure at a given image location is then

$$\begin{aligned}
 \epsilon^2 &= \|\Phi - \Phi_f\|^2 \\
 &= (\Phi - \Phi_f)^T (\Phi - \Phi_f) \\
 &= \Phi^T \Phi - \Phi^T \Phi_f + \Phi_f^T (\Phi - \Phi_f) \\
 &= \Phi^T \Phi - \Phi_f^T \Phi_f
 \end{aligned} \tag{10}$$

Figure 4. Three images and their projections onto the face space defined by the eigenfaces of Figure 2. The relative measures of distance from face space are (a) 29.8, (b) 58.5, (c) 5217.4. Images (a) and (b) are in the original training set.



since $\Phi_f \perp (\Phi - \Phi_f)$. Because Φ_f is a linear combination of the eigenfaces ($\Phi_f = \sum_{i=1}^L \omega_i \mathbf{u}_i$) and the eigenfaces are orthonormal vectors,

$$\Phi_f^T \Phi_f = \sum_{i=1}^L \omega_i^2 \quad (11)$$

and

$$\epsilon^2(x, y) = \Phi^T(x, y) \Phi(x, y) - \sum_{i=1}^L \omega_i^2(x, y) \quad (12)$$

where $\epsilon(x, y)$ and $\omega_i(x, y)$ are scalar functions of image location, and $\Phi(x, y)$ is a vector function of image location.

The second term of Eq. (12) is calculated in practice by a correlation with the L eigenfaces:

$$\begin{aligned} \sum_{i=1}^L \omega_i^2(x, y) &= \sum_{i=1}^L \Phi^T(x, y) \mathbf{u}_i \\ &= \sum_{i=1}^L [\Gamma(x, y) - \Psi]^T \mathbf{u}_i \\ &= \sum_{i=1}^L [\Gamma^T(x, y) \mathbf{u}_i - \Psi^T \mathbf{u}_i] \\ &= \sum_{i=1}^L [I(x, y) \otimes \mathbf{u}_i - \Psi^T \mathbf{u}_i] \end{aligned} \quad (13)$$

where \otimes is the correlation operator. The first term of Eq. (12) becomes

$$\begin{aligned} \Phi^T(x, y) \Phi(x, y) &= [\Gamma(x, y) - \Psi]^T [\Gamma(x, y) - \Psi] \\ &= \Gamma^T(x, y) \Gamma(x, y) - 2\Psi^T \Gamma(x, y) + \Psi^T \Psi \\ &= \Gamma^T(x, y) \Gamma(x, y) - 2\Gamma(x, y) \otimes \Psi + \Psi^T \Psi \end{aligned} \quad (14)$$

so that

$$\begin{aligned} \epsilon^2(x, y) &= \Gamma^T(x, y) \Gamma(x, y) - 2\Gamma(x, y) \otimes \Psi + \Psi^T \Psi + \\ &\quad \sum_{i=1}^L [\Gamma(x, y) \otimes \mathbf{u}_i - \Psi \otimes \mathbf{u}_i] \end{aligned} \quad (15)$$

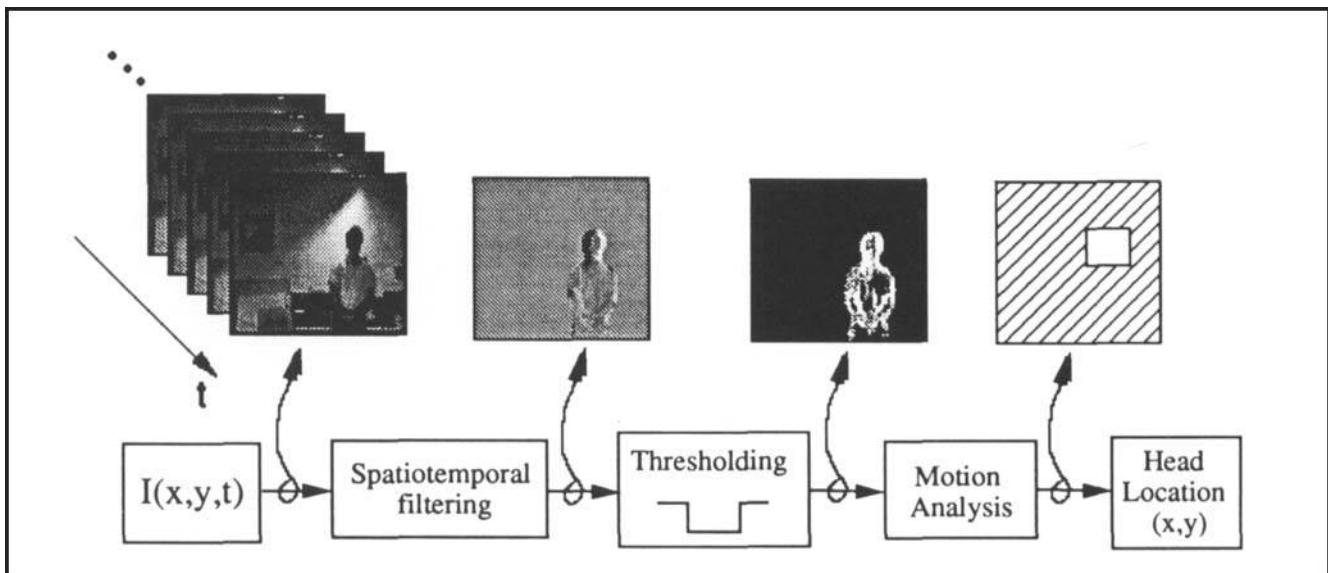


Figure 5. The head tracking and locating system.



Figure 6. The head has been located—the image in the box is sent to the face recognition process. Also shown is the path of the head tracked over several previous frames.

Since the average face Ψ and the eigenfaces \mathbf{u}_i are fixed, the terms $\Psi^T \Psi$ and $\Psi \otimes \mathbf{u}_i$ may be computed ahead of time.

Thus the computation of the face map involves only $L + 1$ correlations over the input image and the computation of the first term $\Gamma^T(x, y)\Gamma(x, y)$. This is computed by squaring the input image $I(x, y)$ and, at each image location, summing the squared values of the local subimage. As discussed in the section on Neural Net-

works, these computations can be implemented by a simple neural network.

Learning to Recognize New Faces

The concept of face space allows the ability to learn and subsequently recognize new faces in an unsupervised manner. When an image is sufficiently close to face space but is not classified as one of the familiar faces, it is initially labeled as “unknown.” The computer stores the pattern vector and the corresponding unknown image. If a collection of “unknown” pattern vectors cluster in the pattern space, the presence of a new but unidentified face is postulated.

The images corresponding to the pattern vectors in the cluster are then checked for similarity by requiring that the distance from each image to the mean of the images is less than a predefined threshold. If the images pass the similarity test, the average of the feature vectors is added to the database of known faces. Occasionally, the eigenfaces may be recalculated using these stored images as part of the new training set.

Other Issues

A number of other issues must be addressed to obtain a robust working system. In this section we will briefly mention these issues and indicate methods of solution.

Eliminating the Background

In the preceding analysis we have ignored the effect of the background. In practice, the background can significantly effect the recognition performance, since the ei-

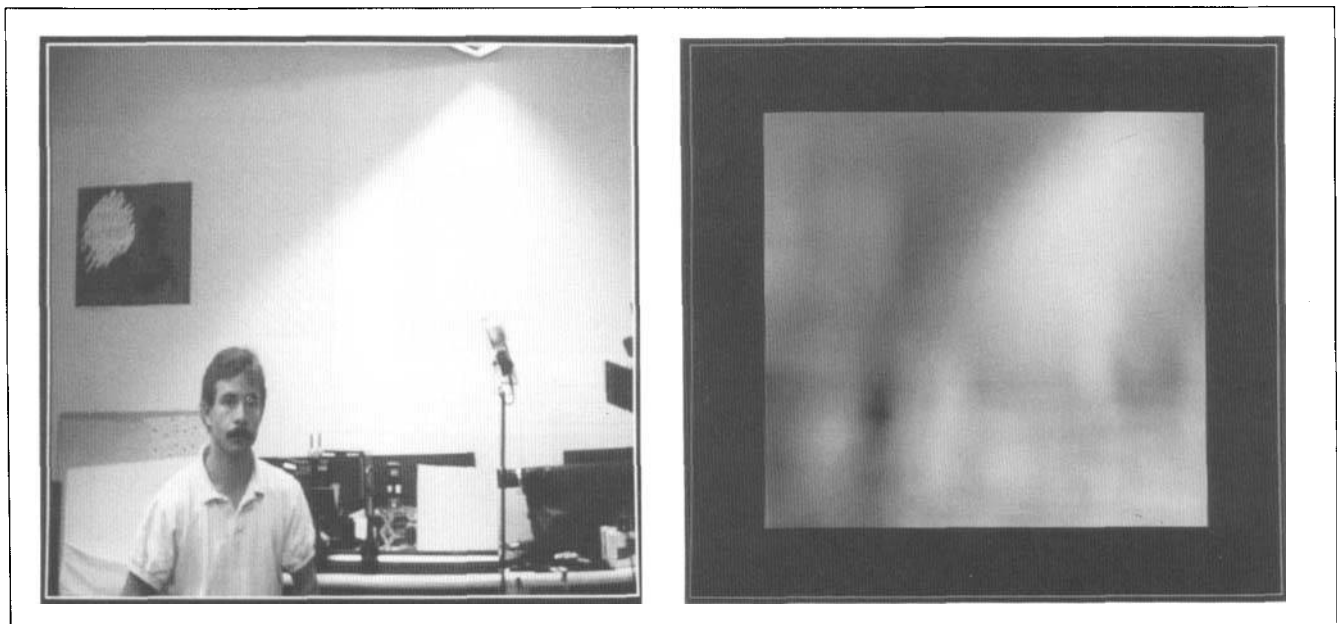


Figure 7. (a) Original image. (b) The corresponding face map, where low values (dark areas) indicate the presence of a face.

genface analysis as described above does not distinguish the face from the rest of the image. In the experiments described in the section on Experiments with Eigenfaces, the background was a significant part of the image used to classify the faces.

To deal with this problem without having to solve other difficult vision problems (such as robust segmentation of the head), we have multiplied the input face image by a two-dimensional gaussian window centered on the face, thus diminishing the background and accentuating the middle of the face. Experiments in human strategies of face recognition (Hay & Young, 1982) cite the importance of the internal facial features for recognition of familiar faces. Deemphasizing the outside of the face is also a practical consideration since changing hairstyles may otherwise negatively affect the recognition.

Scale (Head Size) and Orientation Invariance

The experiments in the section on Database of Face Images show that recognition performance decreases quickly as the head size, or scale, is misjudged. The head size in the input image must be close to that of the eigenfaces for the system to work well. The motion analysis gives an estimate of head size, from which the face image is rescaled to the eigenface size.

Another approach to the scale problem, which may be separate from or in addition to the motion estimate, is to use multiscale eigenfaces, in which an input face image is compared with eigenfaces at a number of scales. In this case the image will appear to be near the face space of only the closest scale eigenfaces. Equivalently, we can

scale the input image to multiple sizes and use the scale that results in the smallest distance measure to face space.

Although the eigenfaces approach is not extremely sensitive to head orientation (i.e., sideways tilt of the head), a non-upright view will cause some performance degradation. An accurate estimate of the head tilt will certainly benefit the recognition. Again, two simple methods have been considered and tested. The first is to calculate the orientation of the motion blob of the head. This is less reliable as the shape tends toward a circle, however. Using the fact that faces are reasonably symmetric patterns, at least for frontal views, we have used simple symmetry operators to estimate head orientation. Once the orientation is estimated, the image can be rotated to align the head with the eigenfaces.

Distribution in Face Space

The nearest-neighbor classification previously described assumes a Gaussian distribution in face space of an individual's feature vectors Ω . Since there is no a priori reason to assume any particular distribution, we want to characterize it rather than assume it is gaussian. Nonlinear networks such as described in Fleming and Cottrell (1990) seem to be a promising way to learn the face space distributions by example.

Multiple Views

We are currently extending the system to deal with other than full frontal views by defining a limited number of face classes for each known person corresponding to *characteristic views*. For example, an individual may be represented by face classes corresponding to a frontal

face view, side views, at $\pm 45^\circ$, and right and left profile views. Under most viewing conditions these seem to be sufficient to recognize a face anywhere from frontal to profile view, because the real view can be approximated by interpolation among the fixed views.

EXPERIMENTS WITH EIGENFACES

To assess the viability of this approach to face recognition, we have performed experiments with stored face images and built a system to locate and recognize faces in a dynamic environment. We first created a large database of face images collected under a wide range of imaging conditions. Using this database we have conducted several experiments to assess the performance under known variations of lighting, scale, and orientation. The results of these experiments and early experience with the near-real-time system are reported in this section.

Database of Face Images

The images from Figure 1a were taken from a database of over 2500 face images digitized under controlled conditions. Sixteen subjects were digitized at all combinations of three head orientations, three head sizes or scales, and three lighting conditions. A six level Gaussian pyramid was constructed for each image, resulting in image resolution from 512×512 pixels down to 16×16 pixels. Figure 8 shows the images from one pyramid level for one individual.

In the first experiment the effects of varying lighting, size, and head orientation were investigated using the complete database of 2500 images of the 16 individuals shown in Figure 1a. Various groups of 16 images were selected and used as the training set. Within each training set there was one image of each person, all taken under the same conditions of lighting, image size, and head orientation. All images in the database were then classified as being one of these sixteen individuals (i.e., the threshold θ_e was effectively infinite, so that no faces were rejected as unknown). Seven eigenfaces were used in the classification process.

Statistics were collected measuring the mean accuracy as a function of the difference between the training conditions and the test conditions. The independent variables were difference in illumination, imaged head size, head orientation, and combinations of illumination, size, and orientation.

Figure 9 shows results of these experiments for the case of infinite θ_e . The graphs of the figure show the number of correct classifications for varying conditions of lighting, size, and head orientation, averaged over the number of experiments. For this case where every face image is classified as known, the system achieved approximately 96% correct classification averaged over

lighting variation, 85% correct averaged over orientation variation, and 64% correct averaged over size variation.

As can be seen from these graphs, changing lighting conditions causes relatively few errors, while performance drops dramatically with size change. This is not surprising, since under lighting changes alone the neighborhood pixel correlation remains high, but under size changes the correlation from one image to another is largely lost. It is clear that there is a need for a multiscale approach, so that faces at a particular size are compared with one another. One method of accomplishing this is to make sure that each "face class" includes images of the individual at several different sizes, as was discussed in the section on Other Issues.

In a second experiment the same procedures were followed, but the acceptance threshold θ_e was also varied. At low values of θ_e , only images that project very closely to the known face classes will be recognized, so that there will be few errors but many of the images will be rejected as unknown. At high values of θ_e most images will be classified, but there will be more errors. Adjusting θ_e to achieve 100% accurate recognition boosted the unknown rates to 19% while varying lighting, 39% for orientation, and 60% for size. Setting the unknown rate arbitrarily to 20% resulted in correct recognition rates of 100%, 94%, and 74% respectively.

These experiments show an increase of performance accuracy as the threshold decreases. This can be tuned to achieve effectively perfect recognition as the threshold tends to zero, but at the cost of many images being rejected as unknown. The tradeoff between rejection rate and recognition accuracy will be different for each of the various face recognition applications. However, what would be most desirable is to have a way of setting the threshold high, so that few known face images are rejected as unknown, while at the same time detecting the incorrect classifications. That is, we would like to increase the efficiency (the d-prime) of the recognition process.

One way of accomplishing this is to also examine the (normalized) Euclidian distance between an image and face space as a whole. Because the projection onto the eigenface vectors is a many-to-one mapping, there is a potentially unlimited number of images that can project onto the eigenfaces in the same manner, i.e., produce the same weights. Many of these will look nothing like a face, as shown in Figure 4c. This approach was described in the section on Using "Face Space" to Locate the Face as a method of identifying likely face subimages.

Real-Time Recognition

We have used the techniques described above to build a system that locates and recognizes faces in near-real-time in a reasonably unstructured environment. Figure 10 shows a diagram of the system. A fixed camera, monitoring part of a room, is connected to a Datacube image

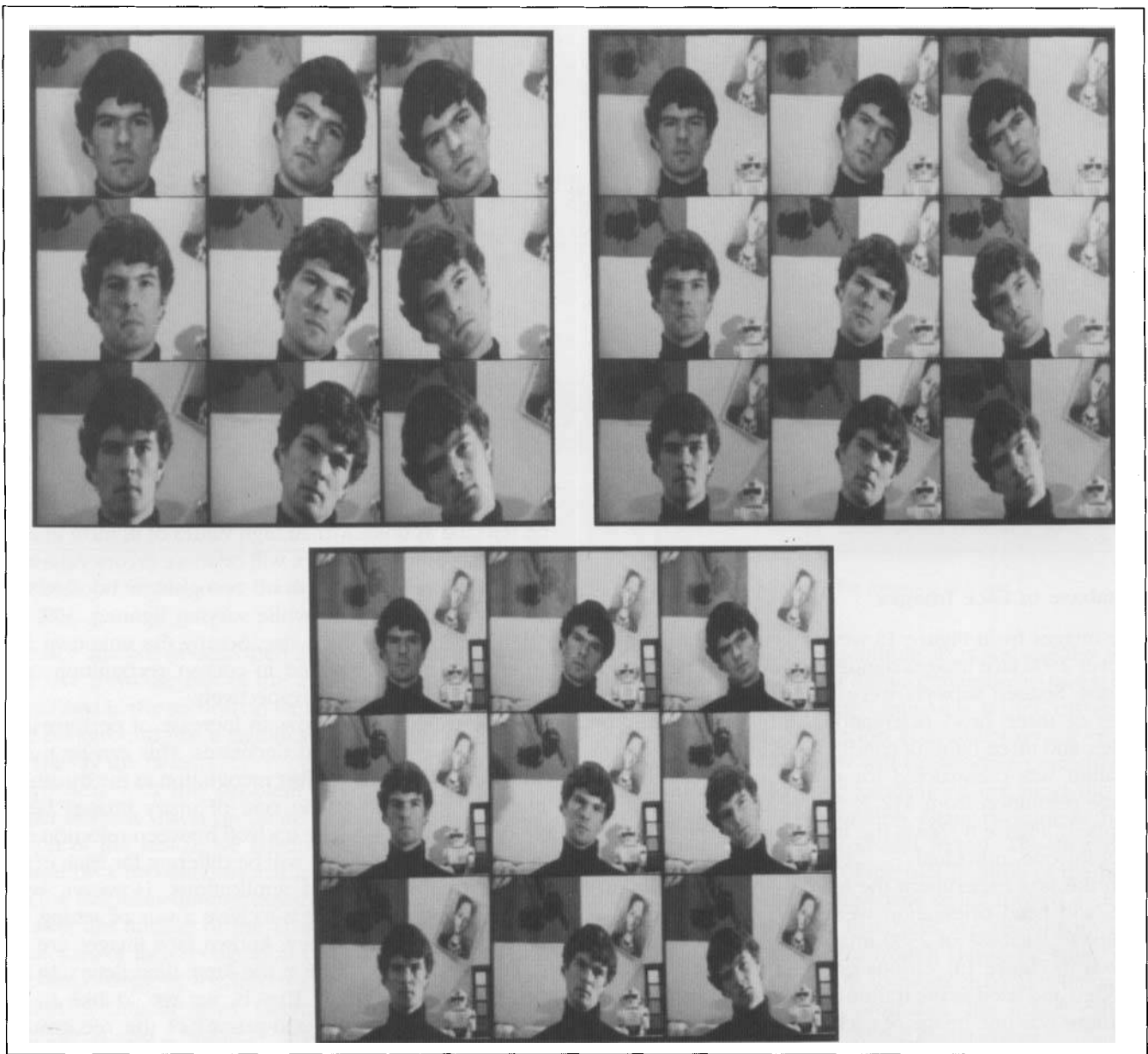


Figure 8. Variation of face images for one individual: three head sizes, three lighting conditions, and three head orientations.

processing system, which resides on the bus of a Sun 3/160. The Datacube digitizes the video image and performs spatiotemporal filtering, thresholding, and subsampling at frame rate (30 frames/sec). (The images are subsampled to speed up the motion analysis.)

The motion detection and analysis programs run on the Sun 3/160, first detecting a moving object and then tracking the motion and applying simple rules to determine if it is tracking a head. When a head is found, the subimage, centered on the head, is sent to another computer (a Sun Sparcstation) that is running the face recognition program (although it could be running on the same computer as the motion program). Using the distance-from-face-space measure, the image is either re-

jected as not a face, recognized as one of a group of familiar faces, or determined to be an unknown face.

Recognition occurs in this system at rates of up to two or three times per second. Until motion is detected, or as long as the image is not perceived to be a face, there is no output. When a face is recognized, the image of the identified individual is displayed on the Sun monitor.

RELATIONSHIP TO BIOLOGY AND NEURAL NETWORKS

Biological Motivations

High-level recognition tasks are typically modeled as requiring many stages of processing, e.g., the Marr (1982)

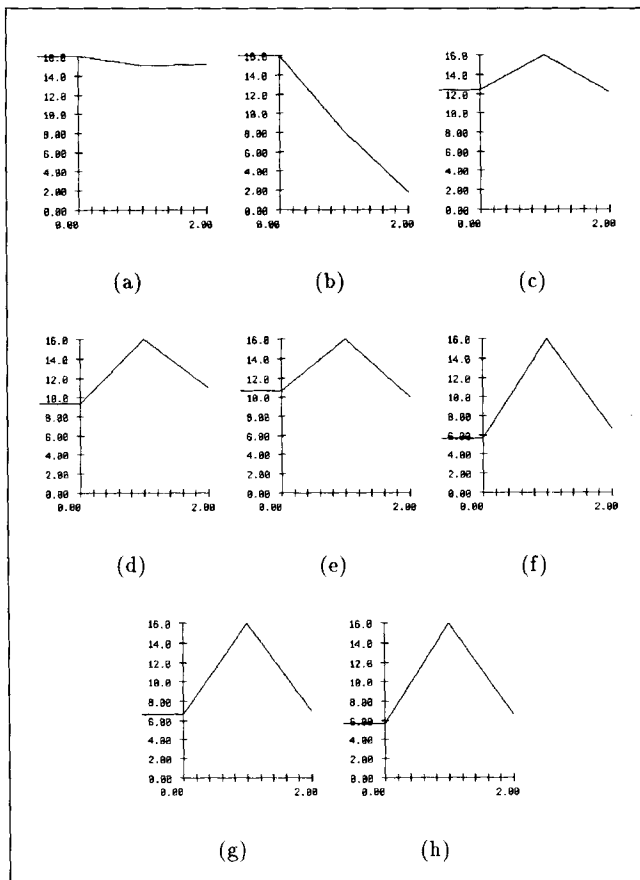


Figure 9. Results of experiments measuring recognition performance using eigenfaces. Each graph shows averaged performance as the lighting conditions, head size, and head orientation vary—the y-axis depicts number of correct classifications (out of 16). The peak (16/16 correct) in each graph results from recognizing the particular training set perfectly. The other two graph points reveal the decline in performance as the following parameters are varied: **(a)** lighting, **(b)** head size (scale), **(c)** orientation, **(d)** orientation and lighting, **(e)** orientation and size (#1), **(f)** orientation and size (#2), **(g)** size and lighting, **(h)** size and lighting (#2).

paradigm of progressing from images to surfaces to three-dimensional models to matched models. However, the early development and the extreme rapidity of face recognition makes it appear likely that there must also be a recognition mechanism based on some fast, low-level, two-dimensional image processing.

On strictly phenomenological grounds, such a face recognition mechanism is plausible because faces are typically seen in a limited range of views, and are a very important stimulus for humans from birth. The existence of such a mechanism is also supported by the results of a number of physiological experiments in monkey cortex claiming to isolate neurons that respond selectively to faces (e.g., see Perrett, Rolls, & Caan, 1982; Perrett, Mistlin, & Chitty, 1987; Bruce, Desimone, & Gross, 1981; Desimone, Albright, Gross, & Bruce, 1984; Rolls, Baylis, Hasselmo, & Nalwa, 1989). In these experiments, some

cells were sensitive to identity, some to “faceness,” and some only to particular views (such as frontal or profile).

Although we do not claim that biological systems have “eigenface cells” or process faces in the same way as the eigenface approach, there are a number of qualitative similarities between our approach and current understanding of human face recognition. For instance, relatively small changes cause the recognition to degrade gracefully, so that partially occluded faces can be recognized, as has been demonstrated in single-cell recording experiments. Gradual changes due to aging are easily handled by the occasional recalculation of the eigenfaces, so that the system is quite tolerant to even large changes as long as they occur over a long period of time. If, however, a large change occurs quickly—e.g., addition of a disguise or change of facial hair—then the eigenfaces approach will be fooled, as are people in conditions of casual observation.

Neural Networks

Although we have presented the eigenfaces approach to face recognition as an information-processing model, it may be implemented using simple parallel computing elements, as in a connectionist system or artificial neural network. Figure 11 shows a three-layer, fully connected linear network that implements a significant part of the system. The input layer receives the input (centered and normalized) face image, with one element per image pixel, or N elements. The weights from the input layer to the hidden layer correspond to the eigenfaces, so that the value of each hidden unit is the dot product of the input image and the corresponding eigenface: $\omega_i = \Phi^T \mathbf{u}_i$. The hidden units, then, form the pattern vector $\Omega^T = [\omega_1, \omega_2, \dots, \omega_L]$.

The output layer produces the face space projection of the input image when the output weights also correspond to the eigenfaces (mirroring the input weights). Adding two nonlinear components we construct Figure 12, which produces the pattern class Ω , face space projection Φ_i , distance measure d (between the image and its face space projection), and a classification vector. The classification vector is comprised of a unit for each known face defining the pattern space distances ϵ_i . The unit with the smallest value, if below the specified threshold θ_ϵ , reveals the identity of the input face image.

Parts of the network of Figure 12 are similar to the associative networks of Kohonen (1989) and Kohonen and Lehtio (1981). These networks implement a learned stimulus–response mapping, in which the learning phase modifies the connection weights. An autoassociative network implements the projection onto face space. Similarly, reconstruction using eigenfaces can be used to recall a partially occluded face, as shown in Figure 13.

Figure 10. System diagram of the face recognition system.

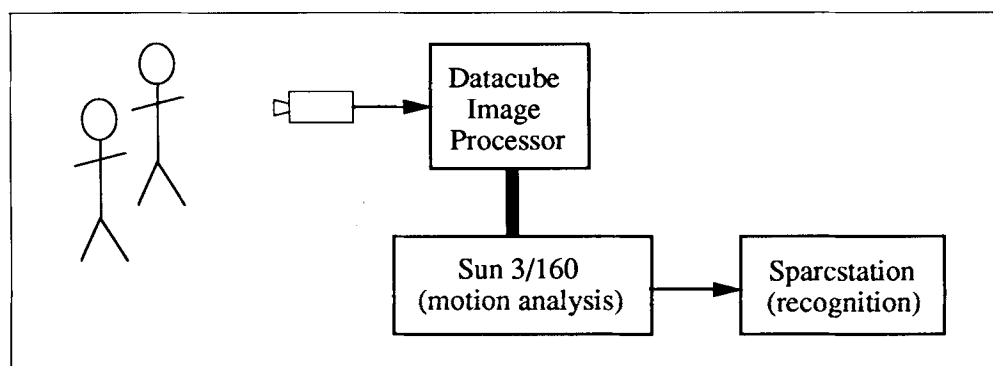
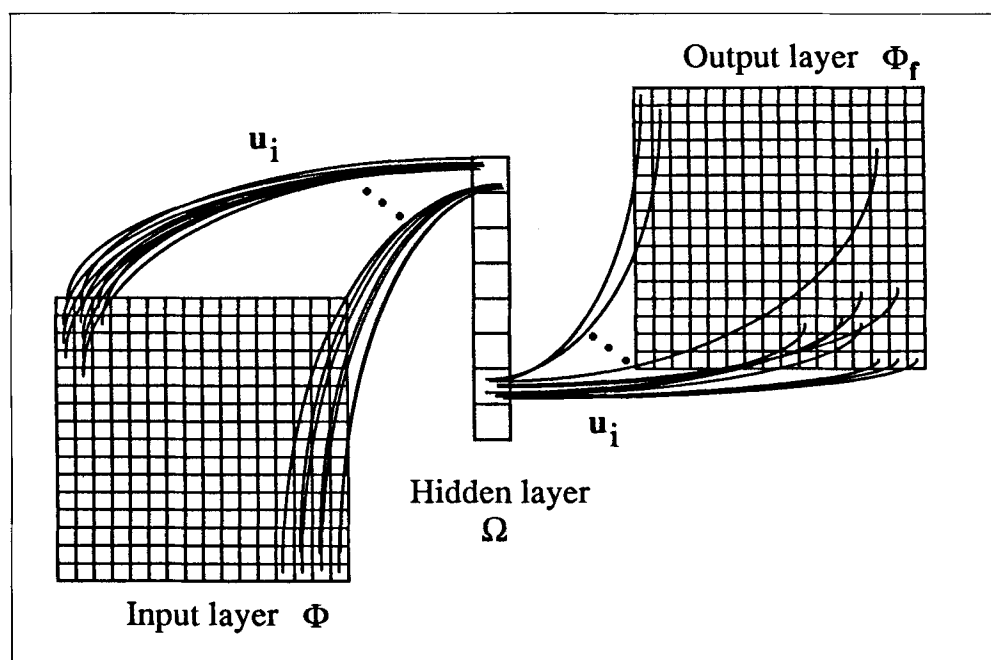


Figure 11. Three-layer linear network for eigenface calculation. The symmetric weights u_i are the eigenfaces, and the hidden units reveal the projection of the input image Φ onto the eigenfaces. The output Φ_f is the face space projection of the input image.



CONCLUSION

Early attempts at making computers recognize faces were limited by the use of impoverished face models and feature descriptions (e.g., locating features from an edge image and matching simple distances and ratios), assuming that a face is no more than the sum of its parts, the individual features. Recent attempts using parameterized feature models and multiscale matching look more promising, but still face severe problems before they are generally applicable. Current connectionist approaches tend to hide much of the pertinent information in the weights that makes it difficult to modify and evaluate parts of the approach.

The eigenface approach to face recognition was motivated by information theory, leading to the idea of basing face recognition on a small set of image features that best approximates the set of known face images, without requiring that they correspond to our intuitive notions of facial parts and features. Although it is not an elegant solution to the general recognition problem, the

eigenface approach does provide a practical solution that is well fitted to the problem of face recognition. It is fast, relatively simple, and has been shown to work well in a constrained environment. It can also be implemented using modules of connectionist or neural networks.

It is important to note that many applications of face recognition do not require perfect identification, although most require a low false-positive rate. In searching a large database of faces, for example, it may be preferable to find a small set of likely matches to present to the user. For applications such as security systems or human-computer interaction, the system will normally be able to "view" the subject for a few seconds or minutes, and thus will have a number of chances to recognize the person. Our experiments show that the eigenface technique can be made to perform at very high accuracy, although with a substantial "unknown" rejection rate, and thus is potentially well suited to these applications.

We are currently investigating in more detail the issues of robustness to changes in lighting, head size, and head orientation, automatically learning new faces, incorpo-

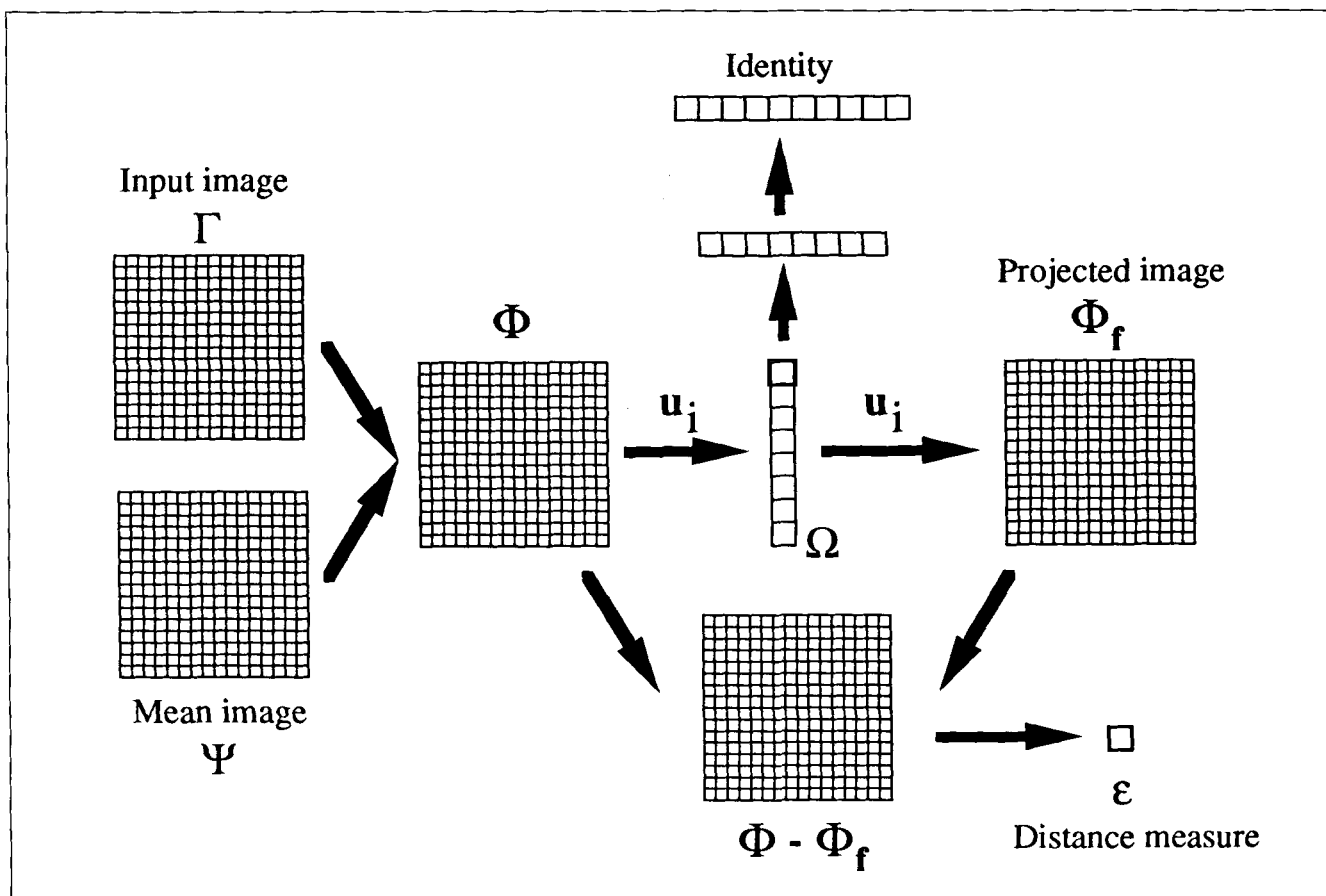


Figure 12. Collection of networks to implement computation of the pattern vector, projection into face space, distance from face space measure, and identification.



Figure 13. (a) Partially occluded face image and (b) its reconstruction using the eigenfaces.

rating a limited number of characteristic views for each individual, and the tradeoffs between the number of people the system needs to recognize and the number of eigenfaces necessary for unambiguous classification. In addition to recognizing faces, we are also beginning efforts to use eigenface analysis to determine the gender of the subject and to interpret facial expressions, two important face processing problems that complement the task of face recognition.

REFERENCES

- Bledsoe, W. W. (1966a). The model method in facial recognition. Panoramic Research Inc., Palo Alto, CA, Rep. PRI:15, August.
- Bledsoe, W. W. (1966b). Man-machine facial recognition. Panoramic Research Inc., Palo Alto, CA, Rep. PRI:22, August.
- Bruce, V. (1988). *Recognising faces*. Hillsdale, NJ: Erlbaum.
- Bruce, C. J., Desimone, R., & Gross, C. G. (1981). *Journal of Neurophysiology*, 46, 369–384.
- Burt, P. (1988a). Algorithms and architectures for smart sensing. *Proceedings of the Image Understanding Workshop*, April.
- Burt, P. (1988b). Smart sensing within a Pyramid Vision Machine. *Proceedings of IEEE*, 76(8), 139–153.
- Cannon, S. R., Jones, G. W., Campbell, R., & Morgan, N. W. (1986). A computer vision system for identification of individuals. *Proceedings of IECON*, 1.
- Carey, S., & Diamond, R. (1977). From piecemeal to configurational representation of faces. *Science*, 195, 312–313.
- Craw, Ellis, & Lishman (1987). Automatic extraction of face features. *Pattern Recognition Letters*, 5, 183–187.
- Davies, Ellis, & Shepherd (Eds.), (1981). *Perceiving and remembering faces*. London: Academic Press.
- Desimone, R., Albright, T. D., Gross, C. G., & Bruce, C. J. (1984). Stimulus-selective properties of inferior temporal neurons in the macaque. *Neuroscience*, 4, 2051–2068.
- Fischler, M. A., & Elschlager, R. A. (1973). The representation and matching of pictorial structures. *IEEE Transactions on Computers*, c-22(1).
- Fleming, M., & Cottrell, G. (1990). Categorization of faces using unsupervised feature extraction. *Proceedings of IJCNN-90*, 2.
- Goldstein, Harmon, & Lesk (1971). Identification of human faces. *Proceedings IEEE*, 59, 748.
- Harmon, L. D. (1971). Some aspects of recognition of human faces. In O. J. Grusser & R. Klinke (Eds.), *Pattern recognition in biological and technical systems*. Berlin: Springer-Verlag.
- Hay, D. C., & Young, A. W. (1982). The human face. In A. W. Ellis (Ed.), *Normality and pathology in cognitive functions*. London: Academic Press.
- Kanade, T. (1973). Picture processing system by computer complex and recognition of human faces. Dept. of Information Science, Kyoto University.
- Kaya, Y., & Kobayashi, K. (1972). A basic study on human face recognition. In S. Watanabe (Ed.), *Frontiers of pattern recognition*. New York: Academic Press.
- Kirby, M., & Sirovich, L. (1990). Application of the Karhunen-Loeve procedure for the characterization of human faces. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 12(1).
- Kohonen, T. (1989). *Self-organization and associative memory*. Berlin: Springer-Verlag.
- Kohonen, T., & Lehtio, P. (1981). Storage and processing of information in distributed associative memory systems. In G. E. Hinton & J. A. Anderson (Eds.), *Parallel models of associative memory*. Hillsdale, NJ: Erlbaum, pp. 105–143.
- Marr, D. (1982). *Vision*. San Francisco: W. H. Freeman.
- Midorikawa, H. (1988). The face pattern identification by back-propagation learning procedure. *Abstracts of the First Annual INNS Meeting*, Boston, p. 515.
- O'Toole, Millward, & Anderson (1988). A physical system approach to recognition memory for spatially transformed faces. *Neural Networks*, 1, 179–199.
- Perrett, D. I., Mistlin, A. J., & Chitty, A. J. (1987). Visual neurones responsive to faces. *TINS*, 10(9), 358–364.
- Perrett, Rolls, & Caan (1982). Visual neurones responsive to faces in the monkey temporal cortex. *Experimental Brain Research*, 47, 329–342.
- Rolls, E. T., Baylis, G. C., Hasselmo, M. E., & Nalwa, V. (1989). The effect of learning on the face selective responses of neurons in the cortex in the superior temporal sulcus of the monkey. *Experimental Brain Research*, 76, 153–164.
- Sirovich, L., & Kirby, M. (1987). Low-dimensional procedure for the characterization of human faces. *Journal of the Optical Society of America A*, 4(3), 519–524.
- Stonham, T. J. (1986). Practical face recognition and verification with WISARD. In H. Ellis, M. Jeeves, F. Newcombe, & A. Young (Eds.), *Aspects of face processing*. Dordrecht: Martinus Nijhoff.
- Wong, K., Law, H., & Tsang, P. (1989). A system for recognising human faces. *Proceedings of ICASSP*, May, 1638–1642.
- Yuille, A. L., Cohen, D. S., & Hallinan, P. W. (1989). Feature extraction from faces using deformable templates. *Proceedings of CVPR*, San Diego, CA, June.

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1. Fatma Zohra Chelali, Amar Djeradi. 2014. Face Recognition System using Discrete Cosine Transform combined with MLP and RBF Neural Networks. *International Journal of Mobile Computing and Multimedia Communications* **4**:4, 11-35. [[CrossRef](#)]
2. Simon Clippingdale, Mahito Fujii. 2014. Video Face Tracking and Recognition with Skin Region Extraction and Deformable Template Matching. *International Journal of Multimedia Data Engineering and Management* **3**:1, 36-48. [[CrossRef](#)]
3. Fergal Monaghan, Siegfried Handschuh, David O'Sullivan. 2013. ACRONYM. *International Journal on Semantic Web and Information Systems* **7**:4, 1-35. [[CrossRef](#)]
4. Jason McLaughlin, Shiao-fen Fang, Sandra W. Jacobson, H. Eugene Hoyme, Luther Robinson, Tatiana Foroud. 2013. Interactive Feature Visualization and Detection for 3D Face Classification. *International Journal of Cognitive Informatics and Natural Intelligence* **5**:2, 1-16. [[CrossRef](#)]
5. Rong-Hua Li, Shuang Liang, George Baciuc, Eddie Chan. 2013. Equivalence Between LDA/QR and Direct LDA. *International Journal of Cognitive Informatics and Natural Intelligence* **5**:1, 94-112. [[CrossRef](#)]
6. Liao Heng Fui, Dino Isa. 2013. Feature Selection Based on Minimizing the Area Under the Detection Error Tradeoff Curve. *International Journal of Applied Evolutionary Computation* **2**:1, 18-33. [[CrossRef](#)]
7. Haichao Zhang, Yanning Zhang, Thomas S. Huang. 2013. Pose-robust face recognition via sparse representation. *Pattern Recognition* **46**:5, 1511-1521. [[CrossRef](#)]
8. Zhizheng Liang, Youfu Li, ShiXiong Xia. 2013. Adaptive weighted learning for linear regression problems via Kullback-Leibler divergence. *Pattern Recognition* **46**:4, 1209-1219. [[CrossRef](#)]
9. Sung-Kwon Oh, Sung-Hoon Yoo, Witold Pedrycz. 2013. Design of face recognition algorithm using PCA-LDA combined for hybrid data pre-processing and polynomial-based RBF neural networks : Design and its application. *Expert Systems with Applications* **40**:5, 1451-1466. [[CrossRef](#)]
10. W.K. Wong, Haitao Zhao. 2013. Eyeglasses removal of thermal image based on visible information. *Information Fusion* **14**:2, 163-176. [[CrossRef](#)]
11. Wei-Lun Chao, Jun-Zuo Liu, Jian-Jiun Ding. 2013. Facial age estimation based on label-sensitive learning and age-oriented regression. *Pattern Recognition* **46**:3, 628-641. [[CrossRef](#)]
12. Yunming Ye, Qingyao Wu, Joshua Zhexue Huang, Michael K. Ng, Xutao Li. 2013. Stratified sampling for feature subspace selection in random forests for high dimensional data. *Pattern Recognition* **46**:3, 769-787. [[CrossRef](#)]
13. W.R. Boukabou, A. Bouridane, S. Al-Maadeed. 2013. Enhancing face recognition using Directional Filter Banks. *Digital Signal Processing* **23**:2, 586-594. [[CrossRef](#)]
14. Thiago H.H. Zavaschi, Alceu S. Britto, Luiz E.S. Oliveira, Alessandro L. Koerich. 2013. Fusion of feature sets and classifiers for facial expression recognition. *Expert Systems with Applications* **40**:2, 646-655. [[CrossRef](#)]
15. F. Segovia, J.M. Gomez-Riz, J. Ramirez, D. Salas-Gonzalez, I. Alvarez. 2013. Early diagnosis of Alzheimer's disease based on Partial Least Squares and Support Vector Machine. *Expert Systems with Applications* **40**:2, 677-683. [[CrossRef](#)]
16. B. Shanthini, S. Swamynatha. 2013. Privacy-protected Multimodal Biometric-based Group Authentication Scheme for ATM. *Information Technology Journal* **12**:2, 297-305. [[CrossRef](#)]
17. Pradipta K. Banerjee, Asit K. Datta. 2013. Generalized regression neural network trained preprocessing of frequency domain correlation filter for improved face recognition and its optical implementation. *Optics & Laser Technology* **45**, 217-227. [[CrossRef](#)]
18. Huang-Chia Shih. 2013. Robust gender classification using a precise patch histogram. *Pattern Recognition* **46**:2, 519-528. [[CrossRef](#)]
19. Intelligent Approaches for Adaptation and Distribution of Personalized Multimedia Content 197-224. [[CrossRef](#)]
20. Huorong Ren, Jianwei Sun, Yanhong Hao, Xinxin Yan, Yang Liu. 2013. Uniform Local Derivative Patterns and Their Application in Face Recognition. *Journal of Signal Processing Systems* . [[CrossRef](#)]
21. Yinjie Lei, Mohammed Bennamoun, Amar A. El-Sallam. 2013. An efficient 3D face recognition approach based on the fusion of novel local low-level features. *Pattern Recognition* **46**:1, 24-37. [[CrossRef](#)]
22. Hyunsoo Yoon, Cheong-Sool Park, Jun Seok Kim, Jun-Geol Baek. 2013. Algorithm learning based neural network integrating feature selection and classification. *Expert Systems with Applications* **40**:1, 231-241. [[CrossRef](#)]
23. Wen Wu, Antonio M. Moreno, Jason M. Tangen, Judith Reinhard. 2013. Honeybees can discriminate between Monet and Picasso paintings. *Journal of Comparative Physiology A* **199**:1, 45-55. [[CrossRef](#)]
24. Ali Mashhoori, Mansoor Zolghadri Jahromi. 2013. Block-Wise 2-Directional 2DPCA with Ensemble Learning for Face Recognition. *Neurocomputing* . [[CrossRef](#)]

25. Saeed Meshgini, Ali Aghagolzadeh, Hadi Seyedarabi. 2013. Face recognition using Gabor-based direct linear discriminant analysis and support vector machine. *Computers & Electrical Engineering* . [\[CrossRef\]](#)
26. Ruchir Srivastava, Sujoy Roy. 2012. Utilizing 3D flow of points for facial expression recognition. *Multimedia Tools and Applications* . [\[CrossRef\]](#)
27. Maryam Eskandari, ##nsen Toygar. 2012. Fusion of face and iris biometrics using local and global feature extraction methods. *Signal, Image and Video Processing* . [\[CrossRef\]](#)
28. Ningbo Zhu, Shengtao Li. 2012. A Kernel-based sparse representation method for face recognition. *Neural Computing and Applications* . [\[CrossRef\]](#)
29. Jun GAO, Chang-Yin SUN, Shi-Tong WANG. 2012. (2D)²UFFCA: Two-directional Two-dimensional Unsupervised Feature Extraction Method with Fuzzy Clustering Ability. *Acta Automatica Sinica* **38**:4, 549-562. [\[CrossRef\]](#)
30. Alireza Bosaghzadeh, Abdelmalik Moujahid, Fadi Dornaika. 2012. Parameterless Local Discriminant Embedding. *Neural Processing Letters* . [\[CrossRef\]](#)
31. Hamid Salimi, Davar Giveki. 2012. Farsi/Arabic handwritten digit recognition based on ensemble of SVD classifiers and reliable multi-phase PSO combination rule. *International Journal on Document Analysis and Recognition (IJDAR)* . [\[CrossRef\]](#)
32. Ayd##n Akyol, Muhittin G##kmen. 2012. Super-resolution reconstruction of faces by enhanced global models of shape and texture. *Pattern Recognition* **45**:12, 4103-4116. [\[CrossRef\]](#)
33. Chong Lu, Xiaodong Liu, Wanquan Liu. 2012. Face recognition based on two dimensional locality preserving projections in frequency domain. *Neurocomputing* **98**, 135-142. [\[CrossRef\]](#)
34. Xiang Xu, Wanquan Liu, Svetha Venkatesh. 2012. An innovative face image enhancement based on principle component analysis. *International Journal of Machine Learning and Cybernetics* **3**:4, 259-267. [\[CrossRef\]](#)
35. Kaveh Heidary, H. John Caulfield. 2012. Needles in a haystack: Fast spatial search for targets in similar-looking backgrounds. *Journal of the Franklin Institute* **349**:10, 2935-2955. [\[CrossRef\]](#)
36. Hu Han, Shiguang Shan, Xilin Chen, Wen Gao. 2012. A comparative study on illumination preprocessing in face recognition. *Pattern Recognition* . [\[CrossRef\]](#)
37. Bing Xiao, Xinbo Gao, Dacheng Tao, Xuelong Li. 2012. Biview Face Recognition in the Shape-texture Domain. *Pattern Recognition* . [\[CrossRef\]](#)
38. A. Samir Elons, Magdy Abull-ela, M.F. Tolba. 2012. A proposed PCNN features quality optimization technique for pose-invariant 3D Arabic sign language recognition. *Applied Soft Computing* . [\[CrossRef\]](#)
39. Deyan Tang, Ningbo Zhu, Fu Yu, Wei Chen, Ting Tang. 2012. A novel sparse representation method based on virtual samples for face recognition. *Neural Computing and Applications* . [\[CrossRef\]](#)
40. Jun Li, Dacheng Tao, Xuelong Li. 2012. A probabilistic model for image representation via multiple patterns. *Pattern Recognition* **45**:11, 4044-4053. [\[CrossRef\]](#)
41. Zhiping Shi, Xi Liu, Qingyong Li, Qing He, Zhongzhi Shi. 2012. Extracting discriminative features for CBIR. *Multimedia Tools and Applications* **61**:2, 263-279. [\[CrossRef\]](#)
42. Liliana Lo Presti, Marco Morana, Marco La Cascia. 2012. A data association approach to detect and organize people in personal photo collections. *Multimedia Tools and Applications* **61**:2, 321-352. [\[CrossRef\]](#)
43. Fei Zang, Jiang-She Zhang. 2012. Label propagation through sparse neighborhood and its applications. *Neurocomputing* **97**, 267-277. [\[CrossRef\]](#)
44. Peng Zhang, Yuanyuan Ren, Bo Zhang. 2012. A new embedding quality assessment method for manifold learning. *Neurocomputing* **97**, 251-266. [\[CrossRef\]](#)
45. Shan Jiang, Joseph Ferreira, Marta C. Gonz##lez. 2012. Clustering daily patterns of human activities in the city. *Data Mining and Knowledge Discovery* **25**:3, 478-510. [\[CrossRef\]](#)
46. Abhishek Sharma, Murad Al Haj, Jonghyun Choi, Larry S. Davis, David W. Jacobs. 2012. Robust pose invariant face recognition using coupled latent space discriminant analysis. *Computer Vision and Image Understanding* **116**:11, 1095-1110. [\[CrossRef\]](#)
47. Deng Zhang, Shingo Mabu, Feng Wen, Kotaro Hirasawa. 2012. An effective preprocessing method for subspace face recognition using genetic-based clustering in ideal and noisy conditions. *IEEEJ Transactions on Electrical and Electronic Engineering* **7**:6, 583-591. [\[CrossRef\]](#)
48. Sunjin Yu, Joongrock Kim, Sangyoun Lee. 2012. Thermal 3D modeling system based on 3-view geometry. *Optics Communications* **285**:24, 5019-5028. [\[CrossRef\]](#)
49. Chongyang Zhang. 2012. Representation of face images for personal authentication. *Optik - International Journal for Light and Electron Optics* . [\[CrossRef\]](#)

50. Imran Naseem, Duc-Son Pham, Svetha Venkatesh. 2012. A novel information theoretic approach to wavelet feature selection for texture classification. *Computers & Electrical Engineering* . [\[CrossRef\]](#)
51. Ignacio Alvarez Ill#n, Juan Manuel G#rriz, Javier Ram#rez, Elmar W. Lang, Diego Salas-Gonzalez, Carlos G. Puntonet. 2012. Bilateral symmetry aspects in computer-aided Alzheimer's disease diagnosis by single-photon emission-computed tomography imaging. *Artificial Intelligence in Medicine* **56**:3, 191-198. [\[CrossRef\]](#)
52. WEN-SHENG CHEN, WEI WANG, JIAN-WEI YANG, YUAN YAN TANG. 2012. SUPERVISED REGULARIZATION LOCALITY-PRESERVING PROJECTION METHOD FOR FACE RECOGNITION. *International Journal of Wavelets, Multiresolution and Information Processing* **10**:06, 1250053. [\[CrossRef\]](#)
53. References **20123071**, 329-340. [\[CrossRef\]](#)
54. Chi-Wei Lin, Yi-Ping Hung, Wen-Ko Hsu, Wei-Ling Chiang, Cheng-Wu Chen. 2012. The construction of a high-resolution visual monitoring for hazard analysis. *Natural Hazards* . [\[CrossRef\]](#)
55. J. Pelletier, K. Halvorsen, B.-Y. Ha, R. Paparcone, S. J. Sandler, C. L. Woldringh, W. P. Wong, S. Jun. 2012. PNAS Plus: Physical manipulation of the Escherichia coli chromosome reveals its soft nature. *Proceedings of the National Academy of Sciences* **109**:40, E2649-E2656. [\[CrossRef\]](#)
56. Billy Y.L. Li, Wanquan Liu, Senjian An, Aneesh Krishna, Tianwei Xu. 2012. Face recognition using various scales of discriminant color space transform. *Neurocomputing* **94**, 68-76. [\[CrossRef\]](#)
57. #afak Saraydemir, Necmi Ta##p##nar, Osman Ero##ul, H##lya Kayserili, Nuriye Din##kan. 2012. Down Syndrome Diagnosis Based on Gabor Wavelet Transform. *Journal of Medical Systems* **36**:5, 3205-3213. [\[CrossRef\]](#)
58. A. Bedagkar-Gala, Shishir K. Shah. 2012. Part-based spatio-temporal model for multi-person re-identification. *Pattern Recognition Letters* **33**:14, 1908-1915. [\[CrossRef\]](#)
59. Rama Chellappa, Jie Ni, Vishal M. Patel. 2012. Remote identification of faces: Problems, prospects, and progress. *Pattern Recognition Letters* **33**:14, 1849-1859. [\[CrossRef\]](#)
60. Usama Ijaz Bajwa, Imtiaz Ahmad Taj, Muhammad Waqas Anwar. 2012. A unified classifier for robust face recognition based on combining multiple subspace algorithms. *Optics Communications* **285**:21-22, 4324-4332. [\[CrossRef\]](#)
61. Wankou Yang, Changyin Sun, Karl Ricanek. 2012. Sequential Row###Column 2DPCA for face recognition. *Neural Computing and Applications* **21**:7, 1729-1735. [\[CrossRef\]](#)
62. Alessandra De Paola, Marco La Cascia, Giuseppe Lo Re, Marco Morana, Marco Ortolani. 2012. Mimicking biological mechanisms for sensory information fusion. *Biologically Inspired Cognitive Architectures* . [\[CrossRef\]](#)
63. Ion Marqu##s, Manuel Gra##a. 2012. Fusion of lattice independent and linear features improving face identification. *Neurocomputing* . [\[CrossRef\]](#)
64. El Hadji S. Diop, Val##rie Burdin. 2012. Bi-Planar Image Segmentation Based on Variational Geometrical Active Contours with Shape Priors. *Medical Image Analysis* . [\[CrossRef\]](#)
65. Gibran Benitez-Garcia, Jesus Olivares-Mercado, Gabriel Sanchez-Perez, Mariko Nakano-Miyatake, Hector Perez-Meana. 2012. A sub-block-based eigenphases algorithm with optimum sub-block size. *Knowledge-Based Systems* . [\[CrossRef\]](#)
66. GHULAM MUHAMMAD, MUHAMMAD HUSSAIN, FATMAH ALENEZY, GEORGE BEBIS, ANWAR M. MIRZA, HATIM ABOALSAMH. 2012. RACE CLASSIFICATION FROM FACE IMAGES USING LOCAL DESCRIPTORS. *International Journal on Artificial Intelligence Tools* **21**:05, 1250019. [\[CrossRef\]](#)
67. M.P. Satone, G.K. Kharate. 2012. Face Recognition Based on PCA on Wavelet Subband of Average-Half-Face. *Journal of Information Processing Systems* **8**:3, 483-494. [\[CrossRef\]](#)
68. Jae-Yong Lee, Ji-Eun Kim, Seoung-Jun Oh. 2012. Gabor Descriptors Extraction in the SURF Feature Point for Improvement Accuracy in Face Recognition. *Journal of Broadcast Engineering* **17**:5, 808-816. [\[CrossRef\]](#)
69. Woo-Youl Kim, Young-Ho Seo, Dong-Wook Kim. 2012. A Fast and Accurate Face Detection and Tracking Method by using Depth Information and color information. *The Journal of the Korean Institute of Information and Communication Engineering* **16**:9, 1825-1838. [\[CrossRef\]](#)
70. R. Casini, P. G. Judge, T. A. Schad. 2012. REMOVAL OF SPECTRO-POLARIMETRIC FRINGES BY TWO-DIMENSIONAL PATTERN RECOGNITION. *The Astrophysical Journal* **756**:2, 194. [\[CrossRef\]](#)
71. Stephan Liwicki, Georgios Tzimiropoulos, Stefanos Zafeiriou, Maja Pantic. 2012. Euler Principal Component Analysis. *International Journal of Computer Vision* . [\[CrossRef\]](#)
72. Beom-Seok Oh, Kar-Ann Toh, Kwontaeg Choi, Andrew Beng Jin Teoh, Jaihie Kim. 2012. Extraction and fusion of partial face features for cancelable identity verification. *Pattern Recognition* **45**:9, 3288-3303. [\[CrossRef\]](#)
73. Satyajit N. Kautkar, Gary A. Atkinson, Melvyn L. Smith. 2012. Face recognition in 2D and 2.5D using ridgelets and photometric stereo. *Pattern Recognition* **45**:9, 3317-3327. [\[CrossRef\]](#)

74. Matthew B. Blaschko, Christoph H. Lampert. 2012. Guest Editorial: Special Issue on Structured Prediction and Inference. *International Journal of Computer Vision* **99**:3, 257-258. [[CrossRef](#)]
75. Fei Long, Tingfan Wu, Javier R. Movellan, Marian S. Bartlett, Gwen Littlewort. 2012. Learning spatiotemporal features by using independent component analysis with application to facial expression recognition. *Neurocomputing* **93**, 126-132. [[CrossRef](#)]
76. Bingyin Zhou, Fan Zhang, Lizhong Peng. 2012. Higher-order SVD analysis for crowd density estimation. *Computer Vision and Image Understanding* **116**:9, 1014-1021. [[CrossRef](#)]
77. Ion Marques, Manuel Graña. 2012. Face recognition with lattice independent component analysis and extreme learning machines. *Soft Computing* **16**:9, 1525-1537. [[CrossRef](#)]
78. Eduardo Rodriguez, Konstantinos Nikolaidis, Tingting Mu, Jason F. Ralph, John Y. Goulermas. 2012. Towards collaborative feature extraction for face recognition. *Natural Computing* **11**:3, 395-404. [[CrossRef](#)]
79. K. Jaya Priya, R. S. Rajesh. 2012. Selective local texture features based face recognition with single sample per class. *Journal of the Brazilian Computer Society* **18**:3, 229-235. [[CrossRef](#)]
80. Yuelong Li, Li Meng, Jufu Feng. 2012. Face illumination compensation dictionary. *Neurocomputing* . [[CrossRef](#)]
81. Yan Liang, Xiaohua Xie, Jian-Huang Lai. 2012. Face hallucination based on morphological component analysis. *Signal Processing* . [[CrossRef](#)]
82. Gang Wei, Ju Tang, Xiaoxing Zhang, Junyi Lin. 2012. Gray intensity image feature extraction of partial discharge in high-voltage cross-linked polyethylene power cable joint. *European Transactions on Electrical Power* n/a-n/a. [[CrossRef](#)]
83. Fumin Shen, Zhenmin Tang, Jingsong Xu. 2012. Locality constrained representation based classification with spatial pyramid patches. *Neurocomputing* . [[CrossRef](#)]
84. WEI-LI FANG, YING-KUEI YANG, JUNG-KUEI PAN. 2012. A LOW-COMPUTATION APPROACH FOR HUMAN FACE RECOGNITION. *International Journal of Pattern Recognition and Artificial Intelligence* **26**:06, 1256015. [[CrossRef](#)]
85. SEYED OMID SHAHDI, SYED A. R. ABU-BAKAR. 2012. VARIANT POSE FACE RECOGNITION USING DISCRETE WAVELET TRANSFORM AND LINEAR REGRESSION. *International Journal of Pattern Recognition and Artificial Intelligence* **26**:06, 1256013. [[CrossRef](#)]
86. Raoul Pascal Pein, Joan Lu, Wolfgang Renz. Case Studies 329-369. [[CrossRef](#)]
87. M. Rubiolo, G. Stegmayer, D. Milone. 2012. Compressing arrays of classifiers using Volterra-neural network: application to face recognition. *Neural Computing and Applications* . [[CrossRef](#)]
88. Hon-Yin Leung, Lee-Ming Cheng, Xiang Yu Li. 2012. A FPGA implementation of facial feature extraction. *Journal of Real-Time Image Processing* . [[CrossRef](#)]
89. Ying-Ke Lei, Yang-Ming Xu, Jun-An Yang, Zhi-Guo Ding, Jie Gui. 2012. Feature extraction using orthogonal discriminant local tangent space alignment. *Pattern Analysis and Applications* **15**:3, 249-259. [[CrossRef](#)]
90. H.K. Bashier, E. Abdu Abusham, F. Khalid. 2012. Face Detection Based on Graph Structure and Neural Networks. *Trends in Applied Sciences Research* **7**:8, 683-691. [[CrossRef](#)]
91. K. Jaya Priya, R. S. Rajesh. 2012. Score-Level Fusion of Local Spatial, Scale and Directional Features Based Face Recognition Approach for Single Sample Problem. *National Academy Science Letters* **35**:4, 315-322. [[CrossRef](#)]
92. Yue Ming, Qiuqi Ruan. 2012. Robust sparse bounding sphere for 3D face recognition. *Image and Vision Computing* **30**:8, 524-534. [[CrossRef](#)]
93. Fadi Dornaika, Ammar Assoum. 2012. Enhanced and parameterless Locality Preserving Projections for face recognition. *Neurocomputing* . [[CrossRef](#)]
94. Quanxue Gao, Haijun Zhang, Xiaojing Yang, Jingjing Liu, Yamin Liu. 2012. Joint geometry and variability for image recognition. *Neurocomputing* . [[CrossRef](#)]
95. Taner Danisman, Ioan Marius Bilasco, Jean Martinet, Chabane Djeraba. 2012. Intelligent pixels of interest selection with application to facial expression recognition using multilayer perceptron. *Signal Processing* . [[CrossRef](#)]
96. J SHEEBA RANI, D DEVARAJ. 2012. Face recognition using Krawtchouk moment. *Sadhana* **37**:4, 441-460. [[CrossRef](#)]
97. Jean-François Connolly, Eric Granger, Robert Sabourin. 2012. Dynamic multi-objective evolution of classifier ensembles for video face recognition. *Applied Soft Computing* . [[CrossRef](#)]
98. Yun-Jin Bae, Hyun-Jun Choi, Young-Ho Seo, Dong-Wook Kim. 2012. A Fast and Accurate Face Detection and Tracking Method by using Depth Information. *The Journal of Korea Information and Communications Society* **37**:7A, 586-599. [[CrossRef](#)]
99. Peihua Li. 2012. Tensor-SIFT Based Earth Mover's Distance for Contour Tracking. *Journal of Mathematical Imaging and Vision* . [[CrossRef](#)]

100. Virginia Espinosa-Dur##, Marcos Faundez-Zanuy, Ji#### Mekyska. 2012. A New Face Database Simultaneously Acquired in Visible, Near-Infrared and Thermal Spectrums. *Cognitive Computation* . [\[CrossRef\]](#)
101. Youness Aliyari Ghassabeh, Hamid Abrishami Moghaddam. 2012. Adaptive linear discriminant analysis for online feature extraction. *Machine Vision and Applications* . [\[CrossRef\]](#)
102. Qi Zhu, Chengli Sun. 2012. Image-based face verification and experiments. *Neural Computing and Applications* . [\[CrossRef\]](#)
103. Sang-Il Choi, Chong-Ho Choi, Gu-Min Jeong, Nojun Kwak. 2012. Pixel selection based on discriminant features with application to face recognition. *Pattern Recognition Letters* **33**:9, 1083-1092. [\[CrossRef\]](#)
104. Benjamin Balas. 2012. Bayesian face recognition and perceptual narrowing in face-space. *Developmental Science* **15**:4, 579-588. [\[CrossRef\]](#)
105. Liang Chen. 2012. ROBUSTNESS INSTEAD OF ACCURACY SHOULD BE THE PRIMARY OBJECTIVE FOR SUBJECTIVE PATTERN RECOGNITION RESEARCH: STABILITY ANALYSIS ON MULTICANDIDATE ELECTORAL COLLEGE VERSUS DIRECT POPULAR VOTE. *Computational Intelligence* no-no. [\[CrossRef\]](#)
106. Meng Yang, Lei Zhang, Simon C.K. Shiu, David Zhang. 2012. Gabor feature based robust representation and classification for face recognition with Gabor occlusion dictionary. *Pattern Recognition* . [\[CrossRef\]](#)
107. Kai Yang, Eliza Yingzi Du, Zhi Zhou. 2012. Consent biometrics. *Neurocomputing* . [\[CrossRef\]](#)
108. Mohammad Aghaahmadi, Mohammad Mahdi Dehshibi, Azam Bastanfard, Mahmood Fazlali. 2012. Clustering Persian viseme using phoneme subspace for developing visual speech application. *Multimedia Tools and Applications* . [\[CrossRef\]](#)
109. Vivek Srivastava, Bipin K. Tripathi, Vinay K. Pathak. 2012. Evolutionary fuzzy clustering and functional modular neural network-based human recognition. *Neural Computing and Applications* . [\[CrossRef\]](#)
110. Fei Yin, L. C. Jiao, Fanhua Shang, Shuang Wang, Biao Hou. 2012. Fast Fisher Sparsity Preserving Projections. *Neural Computing and Applications* . [\[CrossRef\]](#)
111. M.-W. Park, I. Brilakis Enhancement of Construction Equipment Detection in Video Frames by Combining with Tracking 421-428. [\[CrossRef\]](#)
112. Vasileios K. Pothos, Christos Theoharatos, George Economou. 2012. A local spectral distribution approach to face recognition. *Computer Vision and Image Understanding* **116**:6, 663-675. [\[CrossRef\]](#)
113. Idaku Ishii, Tomoki Ichida, Qingyi Gu, Takeshi Takaki. 2012. 500-fps face tracking system. *Journal of Real-Time Image Processing* . [\[CrossRef\]](#)
114. Wei-Yang Lin, Ming-Yang Chen. 2012. A novel framework for automatic 3D face recognition using quality assessment. *Multimedia Tools and Applications* . [\[CrossRef\]](#)
115. Harish Bhaskar, Lyudmila Mihaylova, Simon Maskell. 2012. Articulated human body parts detection based on cluster background subtraction and foreground matching. *Neurocomputing* . [\[CrossRef\]](#)
116. Weilin Huang, Hujun Yin. 2012. On nonlinear dimensionality reduction for face recognition. *Image and Vision Computing* **30**:4-5, 355-366. [\[CrossRef\]](#)
117. Liliana Lo Presti, Marco La Cascia. 2012. An on-line learning method for face association in personal photo collection. *Image and Vision Computing* **30**:4-5, 306-316. [\[CrossRef\]](#)
118. Ibrahim Venkat, Ahamad Tajudin Khader, K.G. Subramanian, Philippe De Wilde. 2012. Recognizing occluded faces by exploiting psychophysically inspired similarity maps. *Pattern Recognition Letters* . [\[CrossRef\]](#)
119. Jungong Han, Lykele Hazelhoff, Peter H.N. de With Neonatal Monitoring Based on Facial Expression Analysis 303-323. [\[CrossRef\]](#)
120. A. Samir Elons, Magdy Aboul-Ela, M.F. Tolba. 2012. 3D object recognition technique using multiple 2D views for Arabic sign language. *Journal of Experimental & Theoretical Artificial Intelligence* 1-19. [\[CrossRef\]](#)
121. Alessandro Rozza, Gabriele Lombardi, Elena Casiraghi, Paola Campadelli. 2012. Novel Fisher discriminant classifiers. *Pattern Recognition* . [\[CrossRef\]](#)
122. Sun-Nyoung Hwang, Wooyeol Choi, Hyuk Lim, Jinhee Choi, Hyunjung Kim, In Seop Chang. 2012. Fluorescence spectrum-based biofouling prediction method for RO membrane systems. *Desalination and Water Treatment* **43**:1-3, 238-245. [\[CrossRef\]](#)
123. GANG XU, HUCHUAN LU, ZUNYI WANG. 2012. FACE RECOGNITION BASED ON GPPBTF AND LBP WITH CLASSIFIER FUSION. *International Journal of Image and Graphics* **12**:02, 1250011. [\[CrossRef\]](#)
124. H. M. Ebied, K. Revett, M. F. Tolba. 2012. Evaluation of unsupervised feature extraction neural networks for face recognition. *Neural Computing and Applications* . [\[CrossRef\]](#)
125. Yuki Oka, Takeshi Shakunaga. 2012. Real-time face tracking and recognition by sparse eigentracker with associative mapping to 3D shape. *Image and Vision Computing* **30**:3, 147-158. [\[CrossRef\]](#)

126. P. Jonathon Phillips, J. Ross Beveridge, Bruce A. Draper, Geof Givens, Alice J. O'Toole, David Bolme, Joseph Dunlop, Yui Man Lui, Hassan Sahibzada, Samuel Weimer. 2012. The Good, the Bad, and the Ugly Face Challenge Problem. *Image and Vision Computing* **30**:3, 177-185. [[CrossRef](#)]
127. Rachel S. Bolton-King, Martin Bencsik, J. Paul O. Evans, Clifton L. Smith, Derek F. Allsop, Jonathan D. Painter, Wayne M. Cranton. 2012. Numerical classification of curvilinear structures for the identification of pistol barrels. *Forensic Science International* . [[CrossRef](#)]
128. Hiroya Kamitomo, Cunwei Lu. 2012. 3-D face recognition method based on optimum 3-D image measurement technology. *Artificial Life and Robotics* **16**:4, 551-554. [[CrossRef](#)]
129. Ziqiang Wang, Xia Sun. 2012. Orthogonal Maximum Margin Projection for Face Recognition. *Journal of Computers* **7**:2. . [[CrossRef](#)]
130. ROGHAYEH ALEMY, MOHAMMAD EBRAHIM SHIRI, FARZAD DIDEHVAR, ZEYNAB HAJIMOHAMMADI. 2012. NEW FACIAL FEATURE LOCALIZATION ALGORITHM USING ADAPTIVE ACTIVE SHAPE MODEL. *International Journal of Pattern Recognition and Artificial Intelligence* **26**:01, 1256003. [[CrossRef](#)]
131. Qi Zhu, Yong Xu. 2012. Multi-directional two-dimensional PCA with matching score level fusion for face recognition. *Neural Computing and Applications* . [[CrossRef](#)]
132. Seiichi Ozawa. 2012. Online Feature Extraction Algorithms for Data Streams. *IEEJ Transactions on Electronics, Information and Systems* **132**:1, 6-13. [[CrossRef](#)]
133. K.N. Tran, I.A. Kakadiaris, S.K. Shah. 2012. Part-based motion descriptor image for human action recognition. *Pattern Recognition* . [[CrossRef](#)]
134. Tao Wu, Xiao-Jun Wu, Xing Liu, Xiao-Qing Luo. 2012. New Method using Feature Level Image Fusion and Entropy Component Analysis for Multimodal Human Face Recognition. *Procedia Engineering* **29**, 3991-3995. [[CrossRef](#)]
135. Biao WANG, Wenming YANG, Weifeng LI, Qingmin LIAO. 2012. Two-Stage Block-Based Whitened Principal Component Analysis with Application to Single Sample Face Recognition. *IEICE Transactions on Information and Systems* **E95-D**:3, 853-860. [[CrossRef](#)]
136. Yongxin Ge, Dan Yang, Xiaohong Zhang, Jiwen Lu. 2012. Improved similarity measure-based graph embedding for face recognition. *Journal of Electronic Imaging* **21**:1, 013002. [[CrossRef](#)]
137. M.##ge ##ar##k####, Figen ##zen. 2012. A Face Recognition System Based on Eigenfaces Method. *Procedia Technology* **1**, 118-123. [[CrossRef](#)]
138. Michael Mazilu, Areti Mourka, Tom Vettenburg, Ewan M. Wright, Kishan Dholakia. 2012. Simultaneous determination of the constituent azimuthal and radial mode indices for light fields possessing orbital angular momentum. *Applied Physics Letters* **100**:23, 231115. [[CrossRef](#)]
139. F. Segovia, J. M. Go##rriz, J. Rami##rez, I. A##lvarez, J. M. Jime##nez-Hoyuela, S. J. Ortega. 2012. Improved Parkinsonism diagnosis using a partial least squares based approach. *Medical Physics* **39**:7, 4395. [[CrossRef](#)]
140. Peng Ma, Dan Yang, Yongxin Ge, Xiaohong Zhang, Ying Qu. 2012. Face recognition using two-dimensional nonnegative principal component analysis. *Journal of Electronic Imaging* **21**:3, 033011. [[CrossRef](#)]
141. Ayan Seal, Suranjan Gangulyb, Debotosh Bhattacharjee, Mita Nasipuri, Dipak Kumar Basu. 2012. Minutiae Based Thermal Human Face Recognition using Label Connected Component Algorithm. *Procedia Technology* **4**, 604-611. [[CrossRef](#)]
142. J. SHEEBA RANI. 2012. FACE RECOGNITION USING HYBRID APPROACH. *International Journal of Image and Graphics* **12**:01, 1250005. [[CrossRef](#)]
143. Shiv Ram Dubey, A.S. Jalal. 2012. Robust Approach for Fruit and Vegetable Classification. *Procedia Engineering* **38**, 3449-3453. [[CrossRef](#)]
144. Ruihu Wang. 2012. AdaBoost for Feature Selection, Classification and Its Relation with SVM, A Review. *Physics Procedia* **25**, 800-807. [[CrossRef](#)]
145. Fadhlán Hafiz, Amir A. Shafie, Yasir Mohd Mustafah. 2012. Face Recognition From Single Sample Per Person by Learning of Generic Discriminant Vectors. *Procedia Engineering* **41**, 465-472. [[CrossRef](#)]
146. Ahmad Poursaberi, Hossein Noubari, Marina Gavrilova, Svetlana N Yanushkevich. 2012. Gauss####Laguerre wavelet textural feature fusion with geometrical information for facial expression identification. *EURASIP Journal on Image and Video Processing* **2012**:1, 17. [[CrossRef](#)]
147. Carlos Eduardo Thomaz, Vagner do Amaral, Gilson Antonio Giraldo, Edson Caoru Kitani, Jo##o Ricardo Sato, Duncan GilliesA Multi-Linear Statistical Method for Discriminant Analysis of 2D Frontal Face Images 18-33. [[CrossRef](#)]
148. C.J. PrabhakarAnalysis of Face Space for Recognition using Interval-Valued Subspace Technique 108-127. [[CrossRef](#)]
149. T. Ravindra Babu, Chethan S.A. Danivas, S.V. SubrahmanyaAdaptive Face Recognition of Partially Visible Faces 194-211. [[CrossRef](#)]

150. Ahmed Elgammal, Chan Lee Human Motion Analysis Applications of Manifold Learning 253-280. [[CrossRef](#)]
151. Miao Cheng, Chi-Man Pun, Yuan Yan Tang. 2011. Nonnegative class-specific entropy component analysis with adaptive step search criterion. *Pattern Analysis and Applications* . [[CrossRef](#)]
152. Guoqiang Wang, Weijuan Zhang. 2011. Neighborhood Preserving Fisher Discriminant Analysis. *Information Technology Journal* **10**:12, 2464-2469. [[CrossRef](#)]
153. G Betta, D Capriglione, F Crenna, G B Rossi, M Gasparetto, E Zappa, C Liguori, A Paolillo. 2011. Face-based recognition techniques: proposals for the metrological characterization of global and feature-based approaches. *Measurement Science and Technology* **22**:12, 124005. [[CrossRef](#)]
154. Jae Kyu Suhr, Sungmin Eum, Ho Gi Jung, Gen Li, Gahyun Kim, Jaihie Kim. 2011. Recognizability assessment of facial images for automated teller machine applications. *Pattern Recognition* . [[CrossRef](#)]
155. Ronald Poppe. 2011. Facing scalability: Naming faces in an online social network. *Pattern Recognition* . [[CrossRef](#)]
156. Lifang Wu, Peng Xiao, Songlong Yuan, Siyuan Jiang, Chang Wen Chen. 2011. A Fuzzy Vault Scheme for Ordered Biometrics. *Journal of Communications* **6**:9. . [[CrossRef](#)]
157. HENGXIN CHEN, Y. Y. TANG, BIN FANG, JING WEN. 2011. ILLUMINATION INVARIANT FACE RECOGNITION USING FABEMD DECOMPOSITION WITH DETAIL MEASURE WEIGHT. *International Journal of Pattern Recognition and Artificial Intelligence* **25**:08, 1261-1273. [[CrossRef](#)]
158. Wei Jen Chew, Kah Phooi Seng, Li-Minn Ang 3D Face Recognition using an Adaptive Non-Uniform Face Mesh 562-573. [[CrossRef](#)]
159. Katarzyna Wilamowska, Jia Wu, Carrie Heike, Linda Shapiro. 2011. Shape-Based Classification of 3D Facial Data to Support 22q11.2DS Craniofacial Research. *Journal of Digital Imaging* . [[CrossRef](#)]
160. Pu Huang, Zhenmin Tang, Caikou Chen, Xintian Cheng. 2011. Nearest-neighbor classifier motivated marginal discriminant projections for face recognition. *Frontiers of Computer Science in China* . [[CrossRef](#)]
161. Yong Xu, Wangmeng Zuo, Zizhu Fan. 2011. Supervised sparse representation method with a heuristic strategy and face recognition experiments. *Neurocomputing* . [[CrossRef](#)]
162. Jianhuang Lai, Yiju Wang, Guanglu Zhou, Wanquan Liu, Xiaoming Chen, Huining Qiu. 2011. A fast ℓ_1 -solver and its applications to robust face recognition. *Journal of Industrial and Management Optimization* **8**:1, 163-178. [[CrossRef](#)]
163. Meng-Hui Lim, Andrew Beng Jin Teoh, Kar-Ann Toh. 2011. An efficient dynamic reliability-dependent bit allocation for biometric discretization. *Pattern Recognition* . [[CrossRef](#)]
164. STEVEN GILLAN, PANAJOTIS AGATHOKLIS. 2011. A METHOD FOR FACE RECOGNITION USING IMAGE REGISTRATION. *Journal of Circuits, Systems and Computers* **20**:07, 1419-1439. [[CrossRef](#)]
165. John R. Vokey, William E. Hockley. 2011. Unmasking a shady mirror effect: Recognition of normal versus obscured faces. *The Quarterly Journal of Experimental Psychology* 1-21. [[CrossRef](#)]
166. References 591-636. [[CrossRef](#)]
167. Zhizheng Liang, Shixiong Xia, Yong Zhou, Youfu Li. 2011. Blockwise projection matrix versus blockwise data on undersampled problems: Analysis, comparison and applications. *Pattern Recognition* **44**:10-11, 2774-2785. [[CrossRef](#)]
168. Binbin Pan, Jianhuang Lai, Wen-Sheng Chen. 2011. Nonlinear nonnegative matrix factorization based on Mercer kernel construction. *Pattern Recognition* **44**:10-11, 2800-2810. [[CrossRef](#)]
169. Tohari Ahmad, Jiankun Hu, Song Wang. 2011. Pair-polar coordinate-based cancelable fingerprint templates. *Pattern Recognition* **44**:10-11, 2555-2564. [[CrossRef](#)]
170. Alexander Todorov, Ron Dotsch, Daniel H. J. Wigboldus, Chris P. Said. 2011. Data-driven Methods for Modeling Social Perception. *Social and Personality Psychology Compass* **5**:10, 775-791. [[CrossRef](#)]
171. Ying Han Pang, Jin Teoh Andrew Beng, Fazly Salleh Abas. 2011. Regularized locality preserving discriminant embedding for face recognition. *Neurocomputing* . [[CrossRef](#)]
172. Ying Wen. 2011. An improved discriminative common vectors and support vector machine based face recognition approach. *Expert Systems with Applications* . [[CrossRef](#)]
173. Nan Liu, Han Wang. 2011. Weighted principal component extraction with genetic algorithms. *Applied Soft Computing* . [[CrossRef](#)]
174. Jay B. Martin, Thomas L. Griffiths, Adam N. Sanborn. 2011. Testing the Efficiency of Markov Chain Monte Carlo With People Using Facial Affect Categories. *Cognitive Science* no-no. [[CrossRef](#)]
175. Mahdi Tabassian, Reza Ghaderi, Reza Ebrahimpour. 2011. Combining complementary information sources in the Dempster-Shafer framework for solving classification problems with imperfect labels. *Knowledge-Based Systems* . [[CrossRef](#)]

176. Shafin Rahman, Sheikh Motahar Naim, Abdullah Al Farooq, Md. Monirul Islam. 2011. Performance of PCA Based Semi-supervised Learning in Face Recognition Using MPEG-7 Edge Histogram Descriptor. *Journal of Multimedia* **6**:5. . [[CrossRef](#)]
177. HUCHUAN LU, DONG WANG, YEN-WEI CHEN, HAO CHEN. 2011. A NOVEL TEXTURE-BASED MULTI-LINEAR ANALYSIS ALGORITHM FOR FACE RECOGNITION. *International Journal of Image and Graphics* **11**:04, 495-508. [[CrossRef](#)]
178. Zhigang Li, Jingwen Hu, Matthew P. Reed, Jonathan D. Rupp, Carrie N. Hoff, Jinhuan Zhang, Bo Cheng. 2011. Development, Validation, and Application of a Parametric Pediatric Head Finite Element Model for Impact Simulations. *Annals of Biomedical Engineering* . [[CrossRef](#)]
179. M. Balasubramanian, S. Palanivel, V. Ramalingam. 2011. Video-based person recognition using fovea intensity comparison code. *Behaviour & Information Technology* 1-14. [[CrossRef](#)]
180. Edoardo Ballico, Alessandra Bernardi. 2011. On the X-rank with respect to linear projections of projective varieties. *Mathematische Nachrichten* n/a-n/a. [[CrossRef](#)]
181. D. Gonz#lez-Ortega, F. J. D#az-Pernas, M. Ant#n-Rodr#guez, M. Mart#nez-Zarzuela, I. Torre-D#ez, D. Boto-Giralda, J. F. D#ez-Higuera. 2011. Multiple scale neural architecture for face recognition. *Pattern Recognition and Image Analysis* **21**:3, 387-391. [[CrossRef](#)]
182. Yue-Fei Guo, Xiaodong Lin, Zhou Teng, Xiangyang Xue, Jianping Fan. 2011. A covariance-free iterative algorithm for distributed principal component analysis on vertically partitioned data. *Pattern Recognition* . [[CrossRef](#)]
183. M. Alarmel Mangai, N. Ammasai Gounden. 2011. Classification of 3-D objects and faces employing view-based clusters. *Computers & Electrical Engineering* . [[CrossRef](#)]
184. Aditi Roy, Shamik Sural, Jayanta Mukherjee. 2011. Gait recognition using Pose Kinematics and Pose Energy Image. *Signal Processing* . [[CrossRef](#)]
185. Sang-Il Choi, Jiyong Oh, Chong-Ho Choi, Chunghoon Kim. 2011. Input variable selection for feature extraction in classification problems. *Signal Processing* . [[CrossRef](#)]
186. Yanwei Pang, Yuan Yuan, Kongqiao Wang. 2011. Learning optimal spatial filters by discriminant analysis for brain###computer-interface. *Neurocomputing* . [[CrossRef](#)]
187. #ngel Serrano, Isaac Mart#n de Diego, Cristina Conde, Enrique Cabello. 2011. Analysis of variance of Gabor filter banks parameters for optimal face recognition. *Pattern Recognition Letters* . [[CrossRef](#)]
188. M. Saraf, K. Mohammadi, M.R. Mosavi. 2011. Classifying the Geometric Dilution of Precision of GPS satellites utilizing Bayesian decision theory. *Computers & Electrical Engineering* . [[CrossRef](#)]
189. Haichao Zhang, Nasser M. Nasrabadi, Yanning Zhang, Thomas S. Huang. 2011. Joint dynamic sparse representation for multi-view face recognition. *Pattern Recognition* . [[CrossRef](#)]
190. HONG HUANG, JIAMIN LIU, HAILIANG FENG. 2011. UNCORRELATED LOCAL FISHER DISCRIMINANT ANALYSIS FOR FACE RECOGNITION. *International Journal of Pattern Recognition and Artificial Intelligence* **25**:06, 863-887. [[CrossRef](#)]
191. Andrzej Drygajlo, Weifeng Li. 2011. Client-specific A-stack model for adult face verification across aging. *Signal, Image and Video Processing* . [[CrossRef](#)]
192. Fang Zhou, Jianguo Jiang, Peizhen Wang. 2011. Learning-based resolution enhancement technique for single-frame coke micrograph. *JOURNAL OF ELECTRONIC MEASUREMENT AND INSTRUMENT* **25**:7, 597-604. [[CrossRef](#)]
193. Stephen R. Niezgoda, Yuksel C. Yabansu, Surya R. Kalidindi. 2011. Understanding and visualizing microstructure and microstructure variance as a stochastic process. *Acta Materialia* . [[CrossRef](#)]
194. Jiwen Lu, Yap-Peng Tan. 2011. Improved discriminant locality preserving projections for face and palmprint recognition. *Neurocomputing* . [[CrossRef](#)]
195. Yu Chen, Xiao-hong Xu, Jian-huang Lai. 2011. Optimal locality preserving projection for face recognition. *Neurocomputing* . [[CrossRef](#)]
196. Sergey Kucheryavski. 2011. Extracting useful information from images. *Chemometrics and Intelligent Laboratory Systems* **108**:1, 2-12. [[CrossRef](#)]
197. Annan Li, Shiguang Shan, Xilin Chen, Wen Gao. 2011. Cross-Pose Face Recognition Based on Partial Least Squares. *Pattern Recognition Letters* . [[CrossRef](#)]
198. Rainer Stollhoff, Ingo Kennerknecht, Tobias Elze, J#rgen Jost. 2011. A computational model of dysfunctional facial encoding in congenital prosopagnosia. *Neural Networks* **24**:6, 652-664. [[CrossRef](#)]
199. Clinton Fookes, Frank Lin, Vinod Chandran, Sridha Sridharan. 2011. Evaluation of Image Resolution and Super-Resolution on Face Recognition Performance. *Journal of Visual Communication and Image Representation* . [[CrossRef](#)]

200. C.G. Baker, K.A. Gallivan, P. Van Dooren. 2011. Low-rank incremental methods for computing dominant singular subspaces. *Linear Algebra and its Applications* . [[CrossRef](#)]
201. Albert Ali Salah Machine Learning for Biometrics 704-723. [[CrossRef](#)]
202. Aditi Roy, Shamik Sural, Jayanta Mukherjee, Gerhard Rigoll. 2011. Occlusion detection and gait silhouette reconstruction from degraded scenes. *Signal, Image and Video Processing* . [[CrossRef](#)]
203. Jun Sun, Qiao Sun, Brian W. Surgenor. 2011. An adaptable automated visual inspection scheme through online learning. *The International Journal of Advanced Manufacturing Technology* . [[CrossRef](#)]
204. Wankou Yang, Changyin Sun, Jingyu Yang, Helen S. Du, Karl Ricanek. 2011. Face Recognition Using Kernel UDP. *Neural Processing Letters* . [[CrossRef](#)]
205. Mauricio Correa, Gabriel Hermosilla, Rodrigo Verschae, Javier Ruiz-del-Solar. 2011. Human Detection and Identification by Robots Using Thermal and Visual Information in Domestic Environments. *Journal of Intelligent & Robotic Systems* . [[CrossRef](#)]
206. Bruce Poon, M. Ashraful Amin, Hong Yan. 2011. Performance evaluation and comparison of PCA Based human face recognition methods for distorted images. *International Journal of Machine Learning and Cybernetics* . [[CrossRef](#)]
207. Pang Ying Han, Andrew Teoh Beng Jin, Toh Kar Ann. 2011. Kernel Discriminant Embedding in Face Recognition. *Journal of Visual Communication and Image Representation* . [[CrossRef](#)]
208. Haiping Lu, Konstantinos N. Plataniotis, Anastasios N. Venetsanopoulos. 2011. A survey of multilinear subspace learning for tensor data. *Pattern Recognition* **44**:7, 1540-1551. [[CrossRef](#)]
209. Shuai Liu, Qiuqi Ruan. 2011. Orthogonal Tensor Neighborhood Preserving Embedding for facial expression recognition. *Pattern Recognition* **44**:7, 1497-1513. [[CrossRef](#)]
210. C##lin-Daniel C##leanu, Xia Mao, Gilbert Pradel, Sorin Moga, Yuli Xue. 2011. Combined pattern search optimization of feature extraction and classification parameters in facial recognition. *Pattern Recognition Letters* **32**:9, 1250-1255. [[CrossRef](#)]
211. Ferhat Kurtulmus, Won Suk Lee, Ali Vardar. 2011. Green citrus detection using ##eigenfruit##, color and circular Gabor texture features under natural outdoor conditions. *Computers and Electronics in Agriculture* . [[CrossRef](#)]
212. Q.L. Ye, C.X. Zhao, H.F. Zhang, X.B. Chen. 2011. Recursive ##concave##convex## Fisher Linear Discriminant with applications to face, handwritten digit and terrain recognition. *Pattern Recognition* . [[CrossRef](#)]
213. Imran Naseem, Roberto Togneri, Mohammed Bennamoun. 2011. Robust regression for face recognition. *Pattern Recognition* . [[CrossRef](#)]
214. Su-Jing Wang, Chun-Guang Zhou, Yu-Hsin Chen, Xu-Jun Peng, Hui-Ling Chen, Gang Wang, Xiaohua Liu. 2011. A novel face recognition method based on sub-pattern and tensor. *Neurocomputing* . [[CrossRef](#)]
215. Su-Jing Wang, Hui-Ling Chen, Xu-Jun Peng, Chun-Guang Zhou. 2011. Exponential locality preserving projections for small sample size problem. *Neurocomputing* . [[CrossRef](#)]
216. Rutuparna Panda, Manoj Kumar Naik, B.K. Panigrahi. 2011. Face recognition using bacterial foraging strategy. *Swarm and Evolutionary Computation* . [[CrossRef](#)]
217. Mahdi Tabassian, Reza Ghaderi, Reza Ebrahimpour. 2011. Combination of multiple diverse classifiers using belief functions for handling data with imperfect labels. *Expert Systems with Applications* . [[CrossRef](#)]
218. Rodrigo Cilla, Miguel A. Patricio, Antonio Berlanga, Jos## M. Molina. 2011. A probabilistic, discriminative and distributed system for the recognition of human actions from multiple views. *Neurocomputing* . [[CrossRef](#)]
219. Dianhui H. Wang, Paul Conilione. 2011. Machine learning approach for face image retrieval. *Neural Computing and Applications* . [[CrossRef](#)]
220. Hasan Fleyeh, Erfan Davami. 2011. Eigen Based Traffic Sign Recognition Which Aids In Achieving Intelligent Speed Adaptation. *Journal of Intelligent Systems* ---. [[CrossRef](#)]
221. Xuguang Chen, Wojciech Ziarko. 2011. Experiments with rough set approach to face recognition. *International Journal of Intelligent Systems* **26**:6, 499-517. [[CrossRef](#)]
222. Jianguo Ma, Rolf M##ller. 2011. A method for characterizing the biodiversity in bat pinnae as a basis for engineering analysis. *Bioinspiration & Biomimetics* **6**:2, 026008. [[CrossRef](#)]
223. Sue-Kyeong Park, Dong-Gyu Sim. 2011. New MCT-based face recognition under varying lighting conditions. *International Journal of Control, Automation and Systems* **9**:3, 542-549. [[CrossRef](#)]
224. Wankou Yang, Changyin Sun, Zhenyu Wang. 2011. Finger-knuckle-print recognition using Gabor feature and MMDA. *Frontiers of Electrical and Electronic Engineering in China* **6**:2, 374-380. [[CrossRef](#)]
225. Mehmet Ko##, Atalay Barkana. 2011. A new solution to one sample problem in face recognition using FLDA. *Applied Mathematics and Computation* . [[CrossRef](#)]

226. XiaoDong Yang, AiJun He, Peng Liu, TongFeng Sun, XinBao Ning. 2011. Complexity and characteristic frequency studies in ECG signals of mice based on multiple scale factors. *Science China Life Sciences* **54**:6, 544-552. [[CrossRef](#)]
227. Yongjin Wang, D Hatzinakos. 2011. On Random Transformations for Changeable Face Verification. *IEEE Transactions on Systems, Man, and Cybernetics, Part B (Cybernetics)* **41**:3, 840-854. [[CrossRef](#)]
228. Xin Geng, K Smith-Miles, Zhi-Hua Zhou, Liang Wang. 2011. Face Image Modeling by Multilinear Subspace Analysis With Missing Values. *IEEE Transactions on Systems, Man, and Cybernetics, Part B (Cybernetics)* **41**:3, 881-892. [[CrossRef](#)]
229. Yee Wan Wong, Sue Inn Ch#####ng, Kah Phooi Seng, Li-Minn Ang, Siew Wen Chin, Wei Jen Chew, King Hann Lim. 2011. A New Multi-Purpose Audio-Visual UNMC-VIER Database with Multiple Variabilities. *Pattern Recognition Letters* . [[CrossRef](#)]
230. W.K. Wong, H.T. Zhao. 2011. Supervised optimal locality preserving projection. *Pattern Recognition* . [[CrossRef](#)]
231. Changming Ye, Jianguo Jiang, Shu Zhan, Shigeru Ando. 2011. Face recognition in complex domain based on 3D facial imaging system. *JOURNAL OF ELECTRONIC MEASUREMENT AND INSTRUMENT* **25**:5, 420-426. [[CrossRef](#)]
232. A. Mike Burton, Rob Jenkins, Stefan R. Schweinberger. 2011. Mental representations of familiar faces. *British Journal of Psychology* no-no. [[CrossRef](#)]
233. Satoru Oishi, Hideki Ina, Tomoyuki Miyashita. 2011. Signal Processing Using Karhunen####Lo##ve Expansion for Wafer Focus Measurement in Lithography. *Japanese Journal of Applied Physics* **50**:6, 06GJ06. [[CrossRef](#)]
234. David C. Plaut, Marlene Behrmann. 2011. Complementary neural representations for faces and words: A computational exploration. *Cognitive Neuropsychology* **28**:3-4, 251-275. [[CrossRef](#)]
235. Maciej Smiatacz, Witold Malina. 2011. SDF classifier revisited. *Expert Systems* no-no. [[CrossRef](#)]
236. Jun GAO, Shi-Tong WANG, Xiao-Ming WANG. 2011. Contextual-distance Metric Based Laplacian Maximum Margin Criterion. *Acta Automatica Sinica* **36**:12, 1661-1673. [[CrossRef](#)]
237. Jianguo Wang, Jizhao Hua. 2011. Supervised Discriminant Projection with Its Application to Face Recognition. *Neural Processing Letters* . [[CrossRef](#)]
238. Minghua Wan, Zhihui Lai, Zhong Jin. 2011. Locally Minimizing Embedding and Globally Maximizing Variance: Unsupervised Linear Difference Projection for Dimensionality Reduction. *Neural Processing Letters* . [[CrossRef](#)]
239. Guangpeng Zhang, Yunhong Wang. 2011. Robust 3D face recognition based on resolution invariant features. *Pattern Recognition Letters* **32**:7, 1009-1019. [[CrossRef](#)]
240. Beom-Seok Oh, Kar-Ann Toh, Andrew Beng Jin Teoh, Jaihie Kim. 2011. Combining local face image features for identity verification. *Neurocomputing* . [[CrossRef](#)]
241. Weiwei Zong, Guang-Bin Huang. 2011. Face recognition based on extreme learning machine. *Neurocomputing* . [[CrossRef](#)]
242. Jae Young Choi, Yong Man Ro, K N Plataniotis. 2011. Boosting Color Feature Selection for Color Face Recognition. *IEEE Transactions on Image Processing* **20**:5, 1425-1434. [[CrossRef](#)]
243. Ajmal Mian. 2011. Online learning from local features for video-based face recognition. *Pattern Recognition* **44**:5, 1068-1075. [[CrossRef](#)]
244. Yun-Hao Yuan, Quan-Sen Sun, Qiang Zhou, De-Shen Xia. 2011. A novel multiset integrated canonical correlation analysis framework and its application in feature fusion. *Pattern Recognition* **44**:5, 1031-1040. [[CrossRef](#)]
245. Wenfei Gu, Cheng Xiang, Y.V. Venkatesh, Dong Huang, Hai Lin. 2011. Facial expression recognition using radial encoding of local Gabor features and classifier synthesis. *Pattern Recognition* . [[CrossRef](#)]
246. Deng-Yuan Huang, Wu-Chih Hu, Sung-Hsiang Chang. 2011. Gabor filter-based hand-pose angle estimation for hand gesture recognition under varying illumination. *Expert Systems with Applications* **38**:5, 6031-6042. [[CrossRef](#)]
247. Xiaohua Gu, Weiguo Gong, Liping Yang. 2011. Regularized locality preserving discriminant analysis for face recognition. *Neurocomputing* . [[CrossRef](#)]
248. Dong Wang, Huchuan Lu, Xuelong Li. 2011. Two dimensional principal components of natural images and its application. *Neurocomputing* . [[CrossRef](#)]
249. Songsong Wu, Mingming Sun, Jingyu Yang. 2011. Stochastic neighbor projection on manifold for feature extraction. *Neurocomputing* . [[CrossRef](#)]
250. Caikou Chen, Jun Shi. 2011. Local correlation discriminant analysis and its semi-supervised extension. *Journal of Electronics (China)* **28**:3, 289-296. [[CrossRef](#)]
251. GUANGHUI HE, YUANYAN TANG, BIN FANG, Patrick S. P. WANG. 2011. BIONIC FACE RECOGNITION USING GABOR TRANSFORMATION. *International Journal of Pattern Recognition and Artificial Intelligence* **25**:03, 391-402. [[CrossRef](#)]

252. Matthieu Guillaumin, Thomas Mensink, Jakob Verbeek, Cordelia Schmid. 2011. Face Recognition from Caption-Based Supervision. *International Journal of Computer Vision* . [[CrossRef](#)]
253. Matthias S. Keil Human Face Recognition and Image Statistics using Matlab 809-831. [[CrossRef](#)]
254. Ling-Jing Kao, Chi-Jie Lu, Chih-Chou Chiu. 2011. Efficiency measurement using independent component analysis and data envelopment analysis. *European Journal of Operational Research* **210**:2, 310-317. [[CrossRef](#)]
255. Ajmal Mian. 2011. Illumination invariant recognition and 3D reconstruction of faces using desktop optics. *Optics Express* **19**:8, 7491. [[CrossRef](#)]
256. Dong-juan ZHAO, Jiu-zhen LIANG. 2011. Face recognition algorithm fusing 2DPCA and fuzzy 2DLDA. *Journal of Computer Applications* **31**:2, 420-422. [[CrossRef](#)]
257. Kyu-Dae Ban, Jaeyeon Lee, DoHyung Kim, Jaehong Kim, Yun Koo Chung. 2011. Tiny and Blurred Face Alignment for Long Distance Face Recognition. *ETRI Journal* . [[CrossRef](#)]
258. Chang Shu, Xiaoqing Ding, Chi Fang. 2011. Histogram of the Oriented Gradient for Face Recognition. *Tsinghua Science & Technology* **16**:2, 216-224. [[CrossRef](#)]
259. Su-Jing Wang, Chun-Guang Zhou, Na Zhang, Xu-Jun Peng, Yu-Hsin Chen, Xiaohua Liu. 2011. Face recognition using second-order discriminant tensor subspace analysis. *Neurocomputing* . [[CrossRef](#)]
260. Yi Zheng Goh, Andrew Beng Jin Teoh, Michael Kah Ong Goh. 2011. Wavelet local binary patterns fusion as illuminated facial image preprocessing for face verification. *Expert Systems with Applications* **38**:4, 3959-3972. [[CrossRef](#)]
261. R C Hoover, A A Maciejewski, R G Roberts. 2011. Fast Eigenspace Decomposition of Images of Objects With Variation in Illumination and Pose. *IEEE Transactions on Systems, Man, and Cybernetics, Part B (Cybernetics)* **41**:2, 318-329. [[CrossRef](#)]
262. Wonjun Hwang, Haitao Wang, Hyunwoo Kim, Seok-Cheol Kee, Junmo Kim. 2011. Face Recognition System Using Multiple Face Model of Hybrid Fourier Feature Under Uncontrolled Illumination Variation. *IEEE Transactions on Image Processing* **20**:4, 1152-1165. [[CrossRef](#)]
263. Toby H.W. Lam, K.H. Cheung, James N.K. Liu. 2011. Gait flow image: A silhouette-based gait representation for human identification. *Pattern Recognition* **44**:4, 973-987. [[CrossRef](#)]
264. Amar Khoukhi, Syed Faraz Ahmed. 2011. A genetically modified fuzzy linear discriminant analysis for face recognition. *Journal of the Franklin Institute* . [[CrossRef](#)]
265. Banafshe Arbab-Zavar, Mark S. Nixon. 2011. On guided model-based analysis for ear biometrics. *Computer Vision and Image Understanding* **115**:4, 487-502. [[CrossRef](#)]
266. Zhong-bao LIU, Shi-tong WANG. 2011. Improved linear discriminant analysis method. *Journal of Computer Applications* **31**:1, 250-253. [[CrossRef](#)]
267. A. Alfalou, C. Brosseau. 2011. Robust and discriminating method for face recognition based on correlation technique and independent component analysis model. *Optics Letters* **36**:5, 645. [[CrossRef](#)]
268. Zhi-wei Zhang, Fan Yang, Ke-wen Xia, Rui-xia Yang. 2011. A Supervised LPP Algorithm and Its Application to Face Recognition. *Journal of Electronics & Information Technology* **30**:3, 539-541. [[CrossRef](#)]
269. Shanwen Zhang, Ying-Ke Lei. 2011. Modified locally linear discriminant embedding for plant leaf recognition. *Neurocomputing* . [[CrossRef](#)]
270. Hua Wu, Shi-Yin Qin. 2011. An approach to robot SLAM based on incremental appearance learning with omnidirectional vision. *International Journal of Systems Science* **42**:3, 407-427. [[CrossRef](#)]
271. Guangzhi Cao, L R Bachega, C A Bouman. 2011. The Sparse Matrix Transform for Covariance Estimation and Analysis of High Dimensional Signals. *IEEE Transactions on Image Processing* **20**:3, 625-640. [[CrossRef](#)]
272. Bongjin Jun, Taewan Kim, Daijin Kim. 2011. A compact local binary pattern using maximization of mutual information for face analysis. *Pattern Recognition* **44**:3, 532-543. [[CrossRef](#)]
273. Haifeng Hu. 2011. Augmented DT-CWT feature based classification using Regularized Neighborhood Projection Discriminant Analysis for face recognition. *Pattern Recognition* **44**:3, 519-531. [[CrossRef](#)]
274. Yaoliang Yu, Jiayan Jiang, Liming Zhang. 2011. Distance metric learning by minimal distance maximization. *Pattern Recognition* **44**:3, 639-649. [[CrossRef](#)]
275. Heiko Claussen, Justinian Rosca, Robert Dampier. 2011. Signature extraction using mutual interdependencies. *Pattern Recognition* **44**:3, 650-661. [[CrossRef](#)]
276. Guan-Chun Luh, Chun-Yi Lin. 2011. PCA based immune networks for human face recognition. *Applied Soft Computing* **11**:2, 1743-1752. [[CrossRef](#)]
277. Stefanos Zafeiriou, Maria Petrou. 2011. 2.5D Elastic graph matching. *Computer Vision and Image Understanding* . [[CrossRef](#)]

278. LINLIN SHEN, LI BAI, ZHEN JI. 2011. FPCODE: AN EFFICIENT APPROACH FOR MULTI-MODAL BIOMETRICS. *International Journal of Pattern Recognition and Artificial Intelligence* **25**:02, 273-286. [[CrossRef](#)]
279. Jin-Ho Kim. 2011. Fully Automatic Facial Recognition Algorithm By Using Gabor Feature Based Face Graph. *The Journal of the Korea Contents Association* **11**:2, 31-39. [[CrossRef](#)]
280. Miao Cheng, Bin Fang, Chi-Man Pun, Yuan Yan Tang. 2011. Kernel-view based discriminant approach for embedded feature extraction in high-dimensional space. *Neurocomputing* . [[CrossRef](#)]
281. Xiaoyuan Jing, Sheng Li, Chao Lan, David Zhang, Jingyu Yang, Qian Liu. 2011. Color image canonical correlation analysis for face feature extraction and recognition. *Signal Processing* . [[CrossRef](#)]
282. Ioannis Brilakis, Man-Woo Park, Gauri Jog. 2011. Automated vision tracking of project related entities. *Advanced Engineering Informatics* . [[CrossRef](#)]
283. Lingling Jiang, Haiqing Yin. 2011. Bregman iteration algorithm for sparse nonnegative matrix factorizations via alternating l_1 -norm minimization. *Multidimensional Systems and Signal Processing* . [[CrossRef](#)]
284. Yan-wei Pang, Zheng-kai Liu. 2011. Automatically Outlier-Resisting Subspace Learning. *Journal of Electronics & Information Technology* **30**:1, 176-179. [[CrossRef](#)]
285. Matthew B. Blaschko, Jacquelyn A. Shelton, Andreas Bartels, Christoph H. Lampert, Arthur Gretton. 2011. Semi-supervised Kernel Canonical Correlation Analysis with Application to Human fMRI. *Pattern Recognition Letters* . [[CrossRef](#)]
286. Patrick Cavanagh. 2011. Visual cognition. *Vision Research* . [[CrossRef](#)]
287. Chandra Shekhar Dhir, Jaehyung Lee, Soo-Young Lee. 2011. Extraction of independent discriminant features for data with asymmetric distribution. *Knowledge and Information Systems* . [[CrossRef](#)]
288. T. R. Melzer, R. Watts, M. R. MacAskill, J. F. Pearson, S. Rueger, T. L. Pitcher, L. Livingston, C. Graham, R. Keenan, A. Shankaranarayanan, D. C. Alsop, J. C. Dalrymple-Alford, T. J. Anderson. 2011. Arterial spin labelling reveals an abnormal cerebral perfusion pattern in Parkinson's disease. *Brain* . [[CrossRef](#)]
289. M. T. Gopala Krishna, M. Ravishankar, D. R. Ramesh Babu, V. N. Manjunath Aradhya. 2011. SiMOR: Single Moving Object Recognition. *Journal of Intelligent Systems ---*. [[CrossRef](#)]
290. Jian Yang. 2011. Kernel feature extraction methods observed from the viewpoint of generating-kernels. *Frontiers of Electrical and Electronic Engineering in China* . [[CrossRef](#)]
291. Takahiro Ogawa, Miki Haseyama. 2011. Missing Intensity Interpolation Using a Kernel PCA-Based POCS Algorithm and its Applications. *IEEE Transactions on Image Processing* **20**:2, 417-432. [[CrossRef](#)]
292. Jae Young Choi, Wesley De Neve, Konstantinos N. Plataniotis, Yong Man Ro. 2011. Collaborative Face Recognition for Improved Face Annotation in Personal Photo Collections Shared on Online Social Networks. *IEEE Transactions on Multimedia* **13**:1, 14-28. [[CrossRef](#)]
293. Kwontaeg Choi, Kar-Ann Toh, Hyeran Byun. 2011. Realtime training on mobile devices for face recognition applications. *Pattern Recognition* **44**:2, 386-400. [[CrossRef](#)]
294. Jae Young Choi, Yong Man Ro, Konstantinos N. Plataniotis. 2011. A comparative study of preprocessing mismatch effects in color image based face recognition. *Pattern Recognition* **44**:2, 412-430. [[CrossRef](#)]
295. Salvador E. Ayala-Raggi, Leopoldo Altamirano-Robles, Janeth Cruz-Enriquez. 2011. Automatic face interpretation using fast 3D illumination-based AAM models. *Computer Vision and Image Understanding* **115**:2, 194-210. [[CrossRef](#)]
296. YU CHEN, JIAN HUANG, XIAOHONG XU, JIANHUANG LAI. 2011. DISCRIMINATIVE LOCAL LEARNING PROJECTION FOR FACE RECOGNITION. *International Journal of Pattern Recognition and Artificial Intelligence* **25**:01, 83-97. [[CrossRef](#)]
297. MIAO CHENG, BIN FANG, YUAN YAN TANG, HENGXIN CHEN. 2011. A COMPUTATIONAL AND THEORETICAL ANALYSIS OF LOCAL NULL SPACE DISCRIMINANT METHOD FOR PATTERN CLASSIFICATION. *International Journal of Pattern Recognition and Artificial Intelligence* **25**:01, 117-134. [[CrossRef](#)]
298. K. RUBA SUNDAR, K. MURUGESAN. 2011. AN ADAPTIVE FACE RECOGNITION IN COMBINED GLOBAL AND LOCAL PRESERVING FEATURE SPACE. *International Journal of Pattern Recognition and Artificial Intelligence* **25**:01, 99-115. [[CrossRef](#)]
299. O. D##niz, G. Bueno, J. Salido[a] F. De la Torre. 2011. Face Recognition using Histograms of Oriented Gradients. *Pattern Recognition Letters* . [[CrossRef](#)]
300. Pramod Kumar P, Prahlad Vadakkepat, Loh Ai Poh. 2011. Fuzzy-rough discriminative feature selection and classification algorithm, with application to microarray and image datasets. *Applied Soft Computing* . [[CrossRef](#)]
301. Xiaofei He, Binbin Lin. 2011. Tangent space learning and generalization. *Frontiers of Electrical and Electronic Engineering in China* . [[CrossRef](#)]

302. Christopher W. Connor, Scott Segal. 2011. Accurate Classification of Difficult Intubation by Computerized Facial Analysis. *Anesthesia & Analgesia* **112**:1, 84-93. [[CrossRef](#)]
303. Xian-Hua HAN, Xu QIAO, Yen-Wei CHEN. 2011. Multilinear Supervised Neighborhood Embedding with Local Descriptor Tensor for Face Recognition. *IEICE Transactions on Information and Systems* **E94-D**:1, 158-161. [[CrossRef](#)]
304. Byounggyu Choi, Youngsung Kim, Kar-Ann Toh. 2011. Fusion of visual and infrared face verification systems. *Security and Communication Networks* n/a-n/a. [[CrossRef](#)]
305. A. Douzal-Chouakria, L. Billard, E. Diday. 2011. Principal component analysis for interval-valued observations. *Statistical Analysis and Data Mining* n/a-n/a. [[CrossRef](#)]
306. Marko Stoiljic, Manuel Marques, Joao Paulo Costeira. 2011. Convex solution of a permutation problem. *Linear Algebra and its Applications* **434**:1, 361-369. [[CrossRef](#)]
307. Tao Peng, Robert F. Murphy. 2011. Image-derived, three-dimensional generative models of cellular organization. *Cytometry Part A* n/a-n/a. [[CrossRef](#)]
308. H. Fleyeh, E. Davami. 2011. Eigen-based traffic sign recognition. *IET Intelligent Transport Systems* **5**:3, 190. [[CrossRef](#)]
309. Marsha Meytlis. 2011. A model of face space. *Visual Cognition* **19**:1, 13-26. [[CrossRef](#)]
310. Junpei YAMAGUCHI, Kazutaka SHIMADA, Shuichi ENOKIDA, Toshiaki EJIMA, Tsutomu ENDO. 2011. Personal Identification Using Facial Feature and Context. *Journal of Japan Society for Fuzzy Theory and Intelligent Informatics* **23**:2, 137-145. [[CrossRef](#)]
311. Lei Wang, Jianshe Zhang, Fei Zang. 2011. An Efficient Feature Extraction Method, Global Between Maximum and Local Within Minimum, and Its Applications. *Mathematical Problems in Engineering* **2011**, 1-15. [[CrossRef](#)]
312. Masakazu Akiba, Chalothorn Liewchavalit, Tsuneo Kanno, Tomoharu Nagao. 2011. Use of PCA with Information on Impressions to Extract of Racial Facial Feature Between Images of Japanese and Thai Faces. *The Journal of The Institute of Image Information and Television Engineers* **65**:5, 704-712. [[CrossRef](#)]
313. Zhonglong Zheng, Jie Yang. 2011. Exemplar based Laplacian Discriminant Projection. *Expert Systems with Applications* **38**:1, 1061-1065. [[CrossRef](#)]
314. Hua Huang, Huiting He. 2011. Super-Resolution Method for Face Recognition Using Nonlinear Mappings on Coherent Features. *IEEE Transactions on Neural Networks* **22**:1, 121-130. [[CrossRef](#)]
315. Jiwen Lu, Yap-Peng Tan. 2011. Nearest Feature Space Analysis for Classification. *IEEE Signal Processing Letters* **18**:1, 55-58. [[CrossRef](#)]
316. Chih-Bin Hsu, Shu-Sheng Hao, Jen-Chun Lee. 2011. Personal authentication through dorsal hand vein patterns. *Optical Engineering* **50**:8, 087201. [[CrossRef](#)]
317. Nicholas J. Tustison, Brian B. Avants, Lucia Flors, Talissa A. Altes, Eduard E. de Lange, John P. Mugler, James C. Gee. 2011. Ventilation-based segmentation of the lungs using hyperpolarized ³He MRI. *Journal of Magnetic Resonance Imaging* n/a-n/a. [[CrossRef](#)]
318. Yousra Ben Jemaa, Ahmed Derbel, Ahmed Ben Jmaa. 2011. 2DPCA Fractal features and Genetic Algorithm for Efficient Face representation and recognition. *EURASIP Journal on Information Security* **2011**:1, 1. [[CrossRef](#)]
319. Chahrazed Rouabhia, Hicham Tebbikh. 2011. Efficient face recognition based on weighted matrix distance metrics and 2DPCA algorithm. *Archives of Control Sciences* **21**:2, 207-221. [[CrossRef](#)]
320. Seyyed Mohammad Reza Farshchi, Saeed Toosizadeh. 2011. A safe authentication system for distance education. *Computer Applications in Engineering Education* n/a-n/a. [[CrossRef](#)]
321. Xiaoyun Yang, Greg Slabaugh. 2011. A robust and efficient approach to detect 3D rectal tubes from CT colonography. *Medical Physics* **38**:11, 6238. [[CrossRef](#)]
322. Ekaterina Nevodninskaya, Oleg A. Mayboroda, Andrzej M. Deelder. 2011. Cross-platform analysis of longitudinal data in metabolomics. *Molecular BioSystems* . [[CrossRef](#)]
323. Binu Muraleedharan Nair, Jacob Foytik, Richard Tompkins, Yakov Diskin, Theus Aspiras, Vijayan Asari. 2011. Multi-Pose Face Recognition And Tracking System. *Procedia Computer Science* **6**, 381-386. [[CrossRef](#)]
324. Yufeng Zheng. 2011. Orientation-based face recognition using multispectral imagery and score fusion. *Optical Engineering* **50**:11, 117202. [[CrossRef](#)]
325. Meng-Hui Lim, Andrew Beng Jin Teoh, Kar-Ann Toh. 2011. An analysis on equal width quantization and linearly separable subcode encoding-based discretization and its performance resemblances. *EURASIP Journal on Advances in Signal Processing* **2011**:1, 82. [[CrossRef](#)]
326. M.E. Saleh, A.B. Mohamed, A.A. Nabi. 2011. Eigenviruses for metamorphic virus recognition. *IET Information Security* **5**:4, 191. [[CrossRef](#)]

327. Bailing Zhang. 2011. Multiple features facial image retrieval by spectral regression and fuzzy aggregation approach. *International Journal of Intelligent Computing and Cybernetics* **4**:4, 420-441. [[CrossRef](#)]
328. Shih-Wei Chen, Sheng-Huang Lin, Lun-De Liao, Hsin-Yi Lai, Yu-Cheng Pei, Te-Son Kuo, Chin-Teng Lin, Jyh-Yeong Chang, You-Yin Chen, Yu-Chun Lo, Shin-Yuan Chen, Robby Wu, Siny Tsang. 2011. Quantification and recognition of parkinsonian gait from monocular video imaging using kernel-based principal component analysis. *BioMedical Engineering OnLine* **10**:1, 99. [[CrossRef](#)]
329. Jaeik Jo, Sung Joo Lee, Ho Gi Jung, Kang Ryoung Park, Jaihie Kim. 2011. Vision-based method for detecting driver drowsiness and distraction in driver monitoring system. *Optical Engineering* **50**:12, 127202. [[CrossRef](#)]
330. Gozde Unal, Delphine Nain, Greg Slabaugh, Tong Fang. 2011. Generating shapes by analogies: An application to hearing aid design. *Computer-Aided Design* **43**:1, 47-56. [[CrossRef](#)]
331. Takahiro Ogawa, Miki Haseyama. 2011. Adaptive example-based super-resolution using Kernel PCA with a novel classification approach. *EURASIP Journal on Advances in Signal Processing* **2011**:1, 138. [[CrossRef](#)]
332. Rachid Beghdad, Mohamed Touati, Mohamed Seghir Berboucha. 2011. A Data Analysis-Based Approach for Detecting Intruders. *Information Security Journal: A Global Perspective* **20**:4-5, 194-209. [[CrossRef](#)]
333. Ningbo Zhu, Kaikai Lv, Cong Li. 2011. Complex matrix PCA consisting of two transform steps. *Energy Procedia* **13**, 7739-7744. [[CrossRef](#)]
334. Deng Zhixiang, Liu Hongyang. 2011. The Application of Face Recognition on Restricting Behaviors of Repetitious Vote in Electronic Voting System. *Energy Procedia* **13**, 6324-6331. [[CrossRef](#)]
335. Yu-Shan Wu, Gwo-Hwa Ju, Heng-Sung Liu, Hsin-Ming Chen. 2011. Improved Face Recognition by Integrating Local Binary Pattern and Constrained Mutual Subspace Method. *Energy Procedia* **13**, 3280-3287. [[CrossRef](#)]
336. Pjotrs Dorogovs, Arkady Borisov, Andrejs Romanovs. 2011. Building an Intrusion Detection System for IT Security Based on Data Mining Techniques. *Scientific Journal of Riga Technical University. Computer Sciences* **45**:-1, 43-48. [[CrossRef](#)]
337. YA SU, XINBO GAO. 2011. ITERATIVE SHAPE REFINEMENT IN AAM. *International Journal of Image and Graphics* **11**:01, 137-151. [[CrossRef](#)]
338. Mohamed Ben Haj Rhouma, Mohamed Ali Khabou, Lotfi HermiShape Recognition Based on Eigenvalues of the Laplacian **167**, 185-254. [[CrossRef](#)]
339. Liu Zhufeng, Chen Gang. 2011. The Strategy of Region Split in LRPCA. *Procedia Engineering* **23**, 199-203. [[CrossRef](#)]
340. Alessandro Colombo, Claudio Cusano, Raimondo Schettini. 2010. Three-Dimensional Occlusion Detection and Restoration of Partially Occluded Faces. *Journal of Mathematical Imaging and Vision* . [[CrossRef](#)]
341. Philipp Sandhaus, Susanne Boll. 2010. Semantic analysis and retrieval in personal and social photo collections. *Multimedia Tools and Applications* . [[CrossRef](#)]
342. Imran Fareed Nizami, Sungjun Hong, Heesung Lee, Byungyun Lee, Euntai Kim. 2010. Automatic gait recognition based on probabilistic approach. *International Journal of Imaging Systems and Technology* **20**:4, 400-408. [[CrossRef](#)]
343. Vivek Menon, Bharat Jayaraman, Venu Govindaraju. 2010. Multimodal identification and tracking in smart environments. *Personal and Ubiquitous Computing* **14**:8, 685-694. [[CrossRef](#)]
344. SuiCheng Gu, Ying Tan, XinGui He. 2010. Laplacian smoothing transform for face recognition. *Science China Information Sciences* **53**:12, 2415-2428. [[CrossRef](#)]
345. N. L. Shchegoleva, G. A. Kukharev. 2010. Application of two-dimensional principal component analysis for recognition of face images. *Pattern Recognition and Image Analysis* **20**:4, 513-527. [[CrossRef](#)]
346. Sung-Kwun Oh, Jin-Wook Seok, Ki-Sang Kim, Hyun-Ki Kim. 2010. A Design on Face Recognition System Based on pRBFNNs by Obtaining Real Time Image. *Journal of Institute of Control, Robotics and Systems* **16**:12, 1150-1158. [[CrossRef](#)]
347. Koichiro Niinuma, Unsang Park, Anil K. Jain. 2010. Soft Biometric Traits for Continuous User Authentication. *IEEE Transactions on Information Forensics and Security* **5**:4, 771-780. [[CrossRef](#)]
348. Norman Poh, Chi Ho Chan, Josef Kittler, Bastien Marcel, Christopher Mc Cool, Enrique Argones Rua, Jos Luis Alba Castro, Mauricio Villegas, Roberto Paredes, Vitomir Struc, Nikola Pavesic, Albert Ali Salah, Hui Fang, Nicholas Costen. 2010. An Evaluation of Video-to-Video Face Verification. *IEEE Transactions on Information Forensics and Security* **5**:4, 781-801. [[CrossRef](#)]
349. Alex Pappachen James, Sima Dimitrijević. 2010. Inter-image outliers and their application to image classification. *Pattern Recognition* **43**:12, 4101-4112. [[CrossRef](#)]
350. Hong Huang, Jianwei Li, Jiamin Liu. 2010. Enhanced semi-supervised local Fisher discriminant analysis for face recognition. *Future Generation Computer Systems* . [[CrossRef](#)]
351. Abhishek Sharma, Anamika Dubey, A. N. Jagannatha, R. S. Anand. 2010. Pose invariant face recognition based on hybrid-global linear regression. *Neural Computing and Applications* **19**:8, 1227-1235. [[CrossRef](#)]

352. CHAN-SU LEE, AHMED ELGAMMAL. 2010. DYNAMIC SHAPE STYLE ANALYSIS: BILINEAR AND MULTILINEAR HUMAN IDENTIFICATION WITH TEMPORAL NORMALIZATION. *International Journal of Pattern Recognition and Artificial Intelligence* **24**:07, 1133-1157. [[CrossRef](#)]
353. XI CHEN, JIASHU ZHANG. 2010. MAXIMUM VARIANCE DIFFERENCE BASED EMBEDDING APPROACH FOR FACIAL FEATURE EXTRACTION. *International Journal of Pattern Recognition and Artificial Intelligence* **24**:07, 1047-1060. [[CrossRef](#)]
354. nsen Toygar, Hakan Alt n ay. 2010. Preserving spatial information and overcoming variations in appearance for face recognition. *Pattern Analysis and Applications* . [[CrossRef](#)]
355. Sun-Hyung Choi, Seong-Won Cho, Sun-Tae Chung. 2010. Improvement of Face Recognition Speed Using Pose Estimation. *Journal of Korean institute of intelligent systems* **20**:5, 677-682. [[CrossRef](#)]
356. Liu Wenying, Xiaojun Quan, Min Feng, Bite Qiu. 2010. A short text modeling method combining semantic and statistical information. *Information Sciences* **180**:20, 4031-4041. [[CrossRef](#)]
357. Mark A. Davenport, Chinmay Hegde, Marco F. Duarte, Richard G. Baraniuk. 2010. Joint Manifolds for Data Fusion. *IEEE Transactions on Image Processing* **19**:10, 2580-2594. [[CrossRef](#)]
358. Arnau Oliver, Xavier Llad n, Elsa P rez, Josep Pont, Erika R. E. Denton, Jordi Freixenet, Joan Mart n. 2010. A Statistical Approach for Breast Density Segmentation. *Journal of Digital Imaging* **23**:5, 527-537. [[CrossRef](#)]
359. Chandan K. Reddy, Mohammad S. Aziz. 2010. Modeling local nonlinear correlations using subspace principal curves. *Statistical Analysis and Data Mining* **3**:5, 332-349. [[CrossRef](#)]
360. Yongjin Wang, K N Plataniotis. 2010. An Analysis of Random Projection for Changeable and Privacy-Preserving Biometric Verification. *IEEE Transactions on Systems, Man, and Cybernetics, Part B (Cybernetics)* **40**:5, 1280-1293. [[CrossRef](#)]
361. Jae Young Choi, Wesley De Neve, Yong Man Ro, Konstantinos Plataniotis. 2010. Automatic Face Annotation in Personal Photo Collections Using Context-Based Unsupervised Clustering and Face Information Fusion. *IEEE Transactions on Circuits and Systems for Video Technology* **20**:10, 1292-1309. [[CrossRef](#)]
362. Yu SU, Shi-Guang SHAN, Xi-Lin CHEN, Wen GAO. 2010. Integration of Global and Local Feature for Face Recognition. *Journal of Software* **21**:8, 1849-1862. [[CrossRef](#)]
363. Issam Dagher. 2010. Highly-compacted DCT coefficients. *Signal, Image and Video Processing* **4**:3, 303-307. [[CrossRef](#)]
364. Dinesh Kumar, C. S. Rai, Shakti Kumar. 2010. Analysis of unsupervised learning techniques for face recognition. *International Journal of Imaging Systems and Technology* **20**:3, 261-267. [[CrossRef](#)]
365. Anil Kumar Sao, B. Yegnanarayana. 2010. On the use of phase of the Fourier transform for face recognition under variations in illumination. *Signal, Image and Video Processing* **4**:3, 353-358. [[CrossRef](#)]
366. Jamal Ahmad Dargham, Ali Chekima, Ervin Moun, Sigeru Omatu. 2010. Radon transform for face recognition. *Artificial Life and Robotics* **15**:3, 359-362. [[CrossRef](#)]
367. Richard M. Jiang, Danny Crookes, Nie Luo. 2010. Face Recognition in Global Harmonic Subspace. *IEEE Transactions on Information Forensics and Security* **5**:3, 416-424. [[CrossRef](#)]
368. Guoyan Zheng. 2010. Statistically Deformable 2D/3D Registration for Estimating Post-operative Cup Orientation from a Single Standard AP X-ray Radiograph. *Annals of Biomedical Engineering* **38**:9, 2910-2927. [[CrossRef](#)]
369. Nick Pears, Tom Heseltine, Marcelo Romero. 2010. From 3D Point Clouds to Pose-Normalised Depth Maps. *International Journal of Computer Vision* **89**:2-3, 152-176. [[CrossRef](#)]
370. Shan Du, Rabab K. Ward. 2010. Adaptive Region-Based Image Enhancement Method for Robust Face Recognition Under Variable Illumination Conditions. *IEEE Transactions on Circuits and Systems for Video Technology* **20**:9, 1165-1175. [[CrossRef](#)]
371. Miao Cheng, Bin Fang, Yuan Yan Tang, Taiping Zhang, Jing Wen. 2010. Incremental Embedding and Learning in the Local Discriminant Subspace With Application to Face Recognition. *IEEE Transactions on Systems, Man, and Cybernetics, Part C (Applications and Reviews)* **40**:5, 580-591. [[CrossRef](#)]
372. Ergun Gumus, Niyazi Kilic, Ahmet Sertbas, Osman N. Ucan. 2010. Evaluation of face recognition techniques using PCA, wavelets and SVM. *Expert Systems with Applications* **37**:9, 6404-6408. [[CrossRef](#)]
373. TAIPING ZHANG, BIN FANG, YUAN Y. TANG, ZHAOWEI SHANG. 2010. LOCALITY PRESERVING NONNEGATIVE MATRIX FACTORIZATION WITH APPLICATION TO FACE RECOGNITION. *International Journal of Wavelets, Multiresolution and Information Processing* **08**:05, 835-846. [[CrossRef](#)]
374. MING-SHAUNG CHANG, JUNG-HUA CHOU. 2010. A ROBUST AND FRIENDLY HUMAN ROBOT INTERFACE SYSTEM BASED ON NATURAL HUMAN GESTURES. *International Journal of Pattern Recognition and Artificial Intelligence* **24**:06, 847-866. [[CrossRef](#)]

375. Charalampous E. Tsourakakis, Petros Drineas, Eirinaios Michelakis, Ioannis Koutis, Christos Faloutsos. 2010. Spectral counting of triangles via element-wise sparsification and triangle-based link recommendation. *Social Network Analysis and Mining* . [\[CrossRef\]](#)
376. Ibrahim Venkat, Philippe Wilde. 2010. Robust Gait Recognition by Learning and Exploiting Sub-gait Characteristics. *International Journal of Computer Vision* . [\[CrossRef\]](#)
377. Alireza Kheyrollahi, Toby P. Breckon. 2010. Automatic real-time road marking recognition using a feature driven approach. *Machine Vision and Applications* . [\[CrossRef\]](#)
378. M. Fatih Demirci. 2010. Graph-based shape indexing. *Machine Vision and Applications* . [\[CrossRef\]](#)
379. Mat##as Alvarado, Farid Garc##a. 2010. Wheeled vehicles### velocity updating by navigating on outdoor terrains. *Neural Computing and Applications* . [\[CrossRef\]](#)
380. Antonio Torralba, Bryan C. Russell, Jenny Yuen. 2010. LabelMe: Online Image Annotation and Applications. *Proceedings of the IEEE* **98**:8, 1467-1484. [\[CrossRef\]](#)
381. Donovan H. Parks, Martin D. Levine. 2010. Is local colour normalization good enough for local appearance-based classification?. *Machine Vision and Applications* **21**:5, 789-796. [\[CrossRef\]](#)
382. Jie Shao, Shaohua Kevin Zhou, Rama Chellappa. 2010. Robust Height Estimation of Moving Objects From Uncalibrated Videos. *IEEE Transactions on Image Processing* **19**:8, 2221-2232. [\[CrossRef\]](#)
383. Thirimachos Bourlai, Josef Kittler, Kieron Messer. 2010. On design and optimization of face verification systems that are smart-card based. *Machine Vision and Applications* **21**:5, 695-711. [\[CrossRef\]](#)
384. David T. Fullwood, Stephen R. Niezgod, Brent L. Adams, Surya R. Kalidindi. 2010. Microstructure sensitive design for performance optimization. *Progress in Materials Science* **55**:6, 477-562. [\[CrossRef\]](#)
385. Zhiming Liu, Chengjun Liu. 2010. Fusion of color, local spatial and global frequency information for face recognition. *Pattern Recognition* **43**:8, 2882-2890. [\[CrossRef\]](#)
386. Liang Chen, Wei Xue, Naoyuki Tokuda. 2010. Classification of 2-dimensional array patterns: Assembling many small neural networks is better than using a large one. *Neural Networks* **23**:6, 770-781. [\[CrossRef\]](#)
387. J. Jes##s Garc##a, Jes##s Ure##a, Manuel Mazo, Felipe Espinosa, ##Ivaro Hern##ndez, Cristina Losada, Ana Jim##nez, Carlos De Marziani, Fernando ##lvarez, Enrique Garc##a. 2010. Sensory system for obstacle detection on high-speed lines. *Transportation Research Part C: Emerging Technologies* **18**:4, 536-553. [\[CrossRef\]](#)
388. Guoyan Zheng, Lutz-P. Nolte, Stephen J. Ferguson. 2010. Scaled, patient-specific 3D vertebral model reconstruction based on 2D lateral fluoroscopy. *International Journal of Computer Assisted Radiology and Surgery* . [\[CrossRef\]](#)
389. Chan. 2010. Face Biometrics Based on Principal Component Analysis and Linear Discriminant Analysis. *Journal of Computer Science* **6**:7, 693-699. [\[CrossRef\]](#)
390. Hua Huang, Huiting He, Xin Fan, Junping Zhang. 2010. Super-resolution of human face image using canonical correlation analysis. *Pattern Recognition* **43**:7, 2532-2543. [\[CrossRef\]](#)
391. Youngsung Kim, Andrew Beng Jin Teoh, Kar-Ann Toh. 2010. A performance driven methodology for cancelable face templates generation. *Pattern Recognition* **43**:7, 2544-2559. [\[CrossRef\]](#)
392. Peter J. Hills, Andrew M. Holland, Michael B. Lewis. 2010. Aftereffects for face attributes with different natural variability: Children are more adaptable than adolescents. *Cognitive Development* **25**:3, 278-289. [\[CrossRef\]](#)
393. ULRIK S##DERSTR##M, HAIBO LI. 2010. REPRESENTATION BOUND FOR HUMAN FACIAL MIMIC WITH THE AID OF PRINCIPAL COMPONENT ANALYSIS. *International Journal of Image and Graphics* **10**:03, 343-363. [\[CrossRef\]](#)
394. Li-Ping YANG, Wei-Guo GONG, Xiao-Hua GU, Wei-Hong LI, Xing DU. 2010. Complete Discriminant Locality Preserving Projections for Face Recognition. *Journal of Software* **21**:6, 1277-1286. [\[CrossRef\]](#)
395. K. Punyani, C. Faloutsos, E. P. Xing. 2010. SPEX2: automated concise extraction of spatial gene expression patterns from Fly embryo ISH images. *Bioinformatics* **26**:12, i47-i56. [\[CrossRef\]](#)
396. Gang Yu, Zhiwei Hu, Hongtao Lu, Wenbin Li. 2010. Robust object tracking with occlusion handle. *Neural Computing and Applications* . [\[CrossRef\]](#)
397. Jeong-Woo Woo, Young-Chul Lim, Minhoo Lee. 2010. Dynamic obstacle identification based on global and local features for a driver assistance system. *Neural Computing and Applications* . [\[CrossRef\]](#)
398. Hyunggu Lee, Andrew Beng Jin Teoh, Jaihie Kim. 2010. Biometric bits extraction through phase quantization based on##feature level fusion. *Telecommunication Systems* . [\[CrossRef\]](#)
399. Xiutao Tang, Cuilu Qu. 2010. Facial image recognition based on fractal image encoding. *Bell Labs Technical Journal* **15**:1, 209-214. [\[CrossRef\]](#)
400. K C Jondhale, L M Waghmare. 2010. Comparative analysis of face recognition techniques with illumination variation. *IOP Conference Series: Materials Science and Engineering* **10**, 012005. [\[CrossRef\]](#)

401. T. N. Vikram, K. Chidananda Gowda. 2010. Subspace models for document script and language identification. *International Journal of Imaging Systems and Technology* **20**:2, 140-148. [[CrossRef](#)]
402. Roberto A. V#zquez, Humberto Sossa, Beatriz A. Garro. 2010. 3D Object Recognition Based on Some Aspects of the Infant Vision System and Associative Memory. *Cognitive Computation* **2**:2, 86-96. [[CrossRef](#)]
403. Deqiang Zhou, Gui Yun Tian, Binqiang Zhang, Maxim Morozov, Haitao Wang. 2010. Optimal features combination for pulsed eddy current NDT. *Nondestructive Testing and Evaluation* **25**:2, 133-143. [[CrossRef](#)]
404. Jiwen Lu, Yap-Peng Tan. 2010. Regularized Locality Preserving Projections and Its Extensions for Face Recognition. *IEEE Transactions on Systems, Man, and Cybernetics, Part B (Cybernetics)* **40**:3, 958-963. [[CrossRef](#)]
405. Xiaoyang Tan, Bill Triggs. 2010. Enhanced Local Texture Feature Sets for Face Recognition Under Difficult Lighting Conditions. *IEEE Transactions on Image Processing* **19**:6, 1635-1650. [[CrossRef](#)]
406. Weihong Deng, Jiani Hu, Jun Guo, Weidong Cai, Dagan Feng. 2010. Emulating biological strategies for uncontrolled face recognition. *Pattern Recognition* **43**:6, 2210-2223. [[CrossRef](#)]
407. Limei Zhang, Lishan Qiao, Songcan Chen. 2010. Graph-optimized locality preserving projections. *Pattern Recognition* **43**:6, 1993-2002. [[CrossRef](#)]
408. R#diger Bock, J#rg Meier, L#szl# G. Ny#l, Joachim Hornegger, Georg Michelson. 2010. Glaucoma risk index:Automated glaucoma detection from color fundus images. *Medical Image Analysis* **14**:3, 471-481. [[CrossRef](#)]
409. Muhammad Khurram Khan, Khaled Alghathbar, Jiashu Zhang. 2010. Privacy-preserving and tokenless chaotic revocable face authentication scheme. *Telecommunication Systems* . [[CrossRef](#)]
410. David Monzo, Alberto Albiol, Jorge Sastre, Antonio Albiol. 2010. Precise eye localization using HOG descriptors. *Machine Vision and Applications* . [[CrossRef](#)]
411. Dinesh Kumar Singh, Chin-Jen Ku, Chonlarat Wichaidit, Robert J Steininger, Lani F Wu, Steven J Altschuler. 2010. Patterns of basal signaling heterogeneity can distinguish cellular populations with different drug sensitivities. *Molecular Systems Biology* **6** . [[CrossRef](#)]
412. Lanthao Benedikt, Darren Cosker, Paul L. Rosin, David Marshall. 2010. Assessing the Uniqueness and Permanence of Facial Actions for Use in Biometric Applications. *IEEE Transactions on Systems, Man, and Cybernetics - Part A: Systems and Humans* **40**:3, 449-460. [[CrossRef](#)]
413. Vikas Singh, Lopamudra Mukherjee, Jiming Peng, Jinhui Xu. 2010. Ensemble clustering using semidefinite programming with applications. *Machine Learning* **79**:1-2, 177-200. [[CrossRef](#)]
414. Manuel A. Duarte-Mermoud, Nicol#s H. Beltr#n, Mat#as A. Bustos. 2010. Chilean wine varietal classification using quadratic Fisher transformation. *Pattern Analysis and Applications* **13**:2, 181-188. [[CrossRef](#)]
415. Khalid Chougali, Mohamed Jedra, Nouredine Zahid. 2010. Kernel relevance weighted discriminant analysis for face recognition. *Pattern Analysis and Applications* **13**:2, 213-221. [[CrossRef](#)]
416. Yong Zhang, Christine McCullough, John R. Sullins, Christine R. Ross. 2010. Hand-Drawn Face Sketch Recognition by Humans and a PCA-Based Algorithm for Forensic Applications. *IEEE Transactions on Systems, Man, and Cybernetics - Part A: Systems and Humans* **40**:3, 475-485. [[CrossRef](#)]
417. Toure. 2010. Intelligent Sensor for Image Control Point of Eigenfaces for Face Recognition. *Journal of Computer Science* **6**:5, 484-491. [[CrossRef](#)]
418. Xiaobai Liu, Shuicheng Yan, Hai Jin. 2010. Projective Nonnegative Graph Embedding. *IEEE Transactions on Image Processing* **19**:5, 1126-1137. [[CrossRef](#)]
419. Shufu Xie, Shiguang Shan, Xilin Chen, Jie Chen. 2010. Fusing Local Patterns of Gabor Magnitude and Phase for Face Recognition. *IEEE Transactions on Image Processing* **19**:5, 1349-1361. [[CrossRef](#)]
420. D OZKAN. 2010. Interesting faces: A graph-based approach for finding people in news. *Pattern Recognition* **43**:5, 1717-1735. [[CrossRef](#)]
421. W KAO. 2010. Local contrast enhancement and adaptive feature extraction for illumination-invariant face recognition. *Pattern Recognition* **43**:5, 1736-1747. [[CrossRef](#)]
422. W DENG. 2010. Robust, accurate and efficient face recognition from a single training image: A uniform pursuit approach. *Pattern Recognition* **43**:5, 1748-1762. [[CrossRef](#)]
423. Haz#m Kemal Ekenel, Johannes Stallkamp, Rainer Stiefelhausen. 2010. A video-based door monitoring system using local appearance-based face models###. *Computer Vision and Image Understanding* **114**:5, 596-608. [[CrossRef](#)]
424. Abhishek Singh, Barbara S. Minsker, Peter Bajcsy. 2010. Image-Based Machine Learning for Reduction of User Fatigue in an Interactive Model Calibration System. *Journal of Computing in Civil Engineering* **24**:3, 241-251. [[CrossRef](#)]

425. MIN-QUAN JING, LING-HWEI CHEN. 2010. A NOVEL METHOD FOR HORIZONTAL EYE LINE DETECTION UNDER VARIOUS ENVIRONMENTS. *International Journal of Pattern Recognition and Artificial Intelligence* **24**:03, 475-498. [[CrossRef](#)]
426. OLCAY KURSUN, OLEG V. FAVOROV. 2010. FEATURE SELECTION AND EXTRACTION USING AN UNSUPERVISED BIOLOGICALLY-SUGGESTED APPROXIMATION TO GEBELEIN'S MAXIMAL CORRELATION. *International Journal of Pattern Recognition and Artificial Intelligence* **24**:03, 337-358. [[CrossRef](#)]
427. Le LI, Yu-Jin ZHANG. 2010. Linear Projection-based Non-negative Matrix Factorization. *Acta Automatica Sinica* **36**:1, 23-39. [[CrossRef](#)]
428. Feature Extraction 269-305. [[CrossRef](#)]
429. Yong Ren, Khan M. Iftekharruddin, William E. White. 2010. Large-scale pose-invariant face recognition using cellular simultaneous recurrent network. *Applied Optics* **49**:10, B92. [[CrossRef](#)]
430. Debotosh Bhattacharjee, Dipak K. Basu, Mita Nasipuri, Mohantapash Kundu. 2010. Human face recognition using fuzzy multilayer perceptron. *Soft Computing* **14**:6, 559-570. [[CrossRef](#)]
431. Harin Sellahewa, Sabah A. Jassim. 2010. Image-Quality-Based Adaptive Face Recognition. *IEEE Transactions on Instrumentation and Measurement* **59**:4, 805-813. [[CrossRef](#)]
432. S. Zafeiriou, M. Petrou. 2010. Nonlinear Non-Negative Component Analysis Algorithms. *IEEE Transactions on Image Processing* **19**:4, 1050-1066. [[CrossRef](#)]
433. Jun Liu, Songcan Chen, Zhi-Hua Zhou, Xiaoyang Tan. 2010. Generalized Low-Rank Approximations of Matrices Revisited. *IEEE Transactions on Neural Networks* **21**:4, 621-632. [[CrossRef](#)]
434. Saeed Dabbaghchian, Masoumeh P. Ghaemmaghami, Ali Aghagolzadeh. 2010. Feature extraction using discrete cosine transform and discrimination power analysis with a face recognition technology. *Pattern Recognition* **43**:4, 1431-1440. [[CrossRef](#)]
435. Satyanadh Gundimada, Vijayan K. Asari, Neeharika Gudur. 2010. Face recognition in multi-sensor images based on a novel modular feature selection technique. *Information Fusion* **11**:2, 124-132. [[CrossRef](#)]
436. Jiangtao Wang, Debao Chen, Jingyu Yang. 2010. Human behavior classification by analyzing periodic motions. *Frontiers of Computer Science in China* . [[CrossRef](#)]
437. Xiaodong Li, Shumin Fei, Tao Zhang. 2010. Weighted maximum scatter difference based feature extraction and its application to face recognition. *Machine Vision and Applications* . [[CrossRef](#)]
438. Paul C. Conilione, Dianhui Wang. 2010. Automatic localization and annotation of facial features using machine learning techniques. *Soft Computing* . [[CrossRef](#)]
439. Qiu-feng CAI. 2010. Face recognition algorithm based on supervised neighborhood preserving embedding. *Journal of Computer Applications* **29**:12, 3349-3351. [[CrossRef](#)]
440. Akio KITAHARA, Keiji YANAI. 2010. Associating faces and names in Japanese photo news articles. *Progress in Informatics* :7, 63. [[CrossRef](#)]
441. Koji YAMAMOTO, Osamu YAMAGUCHI, Hisashi AOKI. 2010. Fast face clustering based on shot similarity for browsing video. *Progress in Informatics* :7, 53. [[CrossRef](#)]
442. Christos-S. Bouganis, Iosifina Pournara, Peter Y. K. Cheung. 2010. Exploration of Heterogeneous FPGAs for Mapping Linear Projection Designs. *IEEE Transactions on Very Large Scale Integration (VLSI) Systems* **18**:3, 436-449. [[CrossRef](#)]
443. Jiwen Lu, Yap-Peng Tan. 2010. A Doubly Weighted Approach for Appearance-Based Subspace Learning Methods. *IEEE Transactions on Information Forensics and Security* **5**:1, 71-81. [[CrossRef](#)]
444. Xinbo Gao, Ya Su, Xuelong Li, Dacheng Tao. 2010. A Review of Active Appearance Models. *IEEE Transactions on Systems, Man, and Cybernetics, Part C (Applications and Reviews)* **40**:2, 145-158. [[CrossRef](#)]
445. Kazuhiro Hotta. 2010. Local normalized linear summation kernel for fast and robust recognition. *Pattern Recognition* **43**:3, 906-913. [[CrossRef](#)]
446. David Zhang, Zhi Liu, Jing-qi Yan. 2010. Dynamic tongueprint: A novel biometric identifier. *Pattern Recognition* **43**:3, 1071-1082. [[CrossRef](#)]
447. Yong Xu, David Zhang, Jing-Yu Yang. 2010. A feature extraction method for use with bimodal biometrics. *Pattern Recognition* **43**:3, 1106-1115. [[CrossRef](#)]
448. Yong Wang, Yi Wu. 2010. Complete neighborhood preserving embedding for face recognition. *Pattern Recognition* **43**:3, 1008-1015. [[CrossRef](#)]
449. CHUNYUAN LU, JIANMIN JIANG, GUOCAN FENG. 2010. A BOOSTED MANIFOLD LEARNING FOR AUTOMATIC FACE RECOGNITION. *International Journal of Pattern Recognition and Artificial Intelligence* **24**:02, 321-335. [[CrossRef](#)]

450. Tirta Susilo, Elinor McKone, Mark Edwards. 2010. What shape are the neural response functions underlying opponent coding in face space? A psychophysical investigation. *Vision Research* **50**:3, 300-314. [[CrossRef](#)]
451. Gu-Min Jeong, Hyun-Sik Ahn, Sang-Il Choi, Nojun Kwak, Chanwoo Moon. 2010. Pattern recognition using feature feedback: Application to face recognition. *International Journal of Control, Automation and Systems* **8**:1, 141-148. [[CrossRef](#)]
452. Yuan-yuan Zhang, Xiao-juan Wu, Qiu-qi Ruan. 2010. Probabilistic model-based silhouette refinement for gait recognition. *Journal of Shanghai Jiaotong University (Science)* **15**:1, 24-30. [[CrossRef](#)]
453. Jiwen Lu, Yap-Peng Tan. 2010. Uncorrelated Discriminant Nearest Feature Line Analysis for Face Recognition. *IEEE Signal Processing Letters* **17**:2, 185-188. [[CrossRef](#)]
454. Baochang Zhang, Yongsheng Gao, Sanqiang Zhao, Jianzhuang Liu. 2010. Local Derivative Pattern Versus Local Binary Pattern: Face Recognition With High-Order Local Pattern Descriptor. *IEEE Transactions on Image Processing* **19**:2, 533-544. [[CrossRef](#)]
455. K. RUBA SOUNDAK, K. MURUGESAN. 2010. PRESERVING GLOBAL AND LOCAL FEATURES ### A COMBINED APPROACH FOR RECOGNIZING FACE IMAGES. *International Journal of Pattern Recognition and Artificial Intelligence* **24**:01, 39-53. [[CrossRef](#)]
456. Fadel M. Megahed, Jaime A. Camelio. 2010. Real-time fault detection in manufacturing environments using face recognition techniques. *Journal of Intelligent Manufacturing* . [[CrossRef](#)]
457. Wanzeng Kong, Yunhan Li, Shan###an Zhu. 2010. Approach of face detection based on pose calibration. *JOURNAL OF ELECTRONIC MEASUREMENT AND INSTRUMENT* **2009**:1, 64-69. [[CrossRef](#)]
458. HIROMASA TAKEMURA. 2010. *The Brain & Neural Networks* **17**:3, 154-163. [[CrossRef](#)]
459. Suneetha Nadella, Dharanipragada Janakiram. 2010. Message filters for hardening the Linux kernel. *Software: Practice and Experience* n/a-n/a. [[CrossRef](#)]
460. Dexing Zhong, Jiuqiang Han, Xinman Zhang, Yongli Liu. 2010. Neighborhood discriminant embedding in face recognition. *Optical Engineering* **49**:7, 077203. [[CrossRef](#)]
461. J. Lu. 2010. Enhanced locality sensitive discriminant analysis for image recognition. *Electronics Letters* **46**:3, 213. [[CrossRef](#)]
462. Xiaokan WANG, Xia MAO, Catalin-Daniel CALEANU. 2010. Nonlinear Shape-Texture Manifold Learning. *IEICE Transactions on Information and Systems* **E93-D**:7, 2016-2019. [[CrossRef](#)]
463. Guoyan Zheng, Steffen Schumann, Miguel A. Gonz###lez Ballester. 2010. An integrated approach for reconstructing a surface model of the proximal femur from sparse input data and a multi-resolution point distribution model: an in vitro study. *International Journal of Computer Assisted Radiology and Surgery* **5**:1, 99-107. [[CrossRef](#)]
464. Nikolaos Konstantinou, Emmanuel Solidakis, Anastasios Zafeiropoulos, Panagiotis Stathopoulos, Nikolas Mitrou. 2010. A context-aware middleware for real-time semantic enrichment of distributed multimedia metadata. *Multimedia Tools and Applications* **46**:2-3, 425-461. [[CrossRef](#)]
465. Hong Guo, Peisen Huang. 2010. Face recognition based on fringe pattern analysis. *Optical Engineering* **49**:3, 037201. [[CrossRef](#)]
466. Lalit Gupta, Srinivas Kota, Swetha Murali, Dennis L. Molfese, Ravi Vaidyanathan. 2010. A Feature Ranking Strategy to Facilitate Multivariate Signal Classification. *IEEE Transactions on Systems, Man, and Cybernetics, Part C (Applications and Reviews)* **40**:1, 98-108. [[CrossRef](#)]
467. Xuchu Wang, Yanmin Niu. 2010. Locality projection discriminant analysis with an application to face recognition. *Optical Engineering* **49**:7, 077201. [[CrossRef](#)]
468. Wei-wei Yu. 2010. Face recognition via adaptive image combination. *Journal of Shanghai Jiaotong University (Science)* **15**:5, 600. [[CrossRef](#)]
469. Xuelong Li, Yawei Pang. 2010. Deterministic Column-Based Matrix Decomposition. *IEEE Transactions on Knowledge and Data Engineering* **22**:1, 145-149. [[CrossRef](#)]
470. Serdar C###ak###r, A. Enis C###etin. 2010. Mel-cepstral feature extraction methods for image representation. *Optical Engineering* **49**:9, 097004. [[CrossRef](#)]
471. Jana M. Kainerstorfer, Martin Ehler, Franck Amyot, Moinuddin Hassan, Stavros G. Demos, Victor Chernomordik, Christoph K. Hitzengerber, Amir H. Gandjbakhche, Jason D. Riley. 2010. Principal component model of multispectral data for near real-time skin chromophore mapping. *Journal of Biomedical Optics* **15**:4, 046007. [[CrossRef](#)]
472. Jianfeng Xu, Koichi Takagi, Akio Yoneyama. 2010. Three-Dimensional Image Information Media: Beat Induction from Motion Capture Data Using Short-Term Principal Component Analysis. *The Journal of The Institute of Image Information and Television Engineers* **64**:4, 577-583. [[CrossRef](#)]
473. Zhimin Xi, Byeng D. Youn, Chao Hu. 2010. Random Field Characterization Considering Statistical Dependence for Probability Analysis and Design. *Journal of Mechanical Design* **132**:10, 101008. [[CrossRef](#)]

474. Guoyan Zheng. 2010. Statistical shape model-based reconstruction of a scaled, patient-specific surface model of the pelvis from a single standard AP x-ray radiograph. *Medical Physics* **37**:4, 1424. [[CrossRef](#)]
475. Nicholas D. K. Petraco, Carol Gambino, Thomas A. Kubic, Dayhana Olivio, Nicholas Petraco. 2010. Statistical Discrimination of Footwear: A Method for the Comparison of Accidentals on Shoe Outsoles Inspired by Facial Recognition Techniques. *Journal of Forensic Sciences* **55**:1, 34-41. [[CrossRef](#)]
476. Yuan Yuan, Yanwei Pang, Xuelong Li. 2010. Footwear for Gender Recognition. *IEEE Transactions on Circuits and Systems for Video Technology* **20**:1, 131-135. [[CrossRef](#)]
477. Maria De Marsico, Michele Nappi, Daniel Riccio. 2010. FARO: FAcE Recognition Against Occlusions and Expression Variations. *IEEE Transactions on Systems, Man, and Cybernetics - Part A: Systems and Humans* **40**:1, 121-132. [[CrossRef](#)]
478. Chuan-Xian Ren, Dao-Qing Dai. 2010. Incremental learning of bidirectional principal components for face recognition. *Pattern Recognition* **43**:1, 318-330. [[CrossRef](#)]
479. Lishan Qiao, Songcan Chen, Xiaoyang Tan. 2010. Sparsity preserving projections with applications to face recognition. *Pattern Recognition* **43**:1, 331-341. [[CrossRef](#)]
480. Sung Won Park, Marios Savvides. 2010. A Multifactor Extension of Linear Discriminant Analysis for Face Recognition under Varying Pose and Illumination. *EURASIP Journal on Advances in Signal Processing* **2010**, 1-11. [[CrossRef](#)]
481. Kazuhiro Hotta. 2010. 1. Research Trends in Face Recognition. *The Journal of The Institute of Image Information and Television Engineers* **64**:4, 455-462. [[CrossRef](#)]
482. Montse Pard#s, Ver#nica Vilaplana, Cristian Canton-Ferrer Image and Video Processing Tools for HCI 93-118. [[CrossRef](#)]
483. Lu Jiang, Bin Zhu, Yang Tao Hyperspectral Image Classification Methods 79-98. [[CrossRef](#)]
484. Shan Du, R.K. Ward. 2009. Improved Face Representation by Nonuniform Multilevel Selection of Gabor Convolution Features. *IEEE Transactions on Systems, Man, and Cybernetics, Part B (Cybernetics)* **39**:6, 1408-1419. [[CrossRef](#)]
485. Corn# Hoogendoorn, Federico M. Sukno, Sebasti#n Ord#s, Alejandro F. Frangi. 2009. Bilinear Models for Spatio-Temporal Point Distribution Analysis. *International Journal of Computer Vision* **85**:3, 237-252. [[CrossRef](#)]
486. K. Saitwal, A. A. Maciejewski, R. G. Roberts. 2009. Computationally efficient eigenspace decomposition of correlated images characterized by three parameters. *Pattern Analysis and Applications* **12**:4, 391-406. [[CrossRef](#)]
487. Xiao-Zhang Liu, Wen-Sheng Chen, P.C. Yuen, Guo-Can Feng. 2009. Learning Kernel in Kernel-Based LDA for Face Recognition Under Illumination Variations. *IEEE Signal Processing Letters* **16**:12, 1019-1022. [[CrossRef](#)]
488. Yang Mu, Dacheng Tao, Xuelong Li, Fionn Murtagh. 2009. Biologically Inspired Tensor Features. *Cognitive Computation* **1**:4, 327-341. [[CrossRef](#)]
489. K. Martin, Haiping Lu, F.M. Bui, K.N. Plataniotis, D. Hatzinakos. 2009. A Biometric Encryption System for the Self-Exclusion Scenario of Face Recognition. *IEEE Systems Journal* **3**:4, 440-450. [[CrossRef](#)]
490. Reza Ebrahimpour, Ehsanollah Kabir, Mohammad Reza Yousefi. 2009. Improving mixture of experts for view-independent face recognition using teacher-directed learning. *Machine Vision and Applications* . [[CrossRef](#)]
491. Yang Wang, Lei Zhang, Zicheng Liu, Gang Hua, Zhen Wen, Zhengyou Zhang, D. Samaras. 2009. Face Relighting from a Single Image under Arbitrary Unknown Lighting Conditions. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **31**:11, 1968-1984. [[CrossRef](#)]
492. Xiaoming Liu. 2009. Discriminative Face Alignment. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **31**:11, 1941-1954. [[CrossRef](#)]
493. Xiaogang Wang, Xiaoou Tang. 2009. Face Photo-Sketch Synthesis and Recognition. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **31**:11, 1955-1967. [[CrossRef](#)]
494. Haiping Lu, Konstantinos N. (Kostas) Plataniotis, Anastasios N. Venetsanopoulos. 2009. Uncorrelated Multilinear Principal Component Analysis for Unsupervised Multilinear Subspace Learning. *IEEE Transactions on Neural Networks* **20**:11, 1820-1836. [[CrossRef](#)]
495. Jamuna Kanta Sing, Sweta Thakur, Dipak Kumar Basu, Mita Nasipuri, Mahantapas Kundu. 2009. High-speed face recognition using self-adaptive radial basis function neural networks. *Neural Computing and Applications* **18**:8, 979-990. [[CrossRef](#)]
496. R.C. Hoover, A.A. Maciejewski, R.G. Roberts. 2009. Eigendecomposition of Images Correlated on S^1 , S^2 , and $SO(3)$ Using Spectral Theory. *IEEE Transactions on Image Processing* **18**:11, 2562-2571. [[CrossRef](#)]
497. Saleh Aly, Naoyuki Tsuruta, Rin-ichiro Taniguchi. 2009. Feature map sharing hypercolumn model for shift invariant face recognition. *Artificial Life and Robotics* **14**:2, 271-274. [[CrossRef](#)]
498. Adrian Schwaninger, Janek S. Lobmaier, Christian Wallraven, Stephan Collishaw. 2009. Two Routes to Face Perception: Evidence From Psychophysics and Computational Modeling. *Cognitive Science* **33**:8, 1413-1440. [[CrossRef](#)]
499. Myoung Soo Park, Jin Young Choi. 2009. Theoretical analysis on feature extraction capability of class-augmented PCA. *Pattern Recognition* **42**:11, 2353-2362. [[CrossRef](#)]

500. Fei Wang, Xin Wang, Daoqiang Zhang, Changshui Zhang, Tao Li. 2009. marginFace: A novel face recognition method by average neighborhood margin maximization. *Pattern Recognition* **42**:11, 2863-2875. [[CrossRef](#)]
501. Xiaozheng Zhang, Yongsheng Gao. 2009. Face recognition across pose: A review. *Pattern Recognition* **42**:11, 2876-2896. [[CrossRef](#)]
502. Gian Luca Marcialis, Fabio Roli, Luca Didaci. 2009. Personal identity verification by serial fusion of fingerprint and face matchers. *Pattern Recognition* **42**:11, 2807-2817. [[CrossRef](#)]
503. Haixian Wang. 2009. Structural two-dimensional principal component analysis for image recognition. *Machine Vision and Applications* . [[CrossRef](#)]
504. Mislav Grgic, Kresimir Delac, Sonja Grgic. 2009. SCface ### surveillance cameras face database. *Multimedia Tools and Applications* . [[CrossRef](#)]
505. Jae Young Choi, Yong Man Ro, K.N. Plataniotis. 2009. Color Face Recognition for Degraded Face Images. *IEEE Transactions on Systems, Man, and Cybernetics, Part B (Cybernetics)* **39**:5, 1217-1230. [[CrossRef](#)]
506. Anirban Basudhar, Samy Missoum. 2009. A sampling-based approach for probabilistic design with random fields. *Computer Methods in Applied Mechanics and Engineering* **198**:47-48, 3647-3655. [[CrossRef](#)]
507. Joan F##bregas, Marcos Faundez-Zanuy. 2009. Biometric Recognition Performing in a Bioinspired System. *Cognitive Computation* **1**:3, 257-267. [[CrossRef](#)]
508. Ljiljana Skrba, Lionel Reveret, Franck H##troy, Marie-Paule Cani, Carol O'Sullivan. 2009. Animating Quadrupeds: Methods and Applications. *Computer Graphics Forum* **28**:6, 1541-1560. [[CrossRef](#)]
509. Jingdong Wang, Fei Wang, Changshui Zhang, H.C. Shen, Long Quan. 2009. Linear Neighborhood Propagation and Its Applications. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **31**:9, 1600-1615. [[CrossRef](#)]
510. M. Toews, T. Arbel. 2009. Detection, Localization, and Sex Classification of Faces from Arbitrary Viewpoints and under Occlusion. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **31**:9, 1567-1581. [[CrossRef](#)]
511. Andy Adler, Richard Youmaran, Sergey Loyka. 2009. Towards a measure of biometric feature information. *Pattern Analysis and Applications* **12**:3, 261-270. [[CrossRef](#)]
512. Yanwei Pang, Xuelong Li, Yuan Yuan, Dacheng Tao, Jing Pan. 2009. Fast Haar Transform Based Feature Extraction for Face Representation and Recognition. *IEEE Transactions on Information Forensics and Security* **4**:3, 441-450. [[CrossRef](#)]
513. Pradipta K. Banerjee, Asit K. Datta. 2009. Illumination and noise tolerant face recognition based on eigen-phase correlation filter modified by Mexican hat wavelet. *Journal of Optics* **38**:3, 160-168. [[CrossRef](#)]
514. Mark Stoudt, Joseph Hubbard. 2009. Fundamental relationships between deformation-induced surface roughness, critical strain localisation and failure in AA5754-O. *Philosophical Magazine* **89**:27, 2403-2425. [[CrossRef](#)]
515. Liping Yang, Weiguo Gong, Xiaohua Gu, Weihong Li, Yanfei Liu. 2009. Bagging null space locality preserving discriminant classifiers for face recognition. *Pattern Recognition* **42**:9, 1853-1858. [[CrossRef](#)]
516. Chenghua Xu, Stan Li, Tieniu Tan, Long Quan. 2009. Automatic 3D face recognition from depth and intensity Gabor features###. *Pattern Recognition* **42**:9, 1895-1905. [[CrossRef](#)]
517. V. KABEER, N. K. NARAYANAN. 2009. WAVELET-BASED ARTIFICIAL LIGHT RECEPTOR MODEL FOR HUMAN FACE RECOGNITION. *International Journal of Wavelets, Multiresolution and Information Processing* **07**:05, 617-627. [[CrossRef](#)]
518. JUNBIN GAO, PAUL W. H. KWAN, XIAODI HUANG. 2009. COMPREHENSIVE ANALYSIS FOR THE LOCAL FISHER DISCRIMINANT ANALYSIS. *International Journal of Pattern Recognition and Artificial Intelligence* **23**:06, 1129-1143. [[CrossRef](#)]
519. Waiyawut Sanayha, Yuttapong Rangsanseri. 2009. Relevance-Weighted (2D) 2 LDA Image Projection Technique for Face Recognition. *ETRI Journal* **31**:4, 438-447. [[CrossRef](#)]
520. I. Kokkinos, P. Maragos. 2009. Synergy between Object Recognition and Image Segmentation Using the Expectation-Maximization Algorithm. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **31**:8, 1486-1501. [[CrossRef](#)]
521. C. Dhanjal, S.R. Gunn, J. Shawe-Taylor. 2009. Efficient Sparse Kernel Feature Extraction Based on Partial Least Squares. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **31**:8, 1347-1361. [[CrossRef](#)]
522. Shabnam Rostamirad, Jason J.S. Barton, ##pek Oru##. 2009. Center###surround organization of face-space: evidence from contrast-based face-priming. *NeuroReport* **20**:13, 1177-1182. [[CrossRef](#)]
523. Wen-Hui Yang, Dao-Qing Dai. 2009. Two-Dimensional Maximum Margin Feature Extraction for Face Recognition. *IEEE Transactions on Systems, Man, and Cybernetics, Part B (Cybernetics)* **39**:4, 1002-1012. [[CrossRef](#)]
524. Dinesh Kumar, Shakti Kumar, C. S. Rai. 2009. Feature selection for face recognition: a memetic algorithmic approach. *Journal of Zhejiang University SCIENCE A* **10**:8, 1140-1152. [[CrossRef](#)]

525. Yu Su, Shiguang Shan, Xilin Chen, Wen Gao. 2009. Hierarchical Ensemble of Global and Local Classifiers for Face Recognition. *IEEE Transactions on Image Processing* **18**:8, 1885-1896. [[CrossRef](#)]
526. M.M. Monwar, M.L. Gavrilova. 2009. Multimodal Biometric System Using Rank-Level Fusion Approach. *IEEE Transactions on Systems, Man, and Cybernetics, Part B (Cybernetics)* **39**:4, 867-878. [[CrossRef](#)]
527. Ye-peng Guan. 2009. Robust video foreground segmentation and face recognition. *Journal of Shanghai University (English Edition)* **13**:4, 311-315. [[CrossRef](#)]
528. Min LIU, Xiao-dong LI, Zhen-hai WANG. 2009. New supervised locality-preserving projections algorithm for face recognition. *Journal of Computer Applications* **29**:5, 1416-1418. [[CrossRef](#)]
529. Bing-Peng MA, Shi-Guang SHAN, Xi-Lin CHEN, Wen GAO. 2009. Robust Appearance-Based Method for Head Pose Estimation. *Journal of Software* **20**:6, 1651-1663. [[CrossRef](#)]
530. Y.-N. SUN, C.-H. LIN, C.-C. KUO, C.-L. HO, C.-J. LIN. 2009. Live cell tracking based on cellular state recognition from microscopic images. *Journal of Microscopy* **235**:1, 94-105. [[CrossRef](#)]
531. Jie Wang, Haiping Lu, K.N. Plataniotis, Juwei Lu. 2009. Gaussian kernel optimization for pattern classification. *Pattern Recognition* **42**:7, 1237-1247. [[CrossRef](#)]
532. XINBO GAO, JINXIU LI, BING XIAO. 2009. A FACE RECOGNITION SCHEME BASED ON EMBEDDED HIDDEN MARKOV MODEL AND SELECTIVE ENSEMBLE STRATEGY. *International Journal of Image and Graphics* **09**:03, 355-367. [[CrossRef](#)]
533. Rabia Jafri, Hamid R. Arabnia. 2009. A Survey of Face Recognition Techniques. *Journal of Information Processing Systems* **5**:2, 41-68. [[CrossRef](#)]
534. Rajani Muraleedharan, Lisa Ann Osadciw, Yanjun Yan. 2009. Resource optimization in distributed biometric recognition using wireless sensor network. *Multidimensional Systems and Signal Processing* **20**:2, 165-182. [[CrossRef](#)]
535. Thirimachos Bourlai, Josef Kittler, Kieron Messer. 2009. Designing a smart-card-based face verification system: empirical investigation. *Machine Vision and Applications* **20**:4, 225-242. [[CrossRef](#)]
536. Xiaoyang Tan, Songcan Chen, Zhi-Hua Zhou, Jun Liu. 2009. Face Recognition Under Occlusions and Variant Expressions With Partial Similarity. *IEEE Transactions on Information Forensics and Security* **4**:2, 217-230. [[CrossRef](#)]
537. Gilson A. Giralaldi, Paulo S. Rodrigues, Edson C. Kitani, Jo##o R. Sato, Carlos E. Thomaz. 2009. Statistical learning approaches for discriminant features selection. *Journal of the Brazilian Computer Society* **14**:2, 7-22. [[CrossRef](#)]
538. S. Gundimada, V.K. Asari. 2009. Facial Recognition Using Multisensor Images Based on Localized Kernel Eigen Spaces. *IEEE Transactions on Image Processing* **18**:6, 1314-1325. [[CrossRef](#)]
539. Augusto Destrero, Christine Mol, Francesca Odone, Alessandro Verri. 2009. A Regularized Framework for Feature Selection in Face Detection and Authentication. *International Journal of Computer Vision* **83**:2, 164-177. [[CrossRef](#)]
540. Ik Siong Heng. 2009. Rotating stellar core-collapse waveform decomposition: a principal component analysis approach. *Classical and Quantum Gravity* **26**:10, 105005. [[CrossRef](#)]
541. Chunfeng Wan, Akira Mita. 2009. Pipeline monitoring using acoustic principal component analysis recognition with the Mel scale. *Smart Materials and Structures* **18**:5, 055004. [[CrossRef](#)]
542. Nathan Eagle, Alex Sandy Pentland. 2009. Eigenbehaviors: identifying structure in routine. *Behavioral Ecology and Sociobiology* **63**:7, 1057-1066. [[CrossRef](#)]
543. Juyang Weng, Matthew Luciw. 2009. Dually Optimal Neuronal Layers: Lobe Component Analysis. *IEEE Transactions on Autonomous Mental Development* **1**:1, 68-85. [[CrossRef](#)]
544. Yuan Yuan, Xuelong Li, Yanwei Pang, Xin Lu, Dacheng Tao. 2009. Binary Sparse Nonnegative Matrix Factorization. *IEEE Transactions on Circuits and Systems for Video Technology* **19**:5, 772-777. [[CrossRef](#)]
545. P HSIEH, P TUNG. 2009. A novel hybrid approach based on sub-pattern technique and whitened PCA for face recognition. *Pattern Recognition* **42**:5, 978-984. [[CrossRef](#)]
546. K DAS, Z NENADIC. 2009. An efficient discriminant-based solution for small sample size problem. *Pattern Recognition* **42**:5, 857-866. [[CrossRef](#)]
547. Matthew P. Reed, Mark M. Sochor, Jonathan D. Rupp, Kathleen D. Klinich, Miriam A. Manary. 2009. Anthropometric specification of child crash dummy pelvises through statistical analysis of skeletal geometry. *Journal of Biomechanics* **42**:8, 1143-1145. [[CrossRef](#)]
548. SHAO KANG CHEN, BRIAN C. LOVELL, TING SHAN. 2009. ROBUST ADAPTED PRINCIPAL COMPONENT ANALYSIS FOR FACE RECOGNITION. *International Journal of Pattern Recognition and Artificial Intelligence* **23**:03, 491-520. [[CrossRef](#)]

549. HONG HUANG, JIANWEI LI, HAILIANG FENG. 2009. SUBSPACES VERSUS SUBMANIFOLDS: A COMPARATIVE STUDY IN SMALL SAMPLE SIZE PROBLEM. *International Journal of Pattern Recognition and Artificial Intelligence* **23**:03, 463-490. [[CrossRef](#)]
550. MANUEL G#N#NTER, ROLF P. W#RTZ. 2009. FACE DETECTION AND RECOGNITION USING MAXIMUM LIKELIHOOD CLASSIFIERS ON GABOR GRAPHS. *International Journal of Pattern Recognition and Artificial Intelligence* **23**:03, 433-461. [[CrossRef](#)]
551. DAN ZHANG, XINGE YOU, PATRICK WANG, SVETLANA N. YANUSHKEVICH, YUAN YAN TANG. 2009. FACIAL BIOMETRICS USING NONTENSOR PRODUCT WAVELET AND 2D DISCRIMINANT TECHNIQUES. *International Journal of Pattern Recognition and Artificial Intelligence* **23**:03, 521-543. [[CrossRef](#)]
552. D. Masip, A. Lapedriza, J. Vitria. 2009. Boosted Online Learning for Face Recognition. *IEEE Transactions on Systems, Man, and Cybernetics, Part B (Cybernetics)* **39**:2, 530-538. [[CrossRef](#)]
553. S. Kota, L. Gupta, D.L. Molfese, R. Vaidyanathan. 2009. A Dynamic Channel Selection Strategy for Dense-Array ERP Classification. *IEEE Transactions on Biomedical Engineering* **56**:4, 1040-1051. [[CrossRef](#)]
554. A-Nasser Ansari, Mohamed Abdel-Mottaleb, Mohammad H. Mahoor. 2009. A multimodal approach for 3D face modeling and recognition using 3D deformable facial mask. *Machine Vision and Applications* **20**:3, 189-203. [[CrossRef](#)]
555. Veera Sundararaghavan, Nicholas Zabaras. 2009. A statistical learning approach for the design of polycrystalline materials. *Statistical Analysis and Data Mining* **1**:5, 306-321. [[CrossRef](#)]
556. Chenping Hou, Feiping Nie, Changshui Zhang, Yi Wu. 2009. Learning an Orthogonal and Smooth Subspace for Image Classification. *IEEE Signal Processing Letters* **16**:4, 303-306. [[CrossRef](#)]
557. Mark Jager, Fred A. Hamprecht. 2009. Principal Component Imagery for the Quality Monitoring of Dynamic Laser Welding Processes. *IEEE Transactions on Industrial Electronics* **56**:4, 1307-1313. [[CrossRef](#)]
558. M. Balasubramanian, S. Palanivel, V. Ramalingam. 2009. Real time face and mouth recognition using radial basis function neural networks. *Expert Systems with Applications* **36**:3, 6879-6888. [[CrossRef](#)]
559. Xiaolong Fan, Brijesh Verma. 2009. Selection and fusion of facial features for face recognition. *Expert Systems with Applications* **36**:3, 7157-7169. [[CrossRef](#)]
560. J.J. Corso, G.D. Hager. 2009. Image description with features that summarize. *Computer Vision and Image Understanding* **113**:4, 446-458. [[CrossRef](#)]
561. GEORGIOS STYLIANOU, ANDREAS LANITIS. 2009. IMAGE BASED 3D FACE RECONSTRUCTION: A SURVEY. *International Journal of Image and Graphics* **09**:02, 217-250. [[CrossRef](#)]
562. AJAY KUMAR, DAVID ZHANG. 2009. USER AUTHENTICATION USING FUSION OF FACE AND PALMPRINT. *International Journal of Image and Graphics* **09**:02, 251-270. [[CrossRef](#)]
563. S. Gilad, M. Meng, P. Sinha. 2009. Role of ordinal contrast relationships in face encoding. *Proceedings of the National Academy of Sciences* **106**:13, 5353-5358. [[CrossRef](#)]
564. Hai-Yang WANG. 2009. Wake Detection Using 2DPCA of Directional Polar Fourier Spectrum. *Acta Automatica Sinica* **34**:9, 1053-1059. [[CrossRef](#)]
565. Zhi-Guang YANG. 2009. Cluster-based Face Image Retrieval and Its Relevance Feedback. *Acta Automatica Sinica* **34**:9, 1033-1039. [[CrossRef](#)]
566. Yu ZHANG. 2009. A New Age Estimation Method Based on Ensemble Learning. *Acta Automatica Sinica* **34**:8, 997-1000. [[CrossRef](#)]
567. Xiang-Yun QING. 2009. Probabilistic Two-dimensional Principal Component Analysis. *Acta Automatica Sinica* **34**:3, 353-359. [[CrossRef](#)]
568. F. Al-Osaimi, M. Bennamoun, A. Mian. 2009. An Expression Deformation Approach to Non-rigid 3D Face Recognition. *International Journal of Computer Vision* **81**:3, 302-316. [[CrossRef](#)]
569. S. Ali, Jieping Ye, A. Razdan, P. Wonka. 2009. Compressed Facade Displacement Maps. *IEEE Transactions on Visualization and Computer Graphics* **15**:2, 262-273. [[CrossRef](#)]
570. Jong-Hwa Park, Hyun-Soo Kang. 2009. Efficient Processing Technique for Unavailable Data in Hardware Implementation of Motion Estimator with Parallel Processing Architecture. *The Journal of the Korea Contents Association* **9**:2, 1-9. [[CrossRef](#)]
571. Tae-In Seol, Sun-Tae Chung, Seong-Won Cho. 2009. Illumination-Robust Face Recognition based on Illumination-Separated Eigenfaces. *The Journal of the Korea Contents Association* **9**:2, 115-124. [[CrossRef](#)]
572. S. Zafeiriou. 2009. Discriminant Nonnegative Tensor Factorization Algorithms. *IEEE Transactions on Neural Networks* **20**:2, 217-235. [[CrossRef](#)]
573. Richard G. Baraniuk, Michael B. Wakin. 2009. Random Projections of Smooth Manifolds. *Foundations of Computational Mathematics* **9**:1, 51-77. [[CrossRef](#)]

574. Yue-ting Zhuang, Yu-shun Wang, Timothy K. Shih, Nick C. Tang. 2009. Patch-guided facial image inpainting by shape propagation. *Journal of Zhejiang University SCIENCE A* **10**:2, 232-238. [[CrossRef](#)]
575. Daisuke Takahashi, Noriyoshi Okamoto. 2009. Robust estimation of driver posture in the presence of lighting changes. *Electronics and Communications in Japan* **92**:2, 10-20. [[CrossRef](#)]
576. Mehrtash T. Harandi, Majid Nili Ahmadabadi, Babak N. Araabi. 2009. Optimal Local Basis: A Reinforcement Learning Approach for Face Recognition. *International Journal of Computer Vision* **81**:2, 191-204. [[CrossRef](#)]
577. T ZHANG, B FANG, Y YUAN, Y YANTANG, Z SHANG, D LI, F LANG. 2009. Multiscale facial structure representation for face recognition under varying illumination. *Pattern Recognition* **42**:2, 251-258. [[CrossRef](#)]
578. Sunjin Yu, Joongrock Kim, Sangyoun Lee. 2009. Iterative three-dimensional head pose estimation using a face normal vector. *Optical Engineering* **48**:3, 037204. [[CrossRef](#)]
579. Tadahiro Oyama, Stephen Githinji Karungaru, Satoru Tsuge, Yasue Mitsukura, Minoru Fukumi. 2009. Fast Incremental Algorithm of Simple Principal Component Analysis. *IEEJ Transactions on Electronics, Information and Systems* **129**:1, 112-117. [[CrossRef](#)]
580. Christian Callegari, Stefano Giordano, Michele Pagano. 2009. New statistical approaches for anomaly detection. *Security and Communication Networks* n/a-n/a. [[CrossRef](#)]
581. Pang Ying Han, Andrew Beng Jin Teoh. 2009. Maximum neighborhood margin criterion in face recognition. *Optical Engineering* **48**:4, 047205. [[CrossRef](#)]
582. Shuicheng Yan, Huan Wang, Yun Fu, Jun Yan, Xiaoou Tang, T.S. Huang. 2009. Synchronized Submanifold Embedding for Person-Independent Pose Estimation and Beyond. *IEEE Transactions on Image Processing* **18**:1, 202-210. [[CrossRef](#)]
583. Walid Karam, Hervé Bredin, Hanna Greige, Gérard Chollet, Chafic Mokbel. 2009. Talking-Face Identity Verification, Audiovisual Forgery, and Robustness Issues. *EURASIP Journal on Advances in Signal Processing* **2009**, 1-16. [[CrossRef](#)]
584. N. Pavesic, S. Ribaric, B. Grad. 2009. Finger-based personal authentication: a comparison of feature-extraction methods based on principal component analysis, most discriminant features and regularised-direct linear discriminant analysis. *IET Signal Processing* **3**:4, 269. [[CrossRef](#)]
585. K. Kryszczuk, A. Drygajlo. 2009. Improving biometric verification with class-independent quality information. *IET Signal Processing* **3**:4, 310. [[CrossRef](#)]
586. Xu Qiao, Rui Xu, Yen-Wei Chen, Takanori Igarashi, Keisuke Nakao, Akio Kashimoto. 2009. Generalized N-Dimensional Principal Component Analysis (GND-PCA) Based Statistical Appearance Modeling of Facial Images with Multiple Modes. *IPSP Transactions on Computer Vision and Applications* **1**, 231-241. [[CrossRef](#)]
587. Huanxi Liu, Xiaowei Lv, Xiong Li, Yuncai Liu. 2009. Unimodal biometric system based on local topology structure preserving projections. *Optical Engineering* **48**:11, 117207. [[CrossRef](#)]
588. I. Alvarez, J.M. Goñarriz, J. Ramiñez, D. Salas-Gonzalez, M. López, C.G. Puntonet, F. Segovia. 2009. Alzheimer's diagnosis using eigenbrains and support vector machines. *Electronics Letters* **45**:7, 342. [[CrossRef](#)]
589. Guoyan Zheng, Steffen Schumann. 2009. 3D reconstruction of a patient-specific surface model of the proximal femur from calibrated x-ray radiographs: A validation study. *Medical Physics* **36**:4, 1155. [[CrossRef](#)]
590. W. Wu, M.O. Ahmad, S. Samadi. 2009. Discriminant analysis based on modified generalised singular value decomposition and its numerical error analysis. *IET Computer Vision* **3**:3, 159. [[CrossRef](#)]
591. M. López, J. Ramiñez, J.M. Goñarriz, D. Salas-Gonzalez, I. Alvarez, F. Segovia, C.G. Puntonet. 2009. Automatic tool for Alzheimer's disease diagnosis using PCA and Bayesian classification rules. *Electronics Letters* **45**:8, 389. [[CrossRef](#)]
592. Yi Zheng Goh, Andrew Beng Jin Teoh, Kah Ong Michael Goh. 2009. Wavelet-based illumination invariant preprocessing in face recognition. *Journal of Electronic Imaging* **18**:2, 023001. [[CrossRef](#)]
593. John M. Irvine, Steven A. Israel. 2009. A Sequential Procedure for Individual Identity Verification Using ECG. *EURASIP Journal on Advances in Signal Processing* **2009**, 1-14. [[CrossRef](#)]
594. Min-Quan Jing, Ling-Hwei Chen. 2009. Novel face-detection method under various environments. *Optical Engineering* **48**:6, 067202. [[CrossRef](#)]
595. Andrew Teoh B. J., Ying Han Pang. 2009. Analysis on Supervised Neighborhood Preserving Embedding. *IEICE Electronics Express* **6**:23, 1631-1637. [[CrossRef](#)]
596. Haiping Lu, K.N. Plataniotis, A.N. Venetsanopoulos. 2009. Uncorrelated Multilinear Discriminant Analysis With Regularization and Aggregation for Tensor Object Recognition. *IEEE Transactions on Neural Networks* **20**:1, 103-123. [[CrossRef](#)]
597. Javier Ruiz-del-Solar, Rodrigo Verschae, Mauricio Correa. 2009. Recognition of Faces in Unconstrained Environments: A Comparative Study. *EURASIP Journal on Advances in Signal Processing* **2009**, 1-20. [[CrossRef](#)]

598. Mehmed Kantardzic, Pedram Sadeghian. 2009. Fractal analysis of semantically distributed data. *International Journal of General Systems* **38**:1, 73-91. [[CrossRef](#)]
599. O ARANDJELOVIC, R CIPOLLA. 2009. A pose-wise linear illumination manifold model for face recognition using video. *Computer Vision and Image Understanding* **113**:1, 113-125. [[CrossRef](#)]
600. Shaohua Kevin Zhou, Rama Chellappa, Narayanan Ramanathan. 2009. Unconstrained Face Recognition from a Single Image. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **31**:6, 1073-1086. [[CrossRef](#)]
601. John Wright, Yi Ma, Yangyu Tao, Zhouchen Lin, Heung-Yeung Shum. 2009. Classification via Minimum Incremental Coding Length. *SIAM Journal on Imaging Sciences* **2**:2, 367-395. [[CrossRef](#)]
602. Jian Yang, Chengjun Liu. 2008. Color Image Discriminant Models and Algorithms for Face Recognition. *IEEE Transactions on Neural Networks* **19**:12, 2088-2098. [[CrossRef](#)]
603. K. J. Craig, Nielen Stander. 2008. Optimization of shell buckling incorporating Karhunen-Loeve-based geometrical imperfections. *Structural and Multidisciplinary Optimization* **37**:2, 185-194. [[CrossRef](#)]
604. Dong Xu, Shuicheng Yan, Stephen Lin, Thomas S. Huang. 2008. Convergent 2-D Subspace Learning With Null Space Analysis. *IEEE Transactions on Circuits and Systems for Video Technology* **18**:12, 1753-1759. [[CrossRef](#)]
605. Saleh Aly, Naoyuki Tsuruta, Rin-Ichiro Taniguchi. 2008. Face recognition under varying illumination using Mahalanobis self-organizing map. *Artificial Life and Robotics* **13**:1, 298-301. [[CrossRef](#)]
606. Georgios Goudelis, Anastasios Tefas, Ioannis Pitas. 2008. Emerging biometric modalities: a survey. *Journal on Multimodal User Interfaces* **2**:3-4, 217-235. [[CrossRef](#)]
607. Bingpeng Ma, Shiguang Shan, Xilin Chen, Wen Gao. 2008. Head Yaw Estimation From Asymmetry of Facial Appearance. *IEEE Transactions on Systems, Man, and Cybernetics, Part B (Cybernetics)* **38**:6, 1501-1512. [[CrossRef](#)]
608. JUSTIN HEAVILIN, JAMES POWELL. 2008. A NOVEL METHOD OF FITTING SPATIO-TEMPORAL MODELS TO DATA, WITH APPLICATIONS TO THE DYNAMICS OF MOUNTAIN PINE BEETLES. *Natural Resource Modeling* **21**:4, 489-524. [[CrossRef](#)]
609. H KANAN, K FAEZ, Y GAO. 2008. Face recognition using adaptively weighted patch PZM array from a single exemplar image per person. *Pattern Recognition* **41**:12, 3799-3812. [[CrossRef](#)]
610. Y YAN, Y ZHANG. 2008. 1D correlation filter based class-dependence feature analysis for face recognition. *Pattern Recognition* **41**:12, 3834-3841. [[CrossRef](#)]
611. Haifeng Hu. 2008. ICA-based neighborhood preserving analysis for face recognition. *Computer Vision and Image Understanding* **112**:3, 286-295. [[CrossRef](#)]
612. Wenjing Li, G. Bebis, N.G. Bourbakis. 2008. 3-D Object Recognition Using 2-D Views. *IEEE Transactions on Image Processing* **17**:11, 2236-2255. [[CrossRef](#)]
613. John Vokey, Jason Tangen, Simon Cole. 2008. On the preliminary psychophysics of fingerprint identification. *The Quarterly Journal of Experimental Psychology* **62**:5, 1023-1040. [[CrossRef](#)]
614. S BALUJA, M COVELL. 2008. Waveprint: Efficient wavelet-based audio fingerprinting. *Pattern Recognition* **41**:11, 3467-3480. [[CrossRef](#)]
615. J IRVINE, S ISRAEL, W TODDSCRUGGS, W WOREK. 2008. eigenPulse: Robust human identification from cardiovascular function. *Pattern Recognition* **41**:11, 3427-3435. [[CrossRef](#)]
616. Jin-Ok Kim. 2008. Improvement of Face Recognition Rate by Normalization of Facial Expression. *The KIPS Transactions: Part B* **15B**:5, 477-486. [[CrossRef](#)]
617. Qian XU. 2008. Adaptively weighted 2DPCA based on local feature for face recognition. *Journal of Computer Applications* **28**:5, 1267-1268. [[CrossRef](#)]
618. Yi ZHANG. 2008. Illumination invariant face recognition algorithm based on local qualitative representation. *Journal of Computer Applications* **28**:5, 1276-1279. [[CrossRef](#)]
619. Jeong-Seon Park, Seong-Whan Lee. 2008. An Example-Based Face Hallucination Method for Single-Frame, Low-Resolution Facial Images. *IEEE Transactions on Image Processing* **17**:10, 1806-1816. [[CrossRef](#)]
620. Shuiwang Ji, Jieping Ye. 2008. Kernel Uncorrelated and Regularized Discriminant Analysis: A Theoretical and Computational Study. *IEEE Transactions on Knowledge and Data Engineering* **20**:10, 1311-1321. [[CrossRef](#)]
621. Zhiming Liu, Chengjun Liu. 2008. A Hybrid Color and Frequency Features Method for Face Recognition. *IEEE Transactions on Image Processing* **17**:10, 1975-1980. [[CrossRef](#)]
622. Huiyu Zhou, Yuan Yuan, Abdul H. Sadka. 2008. Application of semantic features in face recognition. *Pattern Recognition* **41**:10, 3251-3256. [[CrossRef](#)]
623. M. Jager, C. Knoll, F.A. Hamprecht. 2008. Weakly Supervised Learning of a Classifier for Unusual Event Detection. *IEEE Transactions on Image Processing* **17**:9, 1700-1708. [[CrossRef](#)]

624. Amit Ashok, Pawan K. Baheti, Mark A. Neifeld. 2008. Compressive imaging system design using task-specific information. *Applied Optics* **47**:25, 4457. [[CrossRef](#)]
625. Yuanyan Tang. 2008. Status of pattern recognition with wavelet analysis. *Frontiers of Computer Science in China* **2**:3, 268-294. [[CrossRef](#)]
626. Mohammad H. Mahoor, Mohamed Abdel-Mottaleb. 2008. A Multimodal Approach for Face Modeling and Recognition. *IEEE Transactions on Information Forensics and Security* **3**:3, 431-440. [[CrossRef](#)]
627. Chye-Hwa Loo, Atef Z. Elsherbeni. 2008. Optoelectronic 3-D Object Classification From 2-D Images. *Journal of Lightwave Technology* **26**:18, 3248-3255. [[CrossRef](#)]
628. Jian Yang, Jingyu Yang, David Zhang. 2008. Median Fisher Discriminator: a robust feature extraction method with applications to biometrics. *Frontiers of Computer Science in China* **2**:3, 295-305. [[CrossRef](#)]
629. W. B. Langdon, R. Poli, W. Banzhaf. 2008. An eigen analysis of the GP community. *Genetic Programming and Evolvable Machines* **9**:3, 171-182. [[CrossRef](#)]
630. Naser Zaeri, Farzin Mokhtarian, Abdallah Cherri. 2008. Binarized eigenphases applied to limited memory face recognition systems. *Pattern Analysis and Applications* **11**:3-4, 373-383. [[CrossRef](#)]
631. Natalia A. Schmid, Francesco Nicolo. 2008. On Empirical Recognition Capacity of Biometric Systems Under Global PCA and ICA Encoding. *IEEE Transactions on Information Forensics and Security* **3**:3, 512-528. [[CrossRef](#)]
632. Sukwon Choi, Daijin Kim. 2008. Robust head tracking using 3D ellipsoidal head model in particle filter. *Pattern Recognition* **41**:9, 2901-2915. [[CrossRef](#)]
633. Z LIU, C LIU. 2008. Fusion of the complementary Discrete Cosine Features in the YIQ color space for face recognition. *Computer Vision and Image Understanding* **111**:3, 249-262. [[CrossRef](#)]
634. MAT##AS A. BUSTOS, MANUEL A. DUARTE-MERMOUD, NICOL##S H. BELTR##N. 2008. NONLINEAR FEATURE EXTRACTION USING FISHER CRITERION. *International Journal of Pattern Recognition and Artificial Intelligence* **22**:06, 1089-1119. [[CrossRef](#)]
635. Taekyoung Kwon, Hyeonjoon Moon. 2008. Biometric Authentication for Border Control Applications. *IEEE Transactions on Knowledge and Data Engineering* **20**:8, 1091-1096. [[CrossRef](#)]
636. Xin Geng, Zhi-Hua Zhou, K. Smith-Miles. 2008. Individual Stable Space: An Approach to Face Recognition Under Uncontrolled Conditions. *IEEE Transactions on Neural Networks* **19**:8, 1354-1368. [[CrossRef](#)]
637. Yanwei Pang, Dacheng Tao, Yuan Yuan, Xuelong Li. 2008. Binary Two-Dimensional PCA. *IEEE Transactions on Systems, Man, and Cybernetics, Part B (Cybernetics)* **38**:4, 1176-1180. [[CrossRef](#)]
638. Ajmal S. Mian, Mohammed Bennamoun, Robyn Owens. 2008. Keypoint Detection and Local Feature Matching for Textured 3D Face Recognition. *International Journal of Computer Vision* **79**:1, 1-12. [[CrossRef](#)]
639. Mohammad Hossein Khosravi, Reza Safabakhsh. 2008. Human eye sclera detection and tracking using a modified time-adaptive self-organizing map. *Pattern Recognition* **41**:8, 2571-2593. [[CrossRef](#)]
640. Reza Ebrahimpour, Ehsanollah Kabir, Mohammad Reza Yousefi. 2008. Teacher-directed learning in view-independent face recognition with mixture of experts using overlapping eigenspaces. *Computer Vision and Image Understanding* **111**:2, 195-206. [[CrossRef](#)]
641. Ming-yong DING. 2008. Symmetry based two-dimensional principal component analysis and its application to face recognition. *Journal of Computer Applications* **28**:1, 122-124. [[CrossRef](#)]
642. Yulia Lerner, Boris Epshtein, Shimon Ullman, Rafael Malach. 2008. Class Information Predicts Activation by Object Fragments in Human Object Areas. *Journal of Cognitive Neuroscience* **20**:7, 1189-1206. [[Abstract](#)] [[PDF](#)] [[PDF Plus](#)]
643. Doris Y. Tsao, Margaret S. Livingstone. 2008. Mechanisms of Face Perception. *Annual Review of Neuroscience* **31**:1, 411-437. [[CrossRef](#)]
644. Yanwei Pang, Yuan Yuan, Xuelong Li. 2008. Gabor-Based Region Covariance Matrices for Face Recognition. *IEEE Transactions on Circuits and Systems for Video Technology* **18**:7, 989-993. [[CrossRef](#)]
645. Kaleem Siddiqi, Juan Zhang, Diego Macrini, Ali Shokoufandeh, Sylvain Bouix, Sven Dickinson. 2008. Retrieving articulated 3-D models using medial surfaces. *Machine Vision and Applications* **19**:4, 261-275. [[CrossRef](#)]
646. Guodong Guo, Yun Fu, C.R. Dyer, T.S. Huang. 2008. Image-Based Human Age Estimation by Manifold Learning and Locally Adjusted Robust Regression. *IEEE Transactions on Image Processing* **17**:7, 1178-1188. [[CrossRef](#)]
647. A. Z. Kouzani. 2008. Classification of face images using local iterated function systems. *Machine Vision and Applications* **19**:4, 223-248. [[CrossRef](#)]
648. T. Mita, T. Kaneko, B. Stenger, O. Hori. 2008. Discriminative Feature Co-Occurrence Selection for Object Detection. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **30**:7, 1257-1269. [[CrossRef](#)]

649. Yun Sheng, Abdul H. Sadka, Ahmet M. Kondo. 2008. Automatic Single View-Based 3-D Face Synthesis for Unsupervised Multimedia Applications. *IEEE Transactions on Circuits and Systems for Video Technology* **18**:7, 961-974. [[CrossRef](#)]
650. W ZHENG, J LAI, S LI. 2008. 1D-LDA vs. 2D-LDA: When is vector-based linear discriminant analysis better than matrix-based?. *Pattern Recognition* **41**:7, 2156-2172. [[CrossRef](#)]
651. In-Jung Lee. 2008. A Tracking Algorithm to Certain People Using Recognition of Face and Cloth Color and Motion Analysis with Moving Energy in CCTV. *The KIPS Transactions:PartB* **15B**:3, 197-204. [[CrossRef](#)]
652. Scott C. Neu, Arthur W. Toga. 2008. Automatic Localization of Anatomical Point Landmarks for Brain Image Processing Algorithms. *Neuroinformatics* **6**:2, 135-148. [[CrossRef](#)]
653. A Butler, P Bones, M Hurrell. 2008. Prototype system for enhancement of frontal chest radiographs using eigenimage processing. *Journal of Medical Imaging and Radiation Oncology* **52**:3, 244-253. [[CrossRef](#)]
654. Sid-Ahmed Berrani, Christophe Garcia. 2008. Robust detection of outliers for projection-based face recognition methods. *Multimedia Tools and Applications* **38**:2, 271-291. [[CrossRef](#)]
655. Siu-Yeung Cho, Jia-Jun Wong. 2008. Human face recognition by adaptive processing of tree structures representation. *Neural Computing and Applications* **17**:3, 201-215. [[CrossRef](#)]
656. Guiyu Feng, Dewen Hu, Zongtan Zhou. 2008. A Direct Locality Preserving Projections (DLPP) Algorithm for Image Recognition. *Neural Processing Letters* **27**:3, 247-255. [[CrossRef](#)]
657. Samy Missoum. 2008. Probabilistic optimal design in the presence of random fields. *Structural and Multidisciplinary Optimization* **35**:6, 523-530. [[CrossRef](#)]
658. A TEOH, Y KUAN, S LEE. 2008. Cancellable biometrics and annotations on BioHash. *Pattern Recognition* **41**:6, 2034-2044. [[CrossRef](#)]
659. H HU. 2008. Orthogonal neighborhood preserving discriminant analysis for face recognition. *Pattern Recognition* **41**:6, 2045-2054. [[CrossRef](#)]
660. M DEMIRCI, R VANLEUKEN, R VELTKAMP. 2008. Indexing through laplacian spectra. *Computer Vision and Image Understanding* **110**:3, 312-325. [[CrossRef](#)]
661. TIANHAO ZHANG, XUELONG LI, DACHENG TAO, JIE YANG. 2008. LOCAL COORDINATES ALIGNMENT (LCA): A NOVEL MANIFOLD LEARNING APPROACH. *International Journal of Pattern Recognition and Artificial Intelligence* **22**:04, 667-690. [[CrossRef](#)]
662. ALE# UDE, DAMIR OMR#EN, GORDON CHENG. 2008. MAKING OBJECT LEARNING AND RECOGNITION AN ACTIVE PROCESS. *International Journal of Humanoid Robotics* **05**:02, 267-286. [[CrossRef](#)]
663. Bryan C. Russell, Antonio Torralba, Kevin P. Murphy, William T. Freeman. 2008. LabelMe: A Database and Web-Based Tool for Image Annotation. *International Journal of Computer Vision* **77**:1-3, 157-173. [[CrossRef](#)]
664. L. Torresani, A. Hertzmann, C. Bregler. 2008. Nonrigid Structure-from-Motion: Estimating Shape and Motion with Hierarchical Priors. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **30**:5, 878-892. [[CrossRef](#)]
665. W. James MacLean, John K. Tsotsos. 2008. Fast pattern recognition using normalized grey-scale correlation in a pyramid image representation. *Machine Vision and Applications* **19**:3, 163-179. [[CrossRef](#)]
666. Tong Lin, Hongbin Zha. 2008. Riemannian Manifold Learning. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **30**:5, 796-809. [[CrossRef](#)]
667. Andras Ferencz, Erik G. Learned-Miller, Jitendra Malik. 2008. Learning to Locate Informative Features for Visual Identification. *International Journal of Computer Vision* **77**:1-3, 3-24. [[CrossRef](#)]
668. R AGRAWAL, KARMESHU. 2008. Perturbation scheme for online learning of features: Incremental principal component analysis. *Pattern Recognition* **41**:5, 1452-1460. [[CrossRef](#)]
669. FRANK Y. SHIH, CHAO-FA CHUANG, PATRICK S. P. WANG. 2008. PERFORMANCE COMPARISONS OF FACIAL EXPRESSION RECOGNITION IN JAFFE DATABASE. *International Journal of Pattern Recognition and Artificial Intelligence* **22**:03, 445-459. [[CrossRef](#)]
670. JOANNA ROKITA, ADAM KRZY#AK, CHING Y. SUEN. 2008. MULTIMODAL BIOMETRICS BY FACE AND HAND IMAGES TAKEN BY A CELL PHONE CAMERA. *International Journal of Pattern Recognition and Artificial Intelligence* **22**:03, 411-429. [[CrossRef](#)]
671. P. S. HIEMATH, C. J. PRABHAKAR. 2008. SYMBOLIC FACTORIAL DISCRIMINANT ANALYSIS FOR ILLUMINATION INVARIANT FACE RECOGNITION. *International Journal of Pattern Recognition and Artificial Intelligence* **22**:03, 371-387. [[CrossRef](#)]
672. Yuan Cao, Rui Ming Liu, Jie Yang. 2008. Infrared Small Target Detection Using PPCA. *International Journal of Infrared and Millimeter Waves* **29**:4, 385-395. [[CrossRef](#)]

673. Taiping Zhang, Bin Fang, Yuan Yan Tang, Guanghui He, Jing Wen. 2008. Topology Preserving Non-negative Matrix Factorization for Face Recognition. *IEEE Transactions on Image Processing* **17**:4, 574-584. [[CrossRef](#)]
674. Haixian Wang, Sibao Chen, Zilan Hu, Wenming Zheng. 2008. Locality-Preserved Maximum Information Projection. *IEEE Transactions on Neural Networks* **19**:4, 571-585. [[CrossRef](#)]
675. C DESILVA, S RANGANATH, L DESILVA. 2008. Cloud basis function neural network: A modified RBF network architecture for holistic facial expression recognition. *Pattern Recognition* **41**:4, 1241-1253. [[CrossRef](#)]
676. Yiming Wu, Xiuwen Liu, Washington Mio, K.A. Gallivan. 2008. Two-stage optimal component analysis. *Computer Vision and Image Understanding* **110**:1, 91-101. [[CrossRef](#)]
677. Seung-Joo Lee, Sung-Rae Jun. 2008. A Comparison Study of Classification Algorithms in Data Mining. *International Journal of Fuzzy Logic and Intelligent Systems* **8**:1, 1-5. [[CrossRef](#)]
678. K. J. Craig, W. J. Roux. 2008. On the investigation of shell buckling due to random geometrical imperfections implemented using Karhunen-Loève expansions. *International Journal for Numerical Methods in Engineering* **73**:12, 1715-1726. [[CrossRef](#)]
679. Hongcheng Wang, Narendra Ahuja. 2008. A Tensor Approximation Approach to Dimensionality Reduction. *International Journal of Computer Vision* **76**:3, 217-229. [[CrossRef](#)]
680. Saleh Aly, Alaa Sagheer, Naoyuki Tsuruta, Rin-ichiro Taniguchi. 2008. Face recognition across illumination. *Artificial Life and Robotics* **12**:1-2, 33-37. [[CrossRef](#)]
681. Huchuan Lu, Yingjie Huang, Yenwei Chen, Deli Yang. 2008. Automatic gender recognition based on pixel-pattern-based texture feature. *Journal of Real-Time Image Processing* **3**:1-2, 109-116. [[CrossRef](#)]
682. Zhihua Zhang, Dit-Yan Yeung, James T Kwok, Edward Y Chang. 2008. Sliced Coordinate Analysis for Effective Dimension Reduction and Nonlinear Extensions. *Journal of Computational and Graphical Statistics* **17**:1, 225-242. [[CrossRef](#)]
683. T ZHANG, X LI, D TAO, J YANG. 2008. Multimodal biometrics using geometry preserving projections. *Pattern Recognition* **41**:3, 805-813. [[CrossRef](#)]
684. M KYPEROUNTAS, A TEFAS, I PITAS. 2008. Dynamic training using multistage clustering for face recognition. *Pattern Recognition* **41**:3, 894-905. [[CrossRef](#)]
685. Y WU, X LIU, W MIO. 2008. Learning representations for object classification using multi-stage optimal component analysis. *Neural Networks* **21**:2-3, 214-221. [[CrossRef](#)]
686. XINYU WU, YONGSHENG OU, HUIHUAN QIAN, YANGSHENG XU. 2008. A REAL TIME FACE CLASSIFICATION AND COUNTING SYSTEM. *International Journal of Information Acquisition* **05**:01, 1-10. [[CrossRef](#)]
687. Junbin Gao. 2008. Robust L1 Principal Component Analysis and Its Bayesian Variational Inference. *Neural Computation* **20**:2, 555-572. [[Abstract](#)] [[PDF](#)] [[PDF Plus](#)]
688. Lloyd Gamble, Sai Ravela, Kevin McGarigal. 2008. Multi-scale features for identifying individuals in large biological databases: an application of pattern recognition technology to the marbled salamander *Ambystoma opacum*. *Journal of Applied Ecology* **45**:1, 170-180. [[CrossRef](#)]
689. R. Bro, E. Acar, Tamara G. Kolda. 2008. Resolving the sign ambiguity in the singular value decomposition. *Journal of Chemometrics* **22**:2, 135-140. [[CrossRef](#)]
690. QI LI, JIEPING YE, MIN LI, CHANDRA KAMBHAMETTU. 2008. ADAPTIVE APPEARANCE BASED FACE RECOGNITION. *International Journal on Artificial Intelligence Tools* **17**:01, 175-193. [[CrossRef](#)]
691. Ying Han Pang, Andrew Teoh B. J., Wong Eng Kiong. 2008. Neighbourhood Discriminant Embedding in face recognition. *IEICE Electronics Express* **5**:24, 1036-1041. [[CrossRef](#)]
692. Haiping Lu, Konstantinos N. Plataniotis, Anastasios N. Venetsanopoulos. 2008. MPCA: Multilinear Principal Component Analysis of Tensor Objects. *IEEE Transactions on Neural Networks* **19**:1, 18-39. [[CrossRef](#)]
693. Sang-Ki Kim, Kar-Ann Toh, Sangyoun Lee. 2008. Face Recognition Incorporating Ancillary Information. *EURASIP Journal on Advances in Signal Processing* **2008**, 1-12. [[CrossRef](#)]
694. Vitomir Stribuč, France Mihelič, Nikola Pavesić. 2008. Face authentication using a hybrid approach. *Journal of Electronic Imaging* **17**:1, 011003. [[CrossRef](#)]
695. Mary Metilda, T. Santhanam. 2008. Domain Specific View for Face Perception. *Information Technology Journal* **7**:1, 105-111. [[CrossRef](#)]
696. M.A. Dabbah, W.L. Woo, S.S. Dlay. 2008. Image-based facial recognition in the domain of high-order polynomial one-way mapping. *IET Image Processing* **2**:3, 139. [[CrossRef](#)]
697. Andreas Uhl, Peter Wild. 2008. Footprint-based biometric verification. *Journal of Electronic Imaging* **17**:1, 011016. [[CrossRef](#)]

698. P. Nicholl, A. Amira, D. Bouchaffra, R. H. Perrott. 2008. A Statistical Multiresolution Approach for Face Recognition Using Structural Hidden Markov Models. *EURASIP Journal on Advances in Signal Processing* **2008**, 1-14. [[CrossRef](#)]
699. Wen-Sheng Chen, Binbin Pan, Bin Fang, Ming Li, Jianliang Tang. 2008. Incremental Nonnegative Matrix Factorization for Face Recognition. *Mathematical Problems in Engineering* **2008**, 1-18. [[CrossRef](#)]
700. Bo##tjan Vesnicer, France Miheli##. 2008. The Likelihood Ratio Decision Criterion for Nuisance Attribute Projection in GMM Speaker Verification. *EURASIP Journal on Advances in Signal Processing* **2008**, 1-12. [[CrossRef](#)]
701. Yang Liu, Zheng Guo Li, Yeng Chai Soh. 2008. Region-of-Interest Based Resource Allocation for Conversational Video Communication of H.264/AVC. *IEEE Transactions on Circuits and Systems for Video Technology* **18**:1, 134-139. [[CrossRef](#)]
702. Daidi Zhong, Irek Def##e. 2008. Face Retrieval Based on Robust Local Features and Statistical-Structural Learning Approach. *EURASIP Journal on Advances in Signal Processing* **2008**, 1-13. [[CrossRef](#)]
703. Miao Cheng, Bin Fang, Yuan Yan Tang, Jing Wen. 2008. Direct Neighborhood Discriminant Analysis for Face Recognition. *Mathematical Problems in Engineering* **2008**, 1-16. [[CrossRef](#)]
704. Yanjun Yan, Lisa Ann Osadciw, Pinyuen Chen. 2008. Confidence interval of feature number selection for face recognition. *Journal of Electronic Imaging* **17**:1, 011002. [[CrossRef](#)]
705. Anant Choksuriwong, Bruno Emile, Helene Laurent, Christophe Rosenberger. 2008. Comparative study of global invariant descriptors for object recognition. *Journal of Electronic Imaging* **17**:2, 023015. [[CrossRef](#)]
706. Heechul Han, Kwanghoon Sohn. 2008. Face relighting based on virtual irradiance sphere and reflection coefficient. *Optical Engineering* **47**:2, 027204. [[CrossRef](#)]
707. Ioannis G. Damousis, Dimitrios Tzovaras, Evangelos Bekiaris. 2008. Unobtrusive Multimodal Biometric Authentication: The HUMABIO Project Concept. *EURASIP Journal on Advances in Signal Processing* **2008**, 1-12. [[CrossRef](#)]
708. Jos## M. Buenaposada, Enrique Mu##oz, Luis Baumela. 2008. Recognising facial expressions in video sequences. *Pattern Analysis and Applications* **11**:1, 101-116. [[CrossRef](#)]
709. Fethi Smach, Cedric Lema##tre, Jean-Paul Gauthier, Johel Miteran, Mohamed Atri. 2008. Generalized Fourier Descriptors with Applications to Objects Recognition in##SVM Context. *Journal of Mathematical Imaging and Vision* **30**:1, 43-71. [[CrossRef](#)]
710. Dong Xu, Shuicheng Yan, Lei Zhang, Stephen Lin, Hong-Jiang Zhang, Thomas S. Huang. 2008. Reconstruction and Recognition of Tensor-Based Objects With Concurrent Subspaces Analysis. *IEEE Transactions on Circuits and Systems for Video Technology* **18**:1, 36-47. [[CrossRef](#)]
711. Jordi Freixenet, Arnau Oliver, Robert Marti##, Xavier Llado##, Josep Pont, Elsa Pe##rez, Erika R. E. Denton, Reyer Zwiggelaar. 2008. Eigendetection of masses considering false positive reduction and breast density information. *Medical Physics* **35**:5, 1840. [[CrossRef](#)]
712. Ahmed Oirrak. 2008. Affine invariant descriptors using principal components analysis. *Pattern Recognition and Image Analysis* **18**:1, 14-22. [[CrossRef](#)]
713. J LIU, S CHEN, X TAN. 2008. A study on three linear discriminant analysis based methods in small sample size problem. *Pattern Recognition* **41**:1, 102-116. [[CrossRef](#)]
714. J LIU, S CHEN, X TAN. 2008. Fractional order singular value decomposition representation for face recognition. *Pattern Recognition* **41**:1, 378-395. [[CrossRef](#)]
715. X XIE, K LAM. 2008. Elastic shape-texture matching for human face recognition. *Pattern Recognition* **41**:1, 396-405. [[CrossRef](#)]
716. S PALANIVEL. 2008. Multimodal person authentication using speech, face and visual speech. *Computer Vision and Image Understanding* **109**:1, 44-55. [[CrossRef](#)]
717. Michael W. Mahoney, Mauro Maggioni, Petros Drineas. 2008. Tensor-CUR Decompositions for Tensor-Based Data. *SIAM Journal on Matrix Analysis and Applications* **30**:3, 957. [[CrossRef](#)]
718. GUIYU FENG, DAVID ZHANG, JIAN YANG, DEWEN HU. 2008. A THEORETICAL FRAMEWORK FOR MATRIX-BASED FEATURE EXTRACTION ALGORITHMS WITH ITS APPLICATION TO IMAGE RECOGNITION. *International Journal of Image and Graphics* **08**:01, 1-23. [[CrossRef](#)]
719. Woo-Han Yun, Do-Hyung Kim, Ho-Sub Yoon, Young-Jo Cho. 2008. Development of a Face Verification System for a Home Service Robot. *Advanced Robotics* **22**:6-7, 749-760. [[CrossRef](#)]
720. Ethan Meyers, Lior Wolf. 2007. Using Biologically Inspired Features for Face Processing. *International Journal of Computer Vision* **76**:1, 93-104. [[CrossRef](#)]
721. Jian Yang, Chengjun Liu. 2007. Horizontal and Vertical 2DPCA-Based Discriminant Analysis for Face Verification on a Large-Scale Database. *IEEE Transactions on Information Forensics and Security* **2**:4, 781-792. [[CrossRef](#)]

722. Guoyan Zheng, Xiao Dong, Kumar T. Rajamani, Xuan Zhang, Martin Styner, Ramesh U. Thoranaghatte, Lutz-Peter Nolte, Miguel A. Gonzalez Ballester. 2007. Accurate and Robust Reconstruction of a Surface Model of the Proximal Femur From Sparse-Point Data and a Dense-Point Distribution Model for Surgical Navigation. *IEEE Transactions on Biomedical Engineering* **54**:12, 2109-2122. [[CrossRef](#)]
723. Fengxi Song, David Zhang, Dayong Mei, Zhongwei Guo. 2007. A Multiple Maximum Scatter Difference Discriminant Criterion for Facial Feature Extraction. *IEEE Transactions on Systems, Man and Cybernetics, Part B (Cybernetics)* **37**:6, 1599-1606. [[CrossRef](#)]
724. Ling-Zhi Liao, Si-Wei Luo, Mei Tian. 2007. ###Whitenedfaces### Recognition With PCA and ICA. *IEEE Signal Processing Letters* **14**:12, 1008-1011. [[CrossRef](#)]
725. Y LIANG, C LI, W GONG, Y PAN. 2007. Uncorrelated linear discriminant analysis based on weighted pairwise Fisher criterion. *Pattern Recognition* **40**:12, 3606-3615. [[CrossRef](#)]
726. JUN LIU, SONGCAN CHEN, XIAOYANG TAN, DAOQIANG ZHANG. 2007. EFFICIENT PSEUDOINVERSE LINEAR DISCRIMINANT ANALYSIS AND ITS NONLINEAR FORM FOR FACE RECOGNITION. *International Journal of Pattern Recognition and Artificial Intelligence* **21**:08, 1265-1278. [[CrossRef](#)]
727. Ovidiu Ghita, Paul F. Whelan, David Vernon, John Mallon. 2007. Pose estimation for objects with planar surfaces using eigenimage and range data analysis. *Machine Vision and Applications* **18**:6, 355-365. [[CrossRef](#)]
728. Elena Stoykova, A. Ayd###n Alatan, Philip Benzie, Nikos Grammalidis, Sotiris Malassiotis, Joern Ostermann, Sergej Piekh, Ventseslav Sainov, Christian Theobalt, Thangavel Thevar, Xenophon Zabulis. 2007. 3-D Time-Varying Scene Capture Technologies###A Survey. *IEEE Transactions on Circuits and Systems for Video Technology* **17**:11, 1568-1586. [[CrossRef](#)]
729. Wenchao Zhang, Shiguang Shan, Xilin Chen, Wen Gao. 2007. Local Gabor Binary Patterns Based on Kullback###Leibler Divergence for Partially Occluded Face Recognition. *IEEE Signal Processing Letters* **14**:11, 875-878. [[CrossRef](#)]
730. Dong Xu, Shuicheng Yan, Dacheng Tao, Stephen Lin, Hong-Jiang Zhang. 2007. Marginal Fisher Analysis and Its Variants for Human Gait Recognition and Content- Based Image Retrieval. *IEEE Transactions on Image Processing* **16**:11, 2811-2821. [[CrossRef](#)]
731. Randall Smith, Richard Pawlicki, Istv###n K###kai, J###rg Finger, Thomas Vetter. 2007. Navigating in a Shape Space of Registered Models. *IEEE Transactions on Visualization and Computer Graphics* **13**:6, 1552-1559. [[CrossRef](#)]
732. Karine Sergerie, Martin Lepage, Jorge L. Armony. 2007. Influence of Emotional Expression on Memory Recognition Bias: A Functional Magnetic Resonance Imaging Study. *Biological Psychiatry* **62**:10, 1126-1133. [[CrossRef](#)]
733. X JING, Y YAO, D ZHANG, J YANG, M LI. 2007. Face and palmprint pixel level fusion and Kernel DCV-RBF classifier for small sample biometric recognition. *Pattern Recognition* **40**:11, 3209-3224. [[CrossRef](#)]
734. Michael Felsberg, Johan Hedborg. 2007. Real-time view-based pose recognition and interpolation for tracking initialization. *Journal of Real-Time Image Processing* **2**:2-3, 103-115. [[CrossRef](#)]
735. Haixian Wang, Sibao Chen, Zilan Hu, Bin Luo. 2007. Probabilistic two-dimensional principal component analysis and its mixture model for face recognition. *Neural Computing and Applications* . [[CrossRef](#)]
736. Jian-Gang Wang, Eng Thiam Lim, Xiang Chen, Ronda Venkateswarlu. 2007. Real-time Stereo Face Recognition by Fusing Appearance and Depth Fisherfaces. *The Journal of VLSI Signal Processing Systems for Signal, Image, and Video Technology* **49**:3, 409-423. [[CrossRef](#)]
737. Stephanie A. C. Schuckers, Natalia A. Schmid, Aditya Abhyankar, Vivekanand Dorairaj, Christopher K. Boyce, Lawrence A. Hornak. 2007. On Techniques for Angle Compensation in Nonideal Iris Recognition. *IEEE Transactions on Systems, Man and Cybernetics, Part B (Cybernetics)* **37**:5, 1176-1190. [[CrossRef](#)]
738. Ho-Chul Shin, Jae Hee Park, Seong-Dae Kim. 2007. Combination of Warping Robust Elastic Graph Matching and Kernel-Based Projection Discriminant Analysis for Face Recognition. *IEEE Transactions on Multimedia* **9**:6, 1125-1136. [[CrossRef](#)]
739. R. Stiefelhagen, H.K. Ekenel, C. Fugen, P. Gieselmann, H. Holzapfel, F. Kraft, K. Nickel, M. Voit, A. Waibel. 2007. Enabling Multimodal Human###Robot Interaction for the Karlsruhe Humanoid Robot. *IEEE Transactions on Robotics* **23**:5, 840-851. [[CrossRef](#)]
740. Stefanos Zafeiriou, Anastasios Tefas, Ioannis Pitas. 2007. Minimum Class Variance Support Vector Machines. *IEEE Transactions on Image Processing* **16**:10, 2551-2564. [[CrossRef](#)]
741. Andy Adler, Michael E. Schuckers. 2007. Comparing Human and Automatic Face Recognition Performance. *IEEE Transactions on Systems, Man and Cybernetics, Part B (Cybernetics)* **37**:5, 1248-1255. [[CrossRef](#)]
742. Jie Zou, Qiang Ji, George Nagy. 2007. A Comparative Study of Local Matching Approach for Face Recognition. *IEEE Transactions on Image Processing* **16**:10, 2617-2628. [[CrossRef](#)]
743. T.P. Spexard, M.. Hanheide, G.. Sagerer. 2007. Human-Oriented Interaction With an Anthropomorphic Robot. *IEEE Transactions on Robotics* **23**:5, 852-862. [[CrossRef](#)]

744. Andrew Beng Jin Teoh, Chong Tze Yuang. 2007. Cancelable Biometrics Realization With Multispace Random Projections. *IEEE Transactions on Systems, Man and Cybernetics, Part B (Cybernetics)* **37**:5, 1096-1106. [[CrossRef](#)]
745. Richa Singh, Mayank Vatsa, Arun Ross, Afzel Noore. 2007. A Mosaicing Scheme for Pose-Invariant Face Recognition. *IEEE Transactions on Systems, Man and Cybernetics, Part B (Cybernetics)* **37**:5, 1212-1225. [[CrossRef](#)]
746. M P J L Chang, H Nazari, C O Font, G C Gilbreath, E Oh. 2007. Turbulence time series data hole filling using Karhunen-L#eve and ARIMA methods. *Journal of Physics: Conference Series* **85**, 012025. [[CrossRef](#)]
747. Sung Won Park, Marios Savvides. 2007. Individual Kernel Tensor-Subspaces for Robust Face Recognition: A Computationally Efficient Tensor Framework Without Requiring Mode Factorization. *IEEE Transactions on Systems, Man and Cybernetics, Part B (Cybernetics)* **37**:5, 1156-1166. [[CrossRef](#)]
748. S LI, T FEVENS, A KRZYZAK, C JIN, S LI. 2007. Semi-automatic computer aided lesion detection in dental X-rays using variational level set. *Pattern Recognition* **40**:10, 2861-2873. [[CrossRef](#)]
749. F WANG, J WANG, C ZHANG, J KWOK. 2007. Face recognition using spectral features. *Pattern Recognition* **40**:10, 2786-2797. [[CrossRef](#)]
750. S ZAFEIRIOU, A TEFAS, I PITAS. 2007. The discriminant elastic graph matching algorithm applied to frontal face verification. *Pattern Recognition* **40**:10, 2798-2810. [[CrossRef](#)]
751. Sven Wachsmuth, Sebastian Wrede, Marc Hanheide. 2007. Coordinating interactive vision behaviors for cognitive assistance. *Computer Vision and Image Understanding* **108**:1-2, 135-149. [[CrossRef](#)]
752. WENCHAO ZHANG, SHIGUANG SHAN, XILIN CHEN, WEN GAO. 2007. LOCAL GABOR BINARY PATTERNS BASED ON MUTUAL INFORMATION FOR FACE RECOGNITION. *International Journal of Image and Graphics* **07**:04, 777-793. [[CrossRef](#)]
753. Irene Kotsia, Stefanos Zafeiriou, Ioannis Pitas. 2007. A Novel Discriminant Non-Negative Matrix Factorization Algorithm With Applications to Facial Image Characterization Problems. *IEEE Transactions on Information Forensics and Security* **2**:3, 588-595. [[CrossRef](#)]
754. Alice J. O'Toole, P. Jonathon Phillips, Fang Jiang, Janet Ayyad, Nils Penard, Herve Abdi. 2007. Face Recognition Algorithms Surpass Humans Matching Faces Over Changes in Illumination. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **29**:9, 1642-1646. [[CrossRef](#)]
755. Klaus Kollreider, Hartwig Fronthaler, Maycel Isaac Faraj, Josef Bigun. 2007. Real-Time Face Detection and Motion Analysis With Application in ###Liveness### Assessment. *IEEE Transactions on Information Forensics and Security* **2**:3, 548-558. [[CrossRef](#)]
756. Daniel Gonzalez-Jimenez, Jose Luis Alba-Castro. 2007. Toward Pose-Invariant 2-D Face Recognition Through Point Distribution Models and Facial Symmetry. *IEEE Transactions on Information Forensics and Security* **2**:3, 413-429. [[CrossRef](#)]
757. Le Zou, Samuel Cheng, Zixiang Xiong, Mi Lu, Kenneth R. Castleman. 2007. 3-D Face Recognition Based on Warped Example Faces. *IEEE Transactions on Information Forensics and Security* **2**:3, 513-528. [[CrossRef](#)]
758. T KIM, O ARANDJELOVIC, R CIPOLLA. 2007. Boosted manifold principal angles for image set-based recognition. *Pattern Recognition* **40**:9, 2475-2484. [[CrossRef](#)]
759. G LANGS, P PELOSCHEK, R DONNER, H BISCHOF. 2007. Multiple appearance models. *Pattern Recognition* **40**:9, 2485-2495. [[CrossRef](#)]
760. HUIYUAN WANG, ZENG FENG WANG, YAN LENG, XIAOJUAN WU, QING LI. 2007. PCA PLUS F-LDA: A NEW APPROACH TO FACE RECOGNITION. *International Journal of Pattern Recognition and Artificial Intelligence* **21**:06, 1059-1068. [[CrossRef](#)]
761. Xiaorong Pu, Zhang Yi, Zhongjie Fang. 2007. Holistic and partial facial features fusion by binary particle swarm optimization. *Neural Computing and Applications* . [[CrossRef](#)]
762. S. W. Simpson. 2007. Statistics of signature images for arc welding fault detection. *Science and Technology of Welding & Joining* **12**:6, 556-563. [[CrossRef](#)]
763. Anil Kumar Sao, B. Yegnanarayana, B. V. K. Vijaya Kumar. 2007. Significance of image representation for face verification. *Signal, Image and Video Processing* **1**:3, 225-237. [[CrossRef](#)]
764. T SUN, M CHEN, S LO, F TIEN. 2007. Face recognition using 2D and disparity eigenface. *Expert Systems with Applications* **33**:2, 265-273. [[CrossRef](#)]
765. H.. Cevikalp, M.. Neamtu, A.. Barkana. 2007. The Kernel Common Vector Method: A Novel Nonlinear Subspace Classifier for Pattern Recognition. *IEEE Transactions on Systems, Man and Cybernetics, Part B (Cybernetics)* **37**:4, 937-951. [[CrossRef](#)]

766. Jian Huang, P.C. Yuen, Wen-Sheng Chen, Jian Huang Lai. 2007. Choosing Parameters of Kernel Subspace LDA for Recognition of Face Images Under Pose and Illumination Variations. *IEEE Transactions on Systems, Man and Cybernetics, Part B (Cybernetics)* **37**:4, 847-862. [[CrossRef](#)]
767. Jian Yang, D. Zhang, Jing-Yu Yang. 2007. Constructing PCA Baseline Algorithms to Reevaluate ICA-Based Face-Recognition Performance. *IEEE Transactions on Systems, Man and Cybernetics, Part B (Cybernetics)* **37**:4, 1015-1021. [[CrossRef](#)]
768. S BRAHNAM, C CHUANG, R SEXTON, F SHIH. 2007. Machine assessment of neonatal facial expressions of acute pain. *Decision Support Systems* **43**:4, 1242-1254. [[CrossRef](#)]
769. Jordi Inglada. 2007. Automatic recognition of man-made objects in high resolution optical remote sensing images by SVM classification of geometric image features. *ISPRS Journal of Photogrammetry and Remote Sensing* **62**:3, 236-248. [[CrossRef](#)]
770. B ZHU, L JIANG, Y LUO, Y TAO. 2007. Gabor feature-based apple quality inspection using kernel principal component analysis. *Journal of Food Engineering* **81**:4, 741-749. [[CrossRef](#)]
771. Reza Ebrahimpour, Ehsanollah Kabir, Mohammad Reza Yousefi. 2007. Face Detection Using Mixture of MLP Experts. *Neural Processing Letters* **26**:1, 69-82. [[CrossRef](#)]
772. Ce Liu, Heung-Yeung Shum, William T. Freeman. 2007. Face Hallucination: Theory and Practice. *International Journal of Computer Vision* **75**:1, 115-134. [[CrossRef](#)]
773. Ch. Satyanarayana, D. M. Potukuchi, L. Pratap Reddy. 2007. Performance evaluation of incremental training method for face recognition using PCA. *Journal of Real-Time Image Processing* **1**:4, 311-327. [[CrossRef](#)]
774. Stephan Hasler, Heiko Wersing, Edgar K#rner. 2007. Combining Reconstruction and Discrimination with Class-Specific Sparse Coding. *Neural Computation* **19**:7, 1897-1918. [[Abstract](#)] [[PDF](#)] [[PDF Plus](#)]
775. Paul Watta, Sridhar Lakshmanan, Yulin Hou. 2007. Nonparametric Approaches for Estimating Driver Pose. *IEEE Transactions on Vehicular Technology* **56**:4, 2028-2041. [[CrossRef](#)]
776. Jesse Hoey, James J. Little. 2007. Value-Directed Human Behavior Analysis from Video Using Partially Observable Markov Decision Processes. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **29**:7, 1118-1132. [[CrossRef](#)]
777. Marsha Meytlis, Lawrence Sirovich. 2007. On the Dimensionality of Face Space. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **29**:7, 1262-1267. [[CrossRef](#)]
778. Federico M. Sukno, Sebastian Ordas, Constantine Butakoff, Santiago Cruz, Alejandro F. Frangi. 2007. Active Shape Models with Invariant Optimal Features: Application to Facial Analysis. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **29**:7, 1105-1117. [[CrossRef](#)]
779. Xiujuan Chai, Shiguang Shan, Xilin Chen, Wen Gao. 2007. Locally Linear Regression for Pose-Invariant Face Recognition. *IEEE Transactions on Image Processing* **16**:7, 1716-1725. [[CrossRef](#)]
780. Dalong Li, Russell M. Mersereau, Steven Simske. 2007. Atmospheric Turbulence-Degraded Image Restoration Using Principal Components Analysis. *IEEE Geoscience and Remote Sensing Letters* **4**:3, 340-344. [[CrossRef](#)]
781. Pong C. Yuen, C. H. Man. 2007. Human Face Image Searching System Using Sketches. *IEEE Transactions on Systems, Man, and Cybernetics - Part A: Systems and Humans* **37**:4, 493-504. [[CrossRef](#)]
782. S CHOI, C KIM, C CHOI. 2007. Shadow compensation in 2D images for face recognition. *Pattern Recognition* **40**:7, 2118-2125. [[CrossRef](#)]
783. Assaf Harel, Shimon Ullman, Boris Epshtein, Shlomo Bentin. 2007. Mutual information of image fragments predicts categorization in humans: Electrophysiological and behavioral evidence###. *Vision Research* **47**:15, 2010-2020. [[CrossRef](#)]
784. Carlos Eduardo Thomaz, Edson Caoru Kitani, Duncan Fyfe Gillies. 2007. A maximum uncertainty LDA-based approach for limited sample size problems### with application to face recognition. *Journal of the Brazilian Computer Society* **12**:2, 7-18. [[CrossRef](#)]
785. Chengjun Liu. 2007. The Bayes Decision Rule Induced Similarity Measures. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **29**:6, 1086-1090. [[CrossRef](#)]
786. Zhifeng Li, Xiaou Tang. 2007. Using Support Vector Machines to Enhance the Performance of Bayesian Face Recognition. *IEEE Transactions on Information Forensics and Security* **2**:2, 174-180. [[CrossRef](#)]
787. N.A. Fox, R. Gross, J.F. Cohn, R.B. Reilly. 2007. Robust Biometric Person Identification Using Automatic Classifier Fusion of Speech, Mouth, and Face Experts. *IEEE Transactions on Multimedia* **9**:4, 701-714. [[CrossRef](#)]
788. M. Kyperountas, C. Kotropoulos, I. Pitas. 2007. Enhanced Eigen-Audioframes for Audiovisual Scene Change Detection. *IEEE Transactions on Multimedia* **9**:4, 785-797. [[CrossRef](#)]
789. J WU, J WANG, L LIU. 2007. Feature extraction via KPCA for classification of gait patterns. *Human Movement Science* **26**:3, 393-411. [[CrossRef](#)]

790. C. V. Jiji, Subhasis Chaudhuri, Priyam Chatterjee. 2007. Single frame image super-resolution: should we process locally or globally?. *Multidimensional Systems and Signal Processing* **18**:2-3, 123-152. [[CrossRef](#)]
791. M. Asuncion Vicente, Patrik O. Hoyer, Aapo Hyvarinen. 2007. Equivalence of Some Common Linear Feature Extraction Techniques for Appearance-Based Object Recognition Tasks. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **29**:5, 896-900. [[CrossRef](#)]
792. Torbjorn Vik, Fabrice Heitz, Pierre Charbonnier. 2007. Robust Pose Estimation and Recognition Using Non-Gaussian Modeling of Appearance Subspaces. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **29**:5, 901-905. [[CrossRef](#)]
793. Sushmita Mitra, Tinku Acharya. 2007. Gesture Recognition: A Survey. *IEEE Transactions on Systems, Man and Cybernetics, Part C (Applications and Reviews)* **37**:3, 311-324. [[CrossRef](#)]
794. Tudor Barbu. 2007. Eigenimage-Based Facial Recognition Technique Using Gradient Covariance. *Numerical Functional Analysis and Optimization* **28**:5, 591-601. [[CrossRef](#)]
795. S LEE, S MOON, S LEE. 2007. Face recognition under arbitrary illumination using illuminated exemplars###. *Pattern Recognition* **40**:5, 1605-1620. [[CrossRef](#)]
796. X ZHUANG, D DAI. 2007. Improved discriminate analysis for high-dimensional data and its application to face recognition. *Pattern Recognition* **40**:5, 1570-1578. [[CrossRef](#)]
797. H YU, M BENNAMOUN. 2007. Complete invariants for robust face recognition. *Pattern Recognition* **40**:5, 1579-1591. [[CrossRef](#)]
798. C KIM, C CHOI. 2007. Image covariance-based subspace method for face recognition. *Pattern Recognition* **40**:5, 1592-1604. [[CrossRef](#)]
799. M TAN, J HAMMOND. 2007. A non-parametric approach for linear system identification using principal component analysis. *Mechanical Systems and Signal Processing* **21**:4, 1576-1600. [[CrossRef](#)]
800. B HERNANDEZ, G OLAGUE, R HAMMOUD, L TRUJILLO, E ROMERO. 2007. Visual learning of texture descriptors for facial expression recognition in thermal imagery. *Computer Vision and Image Understanding* **106**:2-3, 258-269. [[CrossRef](#)]
801. Xiaoyan Mu, Paul Watta, Mohamad H. Hassoun. 2007. A Weighted Voting Model of Associative Memory. *IEEE Transactions on Neural Networks* **18**:3, 756-777. [[CrossRef](#)]
802. Elaine P. M. Sousa, Caetano Traina, Agma J. M. Traina, Leejay Wu, Christos Faloutsos. 2007. A fast and effective method to find correlations among attributes in databases. *Data Mining and Knowledge Discovery* **14**:3, 367-407. [[CrossRef](#)]
803. Stan Li, Rufeng Chu, Shengcai Liao, Lun Zhang. 2007. Illumination Invariant Face Recognition Using Near-Infrared Images. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **29**:4, 627-639. [[CrossRef](#)]
804. Jian Zhang, Yue-ting Zhuang. 2007. Sample based 3D face reconstruction from a single frontal image by adaptive locally linear embedding. *Journal of Zhejiang University SCIENCE A* **8**:4, 550-558. [[CrossRef](#)]
805. Donald Monroe, Soumyadip Rakshit, Dexin Zhang. 2007. DCT-Based Iris Recognition. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **29**:4, 586-595. [[CrossRef](#)]
806. Jian Yang, David Zhang, Jing-yu Yang, Ben Niu. 2007. Globally Maximizing, Locally Minimizing: Unsupervised Discriminant Projection with Applications to Face and Palm Biometrics. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **29**:4, 650-664. [[CrossRef](#)]
807. Kumar T. Rajamani, Martin A. Styner, Haydar Talib, Guoyan Zheng, Lutz P. Nolte, Miguel A. Gonzalez Ballester. 2007. Statistical deformable bone models for robust 3D surface extrapolation from sparse data. *Medical Image Analysis* **11**:2, 99-109. [[CrossRef](#)]
808. A ELGAMMAL, C LEE. 2007. Nonlinear manifold learning for dynamic shape and dynamic appearance. *Computer Vision and Image Understanding* **106**:1, 31-46. [[CrossRef](#)]
809. Stefanos Zafeiriou, Anastasios Tefas, Ioannis Pitas. 2007. Learning Discriminant Person-Specific Facial Models Using Expandable Graphs. *IEEE Transactions on Information Forensics and Security* **2**:1, 55-68. [[CrossRef](#)]
810. Juyang Weng, Wey-Shiuan Hwang. 2007. Incremental Hierarchical Discriminant Regression. *IEEE Transactions on Neural Networks* **18**:2, 397-415. [[CrossRef](#)]
811. Christian Micheloni, Gian Luca Foresti, Claudio Picciarelli, Luigi Cinque. 2007. An Autonomous Vehicle for Video Surveillance of Indoor Environments. *IEEE Transactions on Vehicular Technology* **56**:2, 487-498. [[CrossRef](#)]
812. Herv Le Borgne, Anne Gurin-Dugu, Noel E. O'Connor. 2007. Learning Midlevel Image Features for Natural Scene and Texture Classification. *IEEE Transactions on Circuits and Systems for Video Technology* **17**:3, 286-297. [[CrossRef](#)]
813. Z LIANG, D ZHANG, P SHI. 2007. The theoretical analysis of GLRAM and its applications. *Pattern Recognition* **40**:3, 1032-1041. [[CrossRef](#)]

814. Ardevan Bakhtari, Beno Benhabib. 2007. An Active Vision System for Multitarget Surveillance in Dynamic Environments. *IEEE Transactions on Systems, Man and Cybernetics, Part B (Cybernetics)* **37**:1, 190-198. [[CrossRef](#)]
815. Rui Ishiyama, Masahiko Hamanaka, Shizuo Sakamoto. 2007. Face recognition under variable pose and illumination conditions using 3D facial appearance models. *Systems and Computers in Japan* **38**:2, 57-70. [[CrossRef](#)]
816. Georgios Passalis, Ioannis Kakadiaris, Theoharis Theoharis. 2007. Intra-class Retrieval of Nonrigid 3D Objects: Application to Face Recognition. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **29**:2, 218-229. [[CrossRef](#)]
817. S ULLMAN. 2007. Object recognition and segmentation by a fragment-based hierarchy. *Trends in Cognitive Sciences* **11**:2, 58-64. [[CrossRef](#)]
818. H VEERARAGHAVAN, N BIRD, S ATEV, N PAPANIKOLOPOULOS. 2007. Classifiers for driver activity monitoring. *Transportation Research Part C: Emerging Technologies* **15**:1, 51-67. [[CrossRef](#)]
819. Jen-Chien Chien, Jeng-Pang Wang, Chien-Lung Cho, Fok-Ching Chong. 2007. SECURITY BIOSIGNAL TRANSMISSION BASED ON FACE RECOGNITION FOR TELEMEDICINE. *Biomedical Engineering: Applications, Basis and Communications* **19**:01, 63-69. [[CrossRef](#)]
820. Chu-Yin Chang, Anthony A. Maciejewski, Venkataramanan Balakrishnan, Rodney G. Roberts, Kishor Saitwal. 2007. Quadtree-based eigendecomposition for pose estimation in the presence of occlusion and background clutter. *Pattern Analysis and Applications* **10**:1, 15-31. [[CrossRef](#)]
821. Edgar Bernal, Jan P. Allebach, Zygmunt Pizlo. 2007. Improved Pen Alignment for Bidirectional Printing. *Journal of Imaging Science and Technology* **51**:1, 1. [[CrossRef](#)]
822. J. B. Hubbard, M. R. Stoudt, L. E. Levine. 2007. Topography of metallic surfaces subjected to plastic strain: Roughness, spatial correlations, and eigenvalue spectral entropy. *Journal of Applied Physics* **102**:2, 023514. [[CrossRef](#)]
823. Y.K. Park, J.K. Kim. 2007. Fast adaptive smoothing based on LBP for robust face recognition. *Electronics Letters* **43**:24, 1350. [[CrossRef](#)]
824. Goran Zaji##, Nenad Koji##, Vladan Radosavljevi##, Maja Rudinac, Stevan Rudinac, Nikola Reljin, Irini Reljin, Branimir Reljin. 2007. Accelerating of Image Retrieval in CBIR System with Relevance Feedback. *EURASIP Journal on Advances in Signal Processing* **2007**, 1-14. [[CrossRef](#)]
825. Yi-Hung Liu, Yen-Ting Chen. 2007. Face Recognition Using Total Margin-Based Adaptive Fuzzy Support Vector Machines. *IEEE Transactions on Neural Networks* **18**:1, 178-192. [[CrossRef](#)]
826. Tianhao Zhang, Jie Yang, Huahua Wang, Chunhua Du, Deli Zhao. 2007. Maximum variance projections for face recognition. *Optical Engineering* **46**:6, 067206. [[CrossRef](#)]
827. Jianming Lu, Xue Yuan, Takashi Yahagi. 2007. A Method of Face Recognition Based on Fuzzy c-Means Clustering and Associated Sub-NNs. *IEEE Transactions on Neural Networks* **18**:1, 150-160. [[CrossRef](#)]
828. Olli Lahdenoja, Mika Laiho, Janne Maunu, Ari Paasio. 2007. A Massively Parallel Face Recognition System. *EURASIP Journal on Embedded Systems* **2007**, 1-14. [[CrossRef](#)]
829. Ruiming Liu, Erqi Liu, Jie Yang, Tianhao Zhang, Yuan Cao. 2007. Point target detection of infrared images with eigentargets. *Optical Engineering* **46**:11, 110502. [[CrossRef](#)]
830. Daisuke Takahashi, Noriyoshi Okamoto. 2007. Robust Posture Estimation for a Driver under the Condition of Lighting Changes. *IEEE Transactions on Electronics, Information and Systems* **127**:7, 1043-1051. [[CrossRef](#)]
831. Qinghui Zhang, Alex Pevsner, Agung Hertanto, Yu-Chi Hu, Kenneth E. Rosenzweig, C. Clifton Ling, Gig S Mageras. 2007. A patient-specific respiratory model of anatomical motion for radiation treatment planning. *Medical Physics* **34**:12, 4772. [[CrossRef](#)]
832. Muhammad Almas Anjum ., Muhammad Younus Javed .. 2007. Multiresolution and Varying Expressions Analysis of Face Images for Recognition. *Information Technology Journal* **6**:1, 57-65. [[CrossRef](#)]
833. Johel Mit##ran, Jean-Philippe Zimmer, Michel Paindavoine, Julien Dubois. 2007. Real-Time 3D Face Acquisition Using Reconfigurable Hybrid Architecture. *EURASIP Journal on Image and Video Processing* **2007**, 1-9. [[CrossRef](#)]
834. D. Gonza##lez-Jime##nez, E. Argones-Ru##a, J.L. Alba-Castro, J. Kittler. 2007. Evaluation of point localisation and similarity fusion methods for Gabor jet-based face verification. *IET Computer Vision* **1**:3-4, 101. [[CrossRef](#)]
835. Y. Pang, Y. Yuan, X. Li. 2007. Generalised nearest feature line for subspace learning. *Electronics Letters* **43**:20, 1079. [[CrossRef](#)]
836. G DAI, D YEUNG, Y QIAN. 2007. Face recognition using a kernel fractional-step discriminant analysis algorithm. *Pattern Recognition* **40**:1, 229-243. [[CrossRef](#)]
837. Johel Mit##ran, Jean-Philippe Zimmer, Michel Paindavoine, Julien Dubois. 2007. Real-Time 3D Face Acquisition Using Reconfigurable Hybrid Architecture. *EURASIP Journal on Image and Video Processing* **2007**:1, 081387. [[CrossRef](#)]

838. Hervé Bredin, Gérard Chollet. 2007. Audiovisual Speech Synchrony Measure: Application to Biometrics. *EURASIP Journal on Advances in Signal Processing* **2007**, 1-12. [[CrossRef](#)]
839. R. Srikantaswamy, R. D. Sudhaker Samuel. 2007. A Novel Face Segmentation Algorithm from a Video Sequence for Real-Time Face Recognition. *EURASIP Journal on Advances in Signal Processing* **2007**, 1-7. [[CrossRef](#)]
840. Anshuman Razdan, Gerald Farin, Myungsoo Bae, Mahesh ChaudhariChapter 4 State of 3D Face Biometrics for Homeland Security Applications **2**, 73-99. [[CrossRef](#)]
841. References 429-446. [[CrossRef](#)]
842. Jong-Heun Rho, Young-Hyun Baek, Sung-Ryong Moon. 2006. A Study on Fuzzy Wavelet LDA Mixed Model for an effective Face Expression Recognition. *Journal of Fuzzy Logic and Intelligent Systems* **16**:6, 759-765. [[CrossRef](#)]
843. A. A. Desyatchikov, D. V. Kovkov, V. V. Lobantsov, K. A. Makovkin, I. A. Matveev, A. B. Murynin, V. Ya. Chuchupal. 2006. A system of algorithms for stable human recognition. *Journal of Computer and Systems Sciences International* **45**:6, 958-969. [[CrossRef](#)]
844. S. CHOI. 2006. Differential learning algorithms for decorrelation and independent component analysis. *Neural Networks* **19**:10, 1558-1567. [[CrossRef](#)]
845. XIPENG QIU, LIDE WU. 2006. NEAREST NEIGHBOR DISCRIMINANT ANALYSIS. *International Journal of Pattern Recognition and Artificial Intelligence* **20**:08, 1245-1259. [[CrossRef](#)]
846. Sami Romdhani, Jeffrey Ho, Thomas Vetter, David J. Kriegman. 2006. Face Recognition Using 3-D Models: Pose and Illumination. *Proceedings of the IEEE* **94**:11, 1977-1999. [[CrossRef](#)]
847. Bhagavatula V. K. Vijaya Kumar, Marios Savvides, Chunyan Xie. 2006. Correlation Pattern Recognition for Face Recognition. *Proceedings of the IEEE* **94**:11, 1963-1976. [[CrossRef](#)]
848. Petar S. Aleksic, Aggelos K. Katsaggelos. 2006. Audio-Visual Biometrics. *Proceedings of the IEEE* **94**:11, 2025-2044. [[CrossRef](#)]
849. Kevin W. Bowyer, Kyong I. Chang, Patrick J. Flynn, Xin Chen. 2006. Face Recognition Using 2-D, 3-D, and Infrared: Is Multimodal Better Than Multisample?. *Proceedings of the IEEE* **94**:11, 2000-2012. [[CrossRef](#)]
850. H. WILSON, A. DIACONESCU. 2006. Learning alters local face space geometry. *Vision Research* **46**:24, 4143-4151. [[CrossRef](#)]
851. Senjian An, Wanquan Liu, Svetha Venkatesh, Ronny Tjahyadi. 2006. A Fast Feature-based Dimension Reduction Algorithm for Kernel Classifiers. *Neural Processing Letters* **24**:2, 137-151. [[CrossRef](#)]
852. Peter Dayan. 2006. Images, Frames, and Connectionist Hierarchies. *Neural Computation* **18**:10, 2293-2319. [[Abstract](#)] [[PDF](#)] [[PDF Plus](#)]
853. Conor Nugent, Pdraig Cunningham, Patrick Kirwan. 2006. Using active learning to annotate microscope images of parasite eggs. *Artificial Intelligence Review* **26**:1-2, 63-73. [[CrossRef](#)]
854. Biren Shah, Vijay Raghavan, Praveen Dhatri, Xiaoquan Zhao. 2006. A cluster-based approach for efficient content-based image retrieval using a similarity-preserving space transformation method. *Journal of the American Society for Information Science and Technology* **57**:12, 1694-1707. [[CrossRef](#)]
855. Martin D. Levine, Ajit Rajwade. 2006. Three-dimensional view-invariant face recognition using a hierarchical pose-normalization strategy. *Machine Vision and Applications* **17**:5, 309-325. [[CrossRef](#)]
856. Kilian Q. Weinberger, Lawrence K. Saul. 2006. Unsupervised Learning of Image Manifolds by Semidefinite Programming. *International Journal of Computer Vision* **70**:1, 77-90. [[CrossRef](#)]
857. C. Mario Christoudias, Louis-Philippe Morency, Trevor Darrell. 2006. Non-parametric and light-field deformable models. *Computer Vision and Image Understanding* **104**:1, 16-35. [[CrossRef](#)]
858. Linlin Shen, Li Bai. 2006. A review on Gabor wavelets for face recognition. *Pattern Analysis and Applications* **9**:2-3, 273-292. [[CrossRef](#)]
859. Yan MA, Shun-bao Li. 2006. Face recognition by combining eigenface method with different wavelet subbands. *Optoelectronics Letters* **2**:5, 383-385. [[CrossRef](#)]
860. Xudong Xie, Kin-Man Lam. 2006. Gabor-based kernel PCA with doubly nonlinear mapping for face recognition with a single face image. *IEEE Transactions on Image Processing* **15**:9, 2481-2492. [[CrossRef](#)]
861. Ke Han, Xiuchang Zhu. 2006. Research on face recognition based on IMED and 2DPCA. *Journal of Electronics (China)* **23**:5, 786-790. [[CrossRef](#)]
862. William Baxter, Ken-ichi Anjyo. 2006. Latent Doodle Space. *Computer Graphics Forum* **25**:3, 477-485. [[CrossRef](#)]
863. X. TAN, S. CHEN, Z. ZHOU, F. ZHANG. 2006. Face recognition from a single image per person: A survey. *Pattern Recognition* **39**:9, 1725-1745. [[CrossRef](#)]

864. J WANG, K PLATANIOTIS, J LU, A VENETSANOPOULOS. 2006. On solving the face recognition problem with one training sample per subject. *Pattern Recognition* **39**:9, 1746-1762. [[CrossRef](#)]
865. JAE-YOUNG CHOI, TAEG-KEUN WHANGBO, YOUNG-GYU YANG, MURLIKRISHNA VISWANATHAN, NAKBIN KIM. 2006. POSE-EXPRESSION NORMALIZATION FOR FACE RECOGNITION USING CONNECTED COMPONENTS ANALYSIS. *International Journal of Pattern Recognition and Artificial Intelligence* **20**:06, 869-881. [[CrossRef](#)]
866. J. Verbeek. 2006. Learning nonlinear image manifolds by global alignment of local linear models. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **28**:8, 1236-1250. [[CrossRef](#)]
867. Y SONG, Y KIM, U CHANG, H KWON. 2006. Face recognition robust to left/right shadows; facial symmetry. *Pattern Recognition* **39**:8, 1542-1545. [[CrossRef](#)]
868. Liang Chen, Ruoyu Chen, Sharmin Nilufar. 2006. Improving the performance of 1D object classification by using the Electoral College. *Knowledge and Information Systems* **10**:1, 41-56. [[CrossRef](#)]
869. Q. Liu, X. Tang, H. Lu, S. Ma. 2006. Face Recognition Using Kernel Scatter-Difference-Based Discriminant Analysis. *IEEE Transactions on Neural Networks* **17**:4, 1081-1085. [[CrossRef](#)]
870. Qi Li, Jieping Ye, Chandra Kambhampettu. 2006. Spatial interest pixels (SIPs): useful low-level features of visual media data. *Multimedia Tools and Applications* **30**:1, 89-108. [[CrossRef](#)]
871. Marina Brozovi??, Richard A. Andersen. 2006. A nonparametric quantification of neural response field structures. *NeuroReport* **17**:10, 963-967. [[CrossRef](#)]
872. S NOUSHATH, G HEMANTHAKUMAR, P SHIVAKUMARA. 2006. (2D)2LDA: An efficient approach for face recognition. *Pattern Recognition* **39**:7, 1396-1400. [[CrossRef](#)]
873. A KONG, K CHEUNG, D ZHANG, M KAMEL, J YOU. 2006. An analysis of BioHashing and its variants. *Pattern Recognition* **39**:7, 1359-1368. [[CrossRef](#)]
874. R GOTTUMUKKAL, H NGO, V ASARI. 2006. Multi-lane architecture for eigenface based real-time face recognition. *Microprocessors and Microsystems* **30**:4, 216-224. [[CrossRef](#)]
875. Christian Eckes , Jochen Triesch , Christoph von der Malsburg . 2006. Analysis of Cluttered Scenes Using an Elastic Matching Approach for Stereo Images. *Neural Computation* **18**:6, 1441-1471. [[Abstract](#)] [[PDF](#)] [[PDF Plus](#)]
876. Xiaoyan Mu, Mehmet Artiklar, Paul Watta, Mohamad H. Hassoun. 2006. An RCE-based Associative Memory with Application to Human Face Recognition. *Neural Processing Letters* **23**:3, 257-271. [[CrossRef](#)]
877. Pei Chen, David Suter. 2006. An Analysis of Linear Subspace Approaches for Computer Vision and Pattern Recognition. *International Journal of Computer Vision* **68**:1, 83-106. [[CrossRef](#)]
878. Tommy W. S. Chow, M. K. M. Rahman. 2006. Face Matching in Large Database by Self-Organizing Maps. *Neural Processing Letters* **23**:3, 305-323. [[CrossRef](#)]
879. Shubhra K. Misra, M. Thomas, C. Kambhampettu, J. T. Kirby, F. Veron, M. Brocchini. 2006. Estimation of complex air/water interfaces from particle image velocimetry images. *Experiments in Fluids* **40**:5, 764-775. [[CrossRef](#)]
880. S. Zafeiriou, A. Tefas, I. Buciu, I. Pitas. 2006. Exploiting Discriminant Information in Nonnegative Matrix Factorization With Application to Frontal Face Verification. *IEEE Transactions on Neural Networks* **17**:3, 683-695. [[CrossRef](#)]
881. S LEE, H JUNG, B HWANG, S LEE. 2006. Authenticating corrupted photo images based on noise parameter estimation. *Pattern Recognition* **39**:5, 910-920. [[CrossRef](#)]
882. J SHI, A SAMAL, D MARX. 2006. How effective are landmarks and their geometry for face recognition?. *Computer Vision and Image Understanding* **102**:2, 117-133. [[CrossRef](#)]
883. Wenming Zheng . 2006. Class-Incremental Generalized Discriminant Analysis. *Neural Computation* **18**:4, 979-1006. [[Abstract](#)] [[PDF](#)] [[PDF Plus](#)]
884. Siu-Yeung Cho, Tommy W. S. Chow. 2006. Robust face recognition using generalized neural reflectance model. *Neural Computing and Applications* **15**:2, 170-182. [[CrossRef](#)]
885. H. Luo, W. Hao, D.H. Foos, C.W. Cornelius. 2006. Automatic Image Hanging Protocol for Chest Radiographs in PACS. *IEEE Transactions on Information Technology in Biomedicine* **10**:2, 302-311. [[CrossRef](#)]
886. E. Erzin, Y. Yemez, A.M. Tekalp, A. Ercil, H. Erdogan, H. Abut. 2006. Multimodal Person Recognition for Human-Vehicle Interaction. *IEEE Multimedia* **13**:2, 18-31. [[CrossRef](#)]
887. P NAGABHUSHAN, D GURU, B SHEKAR. 2006. Visual learning and recognition of 3D objects using two-dimensional principal component analysis: A robust and an efficient approach. *Pattern Recognition* **39**:4, 721-725. [[CrossRef](#)]
888. Dario Riccardo Valenzano, Andrea Mennucci, Giandonato Tartarelli, Alessandro Cellerino. 2006. Shape analysis of female facial attractiveness. *Vision Research* **46**:8-9, 1282-1291. [[CrossRef](#)]

889. M REUTER, F WOLTER, N PEINECKE. 2006. Laplace###Beltrami spectra as ###Shape-DNA### of surfaces and solids. *Computer-Aided Design* **38**:4, 342-366. [[CrossRef](#)]
890. GIAN LUCA MARCIALIS, FABIO ROLI. 2006. DECISION-LEVEL FUSION OF PCA AND LDA-BASED FACE RECOGNITION ALGORITHMS. *International Journal of Image and Graphics* **06**:02, 293-311. [[CrossRef](#)]
891. Benjamin J. Balas , Pawan Sinha . 2006. Receptive Field Structures for Recognition. *Neural Computation* **18**:3, 497-520. [[Abstract](#)] [[PDF](#)] [[PDF Plus](#)]
892. Fred Rothganger, Svetlana Lazebnik, Cordelia Schmid, Jean Ponce. 2006. 3D Object Modeling and Recognition Using Local Affine-Invariant Image Descriptors and Multi-View Spatial Constraints. *International Journal of Computer Vision* **66**:3, 231-259. [[CrossRef](#)]
893. Khairul Anuar Ishak ., Salina Abdul Samad ., Aini Hussain .. 2006. A Face Detection and Recognition System for Intelligent Vehicles. *Information Technology Journal* **5**:3, 507-515. [[CrossRef](#)]
894. A COLOMBO, C CUSANO, R SCHETTINI. 2006. 3D face detection using curvature analysis. *Pattern Recognition* **39**:3, 444-455. [[CrossRef](#)]
895. WEN-SHENG CHEN, PONG CHI YUEN, JIAN HUANG, BIN FANG. 2006. TWO-STEP SINGLE PARAMETER REGULARIZATION FISHER DISCRIMINANT METHOD FOR FACE RECOGNITION. *International Journal of Pattern Recognition and Artificial Intelligence* **20**:02, 189-207. [[CrossRef](#)]
896. YANWEI PANG, ZHENGKAI LIU, YUEFANG SUN. 2006. SUBSPACE LEARNING BASED ON LAPLACIAN EIGENMAPS AND LDA FOR FACE RECOGNITION. *International Journal of Information Acquisition* **03**:01, 45-51. [[CrossRef](#)]
897. M.D. Cordea, E.M. Petriu. 2006. A 3-D Anthropometric-Muscle-Based Active Appearance Model. *IEEE Transactions on Instrumentation and Measurement* **55**:1, 91-98. [[CrossRef](#)]
898. Nooritawati Md Tahir ., Aini Hussain ., Salina Abdul Samad ., Hafizah Husain ., Mohd Marzuki Mustafa .. 2006. Eigenposture for Classification. *Journal of Applied Sciences* **6**:2, 419-424. [[CrossRef](#)]
899. Bin Li, David Zhang, Kuanquan Wang. 2006. Online signature verification based on null component analysis and principal component analysis. *Pattern Analysis and Applications* **8**:4, 345-356. [[CrossRef](#)]
900. C SANDERSON, S BENGIO, Y GAO. 2006. On transforming statistical models for non-frontal face verification. *Pattern Recognition* **39**:2, 288-302. [[CrossRef](#)]
901. D MASIP, J VITRIA. 2006. Boosted discriminant projections for nearest neighbor classification. *Pattern Recognition* **39**:2, 164-170. [[CrossRef](#)]
902. Joyca P. W. Lacroix, Jaap M. J. Murre, Eric O. Postma, H. Jaap Herik. 2006. Modeling Recognition Memory Using the Similarity Structure of Natural Input. *Cognitive Science* **30**:1, 121-145. [[CrossRef](#)]
903. Arnulf B.A. Graf , Felix A. Wichmann , Heinrich H. B###lthoff , Bernhard Sch###lkopf . 2006. Classification of Faces in Man and Machine. *Neural Computation* **18**:1, 143-165. [[Abstract](#)] [[PDF](#)] [[PDF Plus](#)]
904. Yael Eishental , Gideon Dror , Eytan Ruppin . 2006. Facial Attractiveness: Beauty and the Machine. *Neural Computation* **18**:1, 119-142. [[Abstract](#)] [[PDF](#)] [[PDF Plus](#)]
905. Wei-wei Yu, Xiao-long Teng, Chong-qing Liu. 2006. Face recognition fusing global and local features. *Journal of Electronic Imaging* **15**:1, 013014. [[CrossRef](#)]
906. B. Caputo. 2006. A spin glass model of a Markov random field. *International Journal of Imaging Systems and Technology* **16**:5, 181-188. [[CrossRef](#)]
907. P. Quintiliano, A. Santa-Rosa, R. Guadagnin. 2006. Hyperspectral images classification based on KLT. *Pattern Recognition and Image Analysis* **16**:1, 39-42. [[CrossRef](#)]
908. L. M. Galantucci, R. Ferrandes, G. Percoco. 2006. Digital Photogrammetry for Facial Recognition. *Journal of Computing and Information Science in Engineering* **6**:4, 390. [[CrossRef](#)]
909. 2006. Implementation of Face-recognition System Using Auto-associate Learning of Hippocampus and RFID. *Journal of Control, Automation and Systems Engineering* **12**:1, 28-32. [[CrossRef](#)]
910. Jayanta Basak, Koustav Bhattacharya, Santanu Chaudhury. 2006. Multiple Exemplar-Based Facial Image Retrieval Using Independent Component Analysis. *IEEE Transactions on Image Processing* **15**:12, 3773-3783. [[CrossRef](#)]
911. Tze-Yin Chow, Kin-Man Lam, Kwok-Wai Wong. 2006. Efficient color face detection algorithm under different lighting conditions. *Journal of Electronic Imaging* **15**:1, 013015. [[CrossRef](#)]
912. Bo-Suk YANG, Tian HAN, Zhong-Jun YIN. 2006. Fault Diagnosis System of Induction Motors Using Feature Extraction, Feature Selection and Classification Algorithm. *JSME International Journal Series C* **49**:3, 734-741. [[CrossRef](#)]
913. J. Lu, K.N. Plataniotis, A.N. Venetsanopoulos, S.Z. Li. 2006. Ensemble-based discriminant learning with boosting for face recognition. *IEEE Transactions on Neural Networks* **17**:1, 166-178. [[CrossRef](#)]

914. Xin Geng, Zhi-Hua Zhou. 2006. Image Region Selection and Ensemble for Face Recognition. *Journal of Computer Science and Technology* **21**:1, 116-125. [[CrossRef](#)]
915. Yu-Ping Wang, Ashok Kumar Dandpat. 2006. A Hybrid Approach of Using Wavelets and Fuzzy Clustering for Classifying Multispectral Florescence In Situ Hybridization Images. *International Journal of Biomedical Imaging* **2006**, 1-12. [[CrossRef](#)]
916. Yoichi Sato. 2006. *The Journal of The Institute of Image Information and Television Engineers* **60**:4, 516-519. [[CrossRef](#)]
917. Ingo Bax, Gunther Heidemann, Helge Ritter. 2006. Hierarchical feed-forward network for object detection tasks. *Optical Engineering* **45**:6, 067203. [[CrossRef](#)]
918. Yu WANG, Seiji ITAI, Satoshi ONO, Shigeru NAKAYAMA. 2006. Human Recognition with Ear Image by Principal Component Analysis. *Joho Chishiki Gakkaishi* **16**:1, 15-27. [[CrossRef](#)]
919. Md. Hasanuzzaman, T. Zhang, V. Ampornaramveth, H. Ueno. 2006. Gesture-based human-robot interaction using a knowledge-based software platform. *Industrial Robot: An International Journal* **33**:1, 37-49. [[CrossRef](#)]
920. Qin Li, King Hong Cheung, Jane You, Raymond Tong, Arthur Mak. 2006. A robust automatic face recognition system for real-time personal identification. *Sensor Review* **26**:1, 38-44. [[CrossRef](#)]
921. Diogo C. Pereira, Monique P. Fargues, Gamani Karunasiri. 2006. Investigation of uncooled infrared imagery for face recognition. *Optical Engineering* **45**:1, 016401. [[CrossRef](#)]
922. Xue Yuan, Jianming Lu, Takashi Yahagi. 2006. 3D Face Recognition Using Parallel Pyramid Neural Networks. *IEEE Transactions on Electronics, Information and Systems* **126**:8, 963-971. [[CrossRef](#)]
923. Fei Long, Jinsong He, Xueyi Ye, Zhenquan Zhuang, Bin Li. 2006. Discriminant Independent Component Analysis as a subspace representation. *Journal of Electronics (China)* **23**:1, 103-106. [[CrossRef](#)]
924. D ZHANG, Z ZHOU. 2006. Diagonal principal component analysis for face recognition. *Pattern Recognition* **39**:1, 140-142. [[CrossRef](#)]
925. Jian Cheng, Qingshan Liu, Hanqing Lu, Yen-Wei Chen. 2006. Ensemble learning for independent component analysis. *Pattern Recognition* **39**:1, 81-88. [[CrossRef](#)]
926. Lionel Tarassenko, Mike Denham. *Sensory Processing* 85-I. [[CrossRef](#)]
927. Petros Drineas, Ravi Kannan, Michael W. Mahoney. 2006. Fast Monte Carlo Algorithms for Matrices II: Computing a Low-Rank Approximation to a Matrix. *SIAM Journal on Computing* **36**:1, 158. [[CrossRef](#)]
928. Adrian Schwaninger, Christian Wallraven, Douglas W. Cunningham, Sarah D. Chiller-Glaus. Processing of facial identity and expression: a psychophysical, physiological, and computational perspective **156**, 321-343. [[CrossRef](#)]
929. A JAIN, K NANDAKUMAR, A ROSS. 2005. Score normalization in multimodal biometric systems###. *Pattern Recognition* **38**:12, 2270-2285. [[CrossRef](#)]
930. Q SUN, S ZENG, Y LIU, P HENG, D XIA. 2005. A new method of feature fusion and its application in image recognition. *Pattern Recognition* **38**:12, 2437-2448. [[CrossRef](#)]
931. Mann-Jun Kwon, Hyoun-Joo Go, Myung-Geun Chun. 2005. Face Recognition using Fuzzy-EBGM(Elastic Bunch Graph Matching) Method. *Journal of Fuzzy Logic and Intelligent Systems* **15**:6, 759-764. [[CrossRef](#)]
932. Samarasena Buchala, Neil Davey, Tim M. Gale, Ray J Frank. 2005. Analysis of linear and nonlinear dimensionality reduction methods for gender classification of face images. *International Journal of Systems Science* **36**:14, 931-942. [[CrossRef](#)]
933. T. Tan, H. Yan. 2005. Face Recognition Using the Weighted Fractal Neighbor Distance. *IEEE Transactions on Systems, Man and Cybernetics, Part C (Applications and Reviews)* **35**:4, 576-582. [[CrossRef](#)]
934. WEN-SHENG CHEN, PONG C. YUEN, JIAN HUANG. 2005. A NEW REGULARIZED LINEAR DISCRIMINANT ANALYSIS METHOD TO SOLVE SMALL SAMPLE SIZE PROBLEMS. *International Journal of Pattern Recognition and Artificial Intelligence* **19**:07, 917-935. [[CrossRef](#)]
935. M NIKOLAOU, P MISRA, V TAM, A BAILEY. 2005. Complexity in semiconductor manufacturing, activity of antimicrobial agents, and drilling of hydrocarbon wells: Common themes and case studies. *Computers & Chemical Engineering* **29**:11-12, 2266-2289. [[CrossRef](#)]
936. 2005. Personal authentication using multiple palmprint representation. *Pattern Recognition* **38**:10, 1695-1704. [[CrossRef](#)]
937. 2005. Illumination invariant face recognition. *Pattern Recognition* **38**:10, 1705-1716. [[CrossRef](#)]
938. 2005. Natural scene classification using overcomplete ICA. *Pattern Recognition* **38**:10, 1507-1519. [[CrossRef](#)]
939. Man-Jun Kwon, Dong-Hwa Yang, Hyoun-Joo Go, Jin-Wan Kim, Myung-Geun Chun. 2005. Real-Time Face Recognition System using PDA. *Journal of Fuzzy Logic and Intelligent Systems* **15**:5, 649-654. [[CrossRef](#)]
940. Dae-Jong Lee, Kyong-Ah Lee, Hyoun-Joo Go, Myung-Geun Chun. 2005. Face Emotion Recognition by Fusion Model based on Static and Dynamic Image. *Journal of Fuzzy Logic and Intelligent Systems* **15**:5, 573-580. [[CrossRef](#)]

941. S. Srisuk, M. Petrou, W. Kurutach, A. Kadyrov. 2005. A face authentication system using the trace transform. *Pattern Analysis and Applications* **8**:1-2, 50-61. [[CrossRef](#)]
942. K. Venkataramani, S. Qidwai, B.V.K. Vijayakumar. 2005. Face Authentication From Cell Phone Camera Images With Illumination and Temporal Variations. *IEEE Transactions on Systems, Man and Cybernetics, Part C (Applications and Reviews)* **35**:3, 411-418. [[CrossRef](#)]
943. W.-S. Chen, P.C. Yuen, J. Huang, D.-Q. Dai. 2005. Kernel Machine-Based One-Parameter Regularized Fisher Discriminant Method for Face Recognition. *IEEE Transactions on Systems, Man and Cybernetics, Part B (Cybernetics)* **35**:4, 659-669. [[CrossRef](#)]
944. X. Wang, X. Tang. 2005. Hallucinating Face by Eigentransformation. *IEEE Transactions on Systems, Man and Cybernetics, Part C (Applications and Reviews)* **35**:3, 425-434. [[CrossRef](#)]
945. Andrew J. Calder, Andrew W. Young. 2005. Understanding the recognition of facial identity and facial expression. *Nature Reviews Neuroscience* **6**:8, 641-651. [[CrossRef](#)]
946. J. Ruiz-del-Solar, P. Navarrete. 2005. Eigenspace-Based Face Recognition: A Comparative Study of Different Approaches. *IEEE Transactions on Systems, Man and Cybernetics, Part C (Applications and Reviews)* **35**:3, 315-325. [[CrossRef](#)]
947. Thang V. Pham, Arnold W.M. Smeulders. 2005. Object recognition with uncertain geometry and uncertain part detection. *Computer Vision and Image Understanding* **99**:2, 241-258. [[CrossRef](#)]
948. Cesar F. Caiafa, Araceli N. Proto, Daniel Vergani, Zulma Stanganelli. 2005. Development of individual recognition of female southern elephant seals, *Mirounga leonina*, from Punta Norte Peninsula Valdes, applying principal components analysis. *Journal of Biogeography* **32**:7, 1257-1266. [[CrossRef](#)]
949. Zhuowen Tu, Xiangrong Chen, Alan L. Yuille, Song-Chun Zhu. 2005. Image Parsing: Unifying Segmentation, Detection, and Recognition. *International Journal of Computer Vision* **63**:2, 113-140. [[CrossRef](#)]
950. Y QI. 2005. Robust visual similarity retrieval in single model face databases. *Pattern Recognition* **38**:7, 1009-1020. [[CrossRef](#)]
951. R GOLDENBERG, R KIMMEL, E RIVLIN, M RUDZSKY. 2005. Behavior classification by eigendecomposition of periodic motions. *Pattern Recognition* **38**:7, 1033-1043. [[CrossRef](#)]
952. J LEE, J WANG, C ZHANG, Z BIAN. 2005. Visual object recognition using probabilistic kernel subspace similarity. *Pattern Recognition* **38**:7, 997-1008. [[CrossRef](#)]
953. Hui Kong, Lei Wang, Eam Khwang Teoh, Xuchun Li, Jian-Gang Wang, Ronda Venkateswarlu. 2005. Generalized 2D principal component analysis for face image representation and recognition. *Neural Networks* **18**:5-6, 585-594. [[CrossRef](#)]
954. Seiichi Ozawa, Soon Lee Toh, Shigeo Abe, Shaoning Pang, Nikola Kasabov. 2005. Incremental learning of feature space and classifier for face recognition. *Neural Networks* **18**:5-6, 575-584. [[CrossRef](#)]
955. GANG PAN, ZHAOHUI WU. 2005. 3D FACE RECOGNITION FROM RANGE DATA. *International Journal of Image and Graphics* **05**:03, 573-593. [[CrossRef](#)]
956. H. Zhang, W. Huang, Z. Huang, B. Zhang. 2005. A Kernel Autoassociator Approach to Pattern Classification. *IEEE Transactions on Systems, Man and Cybernetics, Part B (Cybernetics)* **35**:3, 593-606. [[CrossRef](#)]
957. B.A. Draper, D.L. Elliott, J. Hayes, K. Baek. 2005. EM in High-Dimensional Spaces. *IEEE Transactions on Systems, Man and Cybernetics, Part B (Cybernetics)* **35**:3, 571-577. [[CrossRef](#)]
958. L CHEN, H MAN, A NEFIAN. 2005. Face recognition based on multi-class mapping of Fisher scores. *Pattern Recognition* **38**:6, 799-811. [[CrossRef](#)]
959. David J. Hurley, Mark S. Nixon, John N. Carter. 2005. Force field feature extraction for ear biometrics. *Computer Vision and Image Understanding* **98**:3, 491-512. [[CrossRef](#)]
960. PEI CHEN, DAVID SUTER. 2005. SUBSPACE-BASED FACE RECOGNITION: OUTLIER DETECTION AND A NEW DISTANCE CRITERION. *International Journal of Pattern Recognition and Artificial Intelligence* **19**:04, 479-493. [[CrossRef](#)]
961. YUAN WANG, YUNDE JIA, CHANGBO HU, MATTHEW TURK. 2005. NON-NEGATIVE MATRIX FACTORIZATION FRAMEWORK FOR FACE RECOGNITION. *International Journal of Pattern Recognition and Artificial Intelligence* **19**:04, 495-511. [[CrossRef](#)]
962. LAIYUN QING, SHIGUANG SHAN, WEN GAO, BO DU. 2005. FACE RECOGNITION UNDER GENERIC ILLUMINATION BASED ON HARMONIC RELIGHTING. *International Journal of Pattern Recognition and Artificial Intelligence* **19**:04, 513-531. [[CrossRef](#)]
963. David Masip, Jordi Vitri. 2005. Feature extraction for nearest neighbor classification: Application to gender recognition. *International Journal of Intelligent Systems* **20**:5, 561-576. [[CrossRef](#)]
964. M.J. Er, W. Chen, S. Wu. 2005. High-Speed Face Recognition Based on Discrete Cosine Transform and RBF Neural Networks. *IEEE Transactions on Neural Networks* **16**:3, 679-691. [[CrossRef](#)]

965. Tsuyoshi Kawaguchi, Mohamed Rizon, Daisuke Hidaka. 2005. Detection of eyes from human faces by Hough transform and separability filter. *Electronics and Communications in Japan (Part II: Electronics)* **88**:5, 29-39. [[CrossRef](#)]
966. Y. Zhang, J. Weng, W.-S. Hwang. 2005. Auditory Learning: A Developmental Method. *IEEE Transactions on Neural Networks* **16**:3, 601-616. [[CrossRef](#)]
967. Dae-Jong Lee, Ui-Sook Ahn, Jang-Hwan Park, Myung-Geun Chun. 2005. Emotion Recognition of Korean and Japanese using Facial Images. *Journal of Fuzzy Logic and Intelligent Systems* **15**:2, 197-203. [[CrossRef](#)]
968. Hee-Jun Jang, Hye-Sun Ko, Young-Woo Choi, Young-Joon Han, Hern-Soo Hahn. 2005. A New Face Tracking Method Using Block Difference Image and Kalman Filter in Moving Picture. *Journal of Fuzzy Logic and Intelligent Systems* **15**:2, 163-172. [[CrossRef](#)]
969. 2005. A Multimodal Emotion Recognition Using the Facial Image and Speech Signal. *International Journal of Fuzzy Logic and Intelligent Systems* **5**:1, 1-6. [[CrossRef](#)]
970. L CHEN, N TOKUDA. 2005. A general stability analysis on regional and national voting schemes against noise?why is an electoral college more stable than a direct popular election?. *Artificial Intelligence* **163**:1, 47-66. [[CrossRef](#)]
971. X JING, Y TANG, D ZHANG. 2005. A Fourier?LDA approach for image recognition. *Pattern Recognition* **38**:3, 453-457. [[CrossRef](#)]
972. Haisong Gu, Qiang Ji. 2005. Information extraction from image sequences of real-world facial expressions. *Machine Vision and Applications* **16**:2, 105-115. [[CrossRef](#)]
973. Jean-Marie Sainthillier, Tijani Gharbi, Patrice Muret, Philippe Humbert. 2005. Skin capillary network recognition and analysis by means of neural algorithms. *Skin Research and Technology* **11**:1, 9-16. [[CrossRef](#)]
974. Stuart J. Gibson, Christopher J. Solomon, Alvaro Pallares-Bejarano. 2005. Nonlinear, near photo-realistic caricatures using a parametric facial appearance model. *Behavior Research Methods* **37**:1, 170-181. [[CrossRef](#)]
975. Tao Xin-min, Liu Fu-rong. 2005. A novel model of IDS based on fuzzy cluster and immune principle. *Wuhan University Journal of Natural Sciences* **10**:1, 157-160. [[CrossRef](#)]
976. H. Zhang, B. Zhang, W. Huang, Q. Tian. 2005. Gabor Wavelet Associative Memory for Face Recognition. *IEEE Transactions on Neural Networks* **16**:1, 275-278. [[CrossRef](#)]
977. Mau-Tsuen Yang, Shih-Chun Wang, Yong-Yuan Lin. 2005. A multimodal fusion system for people detection and tracking. *International Journal of Imaging Systems and Technology* **15**:2, 131-142. [[CrossRef](#)]
978. David C. L. Ngo, Alwyn Goh, Andrew B. J. Teoh. 2005. Recognition using robust bit extraction. *Journal of Electronic Imaging* **14**:4, 043016. [[CrossRef](#)]
979. Kresimir Delac, Mislav Grgic, Sonja Grgic. 2005. Independent comparative study of PCA, ICA, and LDA on the FERET data set. *International Journal of Imaging Systems and Technology* **15**:5, 252-260. [[CrossRef](#)]
980. Xue Yuan, Jianming Lu, Takashi Yahagi. 2005. A Method of 3D Face Recognition Based on Contour Maps. *IEEE Transactions on Electronics, Information and Systems* **125**:3, 426-434. [[CrossRef](#)]
981. Kazuma Shigenari, Fumihiko Sakaue, Takeshi Shakunaga. 2005. Decomposition and virtualization of eigenface for face recognition under various lighting conditions. *Systems and Computers in Japan* **36**:1, 25-34. [[CrossRef](#)]
982. G.Y. Tian, A. Sophian, D. Taylor, J. Rudlin. 2005. Wavelet-based PCA defect classification and quantification for pulsed eddy current NDT. *IEE Proceedings - Science, Measurement and Technology* **152**:4, 141. [[CrossRef](#)]
983. Jian Huang, Pong C. Yuen, Wen-Sheng Chen, Jian Huang Lai. 2005. Component-based subspace linear discriminant analysis method for face recognition with one training sample. *Optical Engineering* **44**:5, 057002. [[CrossRef](#)]
984. Christian Wallraven, Adrian Schwaninger, Heinrich H. Bülthoff. 2005. Learning from humans: Computational modeling of face recognition. *Network: Computation in Neural Systems* **16**:4, 401-418. [[CrossRef](#)]
985. S KONG. 2005. Recent advances in visual and infrared face recognition?a review. *Computer Vision and Image Understanding* **97**:1, 103-135. [[CrossRef](#)]
986. H. Wu, J. Zelek. 2005. A Multiclassifier-based Near-Real-Time Face Detection System. *International Journal of Robotics and Automation* **20**:1. . [[CrossRef](#)]
987. W ZHAO, R CHELLAPPAA guided tour of face processing 3-53. [[CrossRef](#)]
988. Eigenfaces and beyond 55-86. [[CrossRef](#)]
989. Morphable models for training a component-based face-recognition system 439-462. [[CrossRef](#)]
990. W ZHAO, R CHELLAPPAPredicting human performance for face recognition 293-319. [[CrossRef](#)]
991. Modeling illumination variation with spherical harmonics 385-VIII. [[CrossRef](#)]
992. W ZHAO, R CHELLAPPAAFace modeling by information maximization 219-253. [[CrossRef](#)]
993. W ZHAO, R CHELLAPPAMultimodal biometricsAugmenting face with other cues 679-705. [[CrossRef](#)]

994. W ZHAO, R CHELLAPPACurrent landscape of thermal infrared face recognition 647-677. [[CrossRef](#)]
995. A survey of 3D and multimodal 3D+2D face recognition 519-545. [[CrossRef](#)]
996. W ZHAO, R CHELLAPPABeyond one still imageFace recognition from multiple still images or a video sequence 547-575. [[CrossRef](#)]
997. Subset modeling of face localization error, occlusion, and expression 577-618. [[CrossRef](#)]
998. On the effect of illumination and face recognition 339-384. [[CrossRef](#)]
999. C. Fredembach, M. Schroder, S. Susstrunk. 2004. Eigenregions for image classification. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **26**:12, 1645-1649. [[CrossRef](#)]
1000. Tee Connie, Andrew Teoh, Michael Goh, David Ngo. 2004. PalmHashing: a novel approach for dual-factor authentication. *Pattern Analysis and Applications* **7**:3, 255-268. [[CrossRef](#)]
1001. X.-Y. Jing, D. Zhang. 2004. A Face and Palmprint Recognition Approach Based on Discriminant DCT Feature Extraction. *IEEE Transactions on Systems, Man and Cybernetics, Part B (Cybernetics)* **34**:6, 2405-2415. [[CrossRef](#)]
1002. Rozenn Dahyot, Pierre Charbonnier, Fabrice Heitz. 2004. A Bayesian approach to object detection using probabilistic appearance-based models. *Pattern Analysis and Applications* **7**:3, 317-332. [[CrossRef](#)]
1003. A TSAI. 2004. Mutual information in coupled multi-shape model for medical image segmentation. *Medical Image Analysis* **8**:4, 429-445. [[CrossRef](#)]
1004. J HIRAYAMA, J YOSHIMOTO, S ISHII. 2004. Bayesian representation learning in the cortex regulated by acetylcholine. *Neural Networks* **17**:10, 1391-1400. [[CrossRef](#)]
1005. FRANK Y. SHIH, KAI ZHANG, YAN-YU FU. 2004. A HYBRID TWO-PHASE ALGORITHM FOR FACE RECOGNITION. *International Journal of Pattern Recognition and Artificial Intelligence* **18**:08, 1423-1435. [[CrossRef](#)]
1006. Z SUN. 2004. Object detection using feature subset selection. *Pattern Recognition* **37**:11, 2165-2176. [[CrossRef](#)]
1007. G QIU. 2004. Compressing histogram representations for automatic colour photo categorization. *Pattern Recognition* **37**:11, 2177-2193. [[CrossRef](#)]
1008. N.A. Schmid, J.A. O'Sullivan. 2004. Performance Prediction Methodology for Biometric Systems Using a Large Deviations Approach. *IEEE Transactions on Signal Processing* **52**:10, 3036-3045. [[CrossRef](#)]
1009. Makoto Murakami, Masahide Yoneyama, Katsuhiko Shirai. 2004. Extraction of human face and transformable region by facial expression based on extended labeled graph matching. *Electronics and Communications in Japan (Part III: Fundamental Electronic Science)* **87**:10, 35-43. [[CrossRef](#)]
1010. Y. Matsushita, K. Nishino, K. Ikeuchi, M. Sakauchi. 2004. Illumination normalization with time-dependent intrinsic images for video surveillance. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **26**:10, 1336-1347. [[CrossRef](#)]
1011. X.-Y. Jing, D. Zhang, Y.-Y. Tang. 2004. An Improved LDA Approach. *IEEE Transactions on Systems, Man and Cybernetics, Part B (Cybernetics)* **34**:5, 1942-1951. [[CrossRef](#)]
1012. Xiaogang Wang, Xiaou Tang. 2004. A unified framework for subspace face recognition. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **26**:9, 1222-1228. [[CrossRef](#)]
1013. Pin Liao, Li Shen, Yi-Qiang Chen, Shu-Chang Liu. 2004. Unified model in identity subspace for face recognition. *Journal of Computer Science and Technology* **19**:5, 684-690. [[CrossRef](#)]
1014. I PIMA, M ALADJEM. 2004. Regularized discriminant analysis for face recognition. *Pattern Recognition* **37**:9, 1945-1948. [[CrossRef](#)]
1015. W XIAOJUN, J KITTLER, Y JINGYU, W SHITONG. 2004. An analytical algorithm for determining the generalized optimal set of discriminant vectors. *Pattern Recognition* **37**:9, 1949-1952. [[CrossRef](#)]
1016. J VOKEY. 2004. Opposition logic and neural network models in artificial grammar learning*1. *Consciousness and Cognition* **13**:3, 565-578. [[CrossRef](#)]
1017. N. Vasconcelos. 2004. Minimum Probability of Error Image Retrieval. *IEEE Transactions on Signal Processing* **52**:8, 2322-2336. [[CrossRef](#)]
1018. V SUNDARARAGHAVAN. 2004. A dynamic material library for the representation of single-phase polyhedral microstructures. *Acta Materialia* **52**:14, 4111-4119. [[CrossRef](#)]
1019. K ANDERSON. 2004. Robust real-time face tracker for cluttered environments. *Computer Vision and Image Understanding* **95**:2, 184-200. [[CrossRef](#)]
1020. B. Raducanu, M. Gra##a, F. X. Albizuri, A. d###Anjou. 2004. A probabilistic hit-and-miss transform for face localization. *Pattern Analysis and Applications* **7**:2, 117-127. [[CrossRef](#)]
1021. Stephen R. H. Langton, Helen Honeyman, Emma Tessler. 2004. The influence of head contour and nose angle on the perception of eye-gaze direction. *Perception & Psychophysics* **66**:5, 752-771. [[CrossRef](#)]

1022. 2004. Face Recognition Under Ubiquitous Environments. *Journal of Fuzzy Logic and Intelligent Systems* **14**:4, 431-437. [[CrossRef](#)]
1023. Yongmin Li. 2004. On incremental and robust subspace learning. *Pattern Recognition* **37**:7, 1509-1518. [[CrossRef](#)]
1024. S ULLMAN. 2004. Recognition invariance obtained by extended and invariant features. *Neural Networks* **17**:5-6, 833-848. [[CrossRef](#)]
1025. J Baek. 2004. Face recognition using partial least squares components. *Pattern Recognition* **37**:6, 1303-1306. [[CrossRef](#)]
1026. G Heidemann. 2004. Combining spatial and colour information for content based image retrieval. *Computer Vision and Image Understanding* **94**:1-3, 234-270. [[CrossRef](#)]
1027. ODEST CHADWICKE JENKINS, MAJA J. MATARI###. 2004. PERFORMANCE-DERIVED BEHAVIOR VOCABULARIES: DATA-DRIVEN ACQUISITION OF SKILLS FROM MOTION. *International Journal of Humanoid Robotics* **01**:02, 237-288. [[CrossRef](#)]
1028. MIYOKO NAKANO, FUMIKO YASUKATA, MINORU FUKUMI. 2004. RECOGNITION OF SMILING FACES USING NEURAL NETWORKS AND SPCA. *International Journal of Computational Intelligence and Applications* **04**:02, 153-163. [[CrossRef](#)]
1029. Pin Liao, Li Shen. 2004. Unified probabilistic models for face recognition from a single example image per person. *Journal of Computer Science and Technology* **19**:3, 383-392. [[CrossRef](#)]
1030. Chengjun Liu. 2004. Gabor-based kernel pca with fractional power polynomial models for face recognition. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **26**:5, 572-581. [[CrossRef](#)]
1031. S Chen. 2004. Subpattern-based principle component analysis. *Pattern Recognition* **37**:5, 1081-1083. [[CrossRef](#)]
1032. M. Osadchy, D. Keren. 2004. A Rejection-Based Method for Event Detection in Video. *IEEE Transactions on Circuits and Systems for Video Technology* **14**:4, 534-541. [[CrossRef](#)]
1033. C. Liu. 2004. Enhanced Independent Component Analysis and Its Application to Content Based Face Image Retrieval. *IEEE Transactions on Systems, Man and Cybernetics, Part B (Cybernetics)* **34**:2, 1117-1127. [[CrossRef](#)]
1034. Yasuyuki Nakata, Moritoshi Ando. 2004. Lipreading method using color extraction method and eigenspace technique. *Systems and Computers in Japan* **35**:3, 12-23. [[CrossRef](#)]
1035. Michael C. Mangini, Irving Biederman. 2004. Making the ineffable explicit: estimating the information employed for face classifications. *Cognitive Science* **28**:2, 209-226. [[CrossRef](#)]
1036. Mohammad A.U. Khan ., Muhammad Khalid Khan ., Muhammad Aurangzeb Khan ., Muhammad Talal Ibrahim ., Muhammad Kamran Ahmed ., Jahanzeb Afzal Baig .. 2004. Principal Component Analysis of Directional Images for Face Recognition. *Information Technology Journal* **3**:3, 290-295. [[CrossRef](#)]
1037. P Gutkowski. 2004. Algorithm for retrieval and verification of personal identity using bimodal biometrics. *Information Fusion* **5**:1, 65-71. [[CrossRef](#)]
1038. JIAN-HUANG LAI, PONG C. YUEN, DONG-GAO DENG. 2004. GENERALIZED SPECTROFACE FOR FACE RECOGNITION. *International Journal of Pattern Recognition and Artificial Intelligence* **18**:02, 211-228. [[CrossRef](#)]
1039. A. Lanitis, C. Draganova, C. Christodoulou. 2004. Comparing Different Classifiers for Automatic Age Estimation. *IEEE Transactions on Systems, Man and Cybernetics, Part B (Cybernetics)* **34**:1, 621-628. [[CrossRef](#)]
1040. H. Li, O. Chutatape. 2004. Automated Feature Extraction in Color Retinal Images by a Model Based Approach. *IEEE Transactions on Biomedical Engineering* **51**:2, 246-254. [[CrossRef](#)]
1041. C.E. Thomaz, D.F. Gillies, R.Q. Feitosa. 2004. A New Covariance Estimate for Bayesian Classifiers in Biometric Recognition. *IEEE Transactions on Circuits and Systems for Video Technology* **14**:2, 214-223. [[CrossRef](#)]
1042. Changshui Zhang, Jun Wang, Nanyuan Zhao, David Zhang. 2004. Reconstruction and analysis of multi-pose face images based on nonlinear dimensionality reduction. *Pattern Recognition* **37**:2, 325-336. [[CrossRef](#)]
1043. Hyun-Chul Kim, Daijin Kim, Sung Yang Bang, Sang-Youn Lee. 2004. Face recognition using the second-order mixture-of-eigenfaces method. *Pattern Recognition* **37**:2, 337-349. [[CrossRef](#)]
1044. Philip M. Birch, Rupert C. D. Young, Frederic Claret-Tournier, Chris R. Chatwin. 2004. Automated vehicle occupancy monitoring. *Optical Engineering* **43**:8, 1828. [[CrossRef](#)]
1045. S. Yan, X. He, Y. Hu, H. Zhang, M. Li, Q. Cheng. 2004. Bayesian Shape Localization for Face Recognition Using Global and Local Textures. *IEEE Transactions on Circuits and Systems for Video Technology* **14**:1, 102-113. [[CrossRef](#)]
1046. Dake Zhou, Xin Yang. 2004. Enhanced Fisher linear discriminant model based face recognition using facial combined feature. *Optical Engineering* **43**:12, 2829. [[CrossRef](#)]
1047. X. Tang, X. Wang. 2004. Face Sketch Recognition. *IEEE Transactions on Circuits and Systems for Video Technology* **14**:1, 50-57. [[CrossRef](#)]

1048. B.-L. Zhang, H. Zhang, S.S. Ge. 2004. Face Recognition by Applying Wavelet Subband Representation and Kernel Associative Memory. *IEEE Transactions on Neural Networks* **15**:1, 166-177. [[CrossRef](#)]
1049. Susan T. Dumais. 2004. Latent semantic analysis. *Annual Review of Information Science and Technology* **38**:1, 188-230. [[CrossRef](#)]
1050. Q. Liu, H. Lu, S. Ma. 2004. Improving Kernel Fisher Discriminant Analysis for Face Recognition. *IEEE Transactions on Circuits and Systems for Video Technology* **14**:1, 42-49. [[CrossRef](#)]
1051. A PITIOT, H DELINGETTE, P THOMPSON, N AYACHE. 2004. Expert knowledge-guided segmentation system for brain MRI. *NeuroImage* **23**, S85-S96. [[CrossRef](#)]
1052. C DiRuberto. 2004. Recognition of shapes by attributed skeletal graphs. *Pattern Recognition* **37**:1, 21-31. [[CrossRef](#)]
1053. M. Bressan, D. Guillaumet, J. Vitria. 2004. MULTICLASS OBJECT RECOGNITION USING CLASS-CONDITIONAL INDEPENDENT COMPONENT ANALYSIS. *Cybernetics and Systems* **35**:1, 35-61. [[CrossRef](#)]
1054. Neil Muller, Lourenc##o Magaia, B. M. Herbst. 2004. Singular Value Decomposition, Eigenfaces, and 3D Reconstructions. *SIAM Review* **46**:3, 518. [[CrossRef](#)]
1055. 2003. Face Recognition Using Wavelet Coefficients and Hidden Markov Model. *Journal of Fuzzy Logic and Intelligent Systems* **13**:6, 673-678. [[CrossRef](#)]
1056. Z Xue. 2003. Bayesian shape model for facial feature extraction and recognition. *Pattern Recognition* **36**:12, 2819-2833. [[CrossRef](#)]
1057. Gulzar Khuwaja. 2003. ADAPTIVE LVQ CLASSIFIER FOR INVARIANT FACE RECOGNITION. *Cybernetics and Systems* **34**:8, 725-746. [[CrossRef](#)]
1058. JIAN YANG, JING-YU YANG, ALEJANDRO F. FRANGI, DAVID ZHANG. 2003. UNCORRELATED PROJECTION DISCRIMINANT ANALYSIS AND ITS APPLICATION TO FACE IMAGE FEATURE EXTRACTION. *International Journal of Pattern Recognition and Artificial Intelligence* **17**:08, 1325-1347. [[CrossRef](#)]
1059. QingShan Liu, Rui Huang, HanQing Lu, SongDe Ma. 2003. Kernel-based nonlinear discriminant analysis for face recognition. *Journal of Computer Science and Technology* **18**:6, 788-795. [[CrossRef](#)]
1060. Rein-Lien Hsu, Anil K. Jain. 2003. Generating discriminating cartoon faces using interacting snakes. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **25**:11, 1388-1398. [[CrossRef](#)]
1061. X Jing. 2003. UODV: improved algorithm and generalized theory. *Pattern Recognition* **36**:11, 2593-2602. [[CrossRef](#)]
1062. M Kim. 2003. Face recognition using the embedded HMM with second-order block-specific observations. *Pattern Recognition* **36**:11, 2723-2735. [[CrossRef](#)]
1063. F. Kagalwala, T. Kanade. 2003. Reconstructing specimens using DIC microscope images. *IEEE Transactions on Systems, Man and Cybernetics, Part B (Cybernetics)* **33**:5, 728-737. [[CrossRef](#)]
1064. Mark Stopfer, Vivek Jayaraman, Gilles Laurent. 2003. Intensity versus Identity Coding in an Olfactory System. *Neuron* **39**:6, 991-1004. [[CrossRef](#)]
1065. Qingshan Liu, Hanqing Lu, Songde Ma. 2003. A non-parameter bayesian classifier for face recognition. *Journal of Electronics (China)* **20**:5, 362-370. [[CrossRef](#)]
1066. Kyong Chang, K.W. Bowyer, S. Sarkar, B. Victor. 2003. Comparison and combination of ear and face images in appearance-based biometrics. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **25**:9, 1160-1165. [[CrossRef](#)]
1067. Fan Yang, M. Paindavoine. 2003. Implementation of an rbf neural network on embedded systems: real-time face tracking and identity verification. *IEEE Transactions on Neural Networks* **14**:5, 1162-1175. [[CrossRef](#)]
1068. Liang Wang, Tieniu Tan, Weiming Hu, Huazhong Ning. 2003. Automatic gait recognition based on statistical shape analysis. *IEEE Transactions on Image Processing* **12**:9, 1120-1131. [[CrossRef](#)]
1069. X Pardo. 2003. Discriminant snakes for 3D reconstruction of anatomical organs. *Medical Image Analysis* **7**:3, 293-310. [[CrossRef](#)]
1070. H Li. 2003. Boundary detection of optic disk by a modified ASM method. *Pattern Recognition* **36**:9, 2093-2104. [[CrossRef](#)]
1071. A Leonardis. 2003. Kernel and subspace methods for computer vision. *Pattern Recognition* **36**:9, 1925-1927. [[CrossRef](#)]
1072. X Liu. 2003. Eigenspace updating for non-stationary process and its application to face recognition. *Pattern Recognition* **36**:9, 1945-1959. [[CrossRef](#)]
1073. T Melzer. 2003. Appearance models based on kernel canonical correlation analysis. *Pattern Recognition* **36**:9, 1961-1971. [[CrossRef](#)]
1074. Juyang Weng, Yilu Zhang, Wey-Shiuan Hwang. 2003. Candid covariance-free incremental principal component analysis. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **25**:8, 1034-1040. [[CrossRef](#)]

1075. K Lin. 2003. Spatially eigen-weighted Hausdorff distances for human face recognition. *Pattern Recognition* **36**:8, 1827-1834. [[CrossRef](#)]
1076. M WaiLee. 2003. Pose-invariant face recognition using a 3D deformable model. *Pattern Recognition* **36**:8, 1835-1846. [[CrossRef](#)]
1077. D Socolinsky. 2003. Face recognition with visible and thermal infrared imagery. *Computer Vision and Image Understanding* **91**:1-2, 72-114. [[CrossRef](#)]
1078. B Draper. 2003. Recognizing faces with PCA and ICA. *Computer Vision and Image Understanding* **91**:1-2, 115-137. [[CrossRef](#)]
1079. S Zhou. 2003. Probabilistic recognition of human faces from video. *Computer Vision and Image Understanding* **91**:1-2, 214-245. [[CrossRef](#)]
1080. Y Liu. 2003. Facial asymmetry quantification for expression invariant human identification. *Computer Vision and Image Understanding* **91**:1-2, 138-159. [[CrossRef](#)]
1081. F De la Torre. 2003. Robust parameterized component analysis: theory and applications to 2D facial appearance models. *Computer Vision and Image Understanding* **91**:1-2, 53-71. [[CrossRef](#)]
1082. Liang Chen, N. Tokuda. 2003. Stability analysis of regional and national voting schemes by a continuous model. *IEEE Transactions on Knowledge and Data Engineering* **15**:4, 1037-1042. [[CrossRef](#)]
1083. Chengjun Liu, H. Wechsler. 2003. Independent component analysis of gabor features for face recognition. *IEEE Transactions on Neural Networks* **14**:4, 919-928. [[CrossRef](#)]
1084. X Liu. 2003. Intrinsic generalization analysis of low dimensional representations. *Neural Networks* **16**:5-6, 537-545. [[CrossRef](#)]
1085. JUN SUN, WENYUAN WANG, QING ZHUO, CHENGYUAN MA. 2003. DISCRIMINATORY SPARSE CODING AND ITS APPLICATION TO FACE RECOGNITION. *International Journal of Image and Graphics* **03**:03, 503-521. [[CrossRef](#)]
1086. 2003. Facial Expression Recognition using ICA-Factorial Representation Method. *Journal of Fuzzy Logic and Intelligent Systems* **13**:3, 371-376. [[CrossRef](#)]
1087. Z WANG. 2003. An improved sequential method for principal component analysis*1. *Pattern Recognition Letters* **24**:9-10, 1409-1415. [[CrossRef](#)]
1088. G LU. 2003. Palmprint recognition using eigenpalms features. *Pattern Recognition Letters* **24**:9-10, 1463-1467. [[CrossRef](#)]
1089. X CHEN. 2003. Facial expression recognition: A clustering-based approach. *Pattern Recognition Letters* **24**:9-10, 1295-1302. [[CrossRef](#)]
1090. J Wu. 2003. Efficient face candidates selector for face detection. *Pattern Recognition* **36**:5, 1175-1186. [[CrossRef](#)]
1091. J Haddadnia. 2003. A fuzzy hybrid learning algorithm for radial basis function neural network with application in human face recognition. *Pattern Recognition* **36**:5, 1187-1202. [[CrossRef](#)]
1092. R Hamdan. 2003. A low complexity approximation of probabilistic appearance models. *Pattern Recognition* **36**:5, 1107-1118. [[CrossRef](#)]
1093. L Fan. 2003. Pedestrian registration in static images with unconstrained background. *Pattern Recognition* **36**:4, 1019-1029. [[CrossRef](#)]
1094. Tao Wang, Jia-Jun Bu, Chun Chen. 2003. A color based face detection system using multiple templates. *Journal of Zhejiang University SCIENCE A* **4**:2, 162-165. [[CrossRef](#)]
1095. Bon-Woo Hwang, Seong-Whan Lee. 2003. Reconstruction of partially damaged face images based on a morphable face model. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **25**:3, 365-372. [[CrossRef](#)]
1096. L Chen. 2003. Robustness of regional matching scheme over global matching scheme. *Artificial Intelligence* **144**:1-2, 213-232. [[CrossRef](#)]
1097. M Bressan. 2003. Using an ICA representation of local color histograms for object recognition. *Pattern Recognition* **36**:3, 691-701. [[CrossRef](#)]
1098. Nejib Smaoui, Matar Ibrahim Matar. 2003. Classification Of Human Faces Using Karhunen-LoEve Decomposition And Radial Basis Function Neural Networks. *International Journal of Computer Mathematics* **80**:3, 325-345. [[CrossRef](#)]
1099. GARY G. YEN, NETHRIE NITHIANANDAN. 2003. AUTOMATIC FACIAL FEATURE EXTRACTION USING EDGE DISTRIBUTION AND GENETIC SEARCH. *International Journal of Computational Intelligence and Applications* **03**:01, 89-100. [[CrossRef](#)]
1100. P. Ravazzani, G. Tognola, M. Parazzini, F. Grandori. 2003. Principal component analysis as a method to facilitate fast detection of transient-evoked otoacoustic emissions. *IEEE Transactions on Biomedical Engineering* **50**:2, 249-252. [[CrossRef](#)]

1101. R. Basri, D.W. Jacobs. 2003. Lambertian reflectance and linear subspaces. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **25**:2, 218-233. [[CrossRef](#)]
1102. 2003. Noise compensation in a person verification system using face and multiple speech features. *Pattern Recognition* **36**:2, 293-302. [[CrossRef](#)]
1103. 2003. Face authentication for multiple subjects using eigenflow. *Pattern Recognition* **36**:2, 313-328. [[CrossRef](#)]
1104. 2003. Iris detection using intensity and edge information. *Pattern Recognition* **36**:2, 549-562. [[CrossRef](#)]
1105. JAVAD HADDADNIA, KARIM FAEZ, MAJID AHMADI. 2003. AN EFFICIENT HUMAN FACE RECOGNITION SYSTEM USING PSEUDO ZERNIKE MOMENT INVARIANT AND RADIAL BASIS FUNCTION NEURAL NETWORK. *International Journal of Pattern Recognition and Artificial Intelligence* **17**:01, 41-62. [[CrossRef](#)]
1106. B.J. Frey, N. Jojic. 2003. Transformation-invariant clustering using the EM algorithm. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **25**:1, 1-17. [[CrossRef](#)]
1107. Shiguang Shan, Wen Gao, Debin Zhao. 2003. Face recognition based on face-specific subspace. *International Journal of Imaging Systems and Technology* **13**:1, 23-32. [[CrossRef](#)]
1108. Juwei Lu, K.N. Plataniotis, A.N. Venetsanopoulos. 2003. Face recognition using LDA-based algorithms. *IEEE Transactions on Neural Networks* **14**:1, 195-200. [[CrossRef](#)]
1109. Quan Pan, Min-Gui Zhang, De-Long Zhou, Yong-Mei Cheng, Hong-Cai Zhang. 2003. Face recognition based on singular-value feature vectors. *Optical Engineering* **42**:8, 2368. [[CrossRef](#)]
1110. Peter Eisert. 2003. MPEG-4 facial animation in video analysis and synthesis. *International Journal of Imaging Systems and Technology* **13**:5, 245-256. [[CrossRef](#)]
1111. Huiqi Li, Opas Chutatape. 2003. Automatic detection and boundary estimation of the optic disk in retinal images using a model-based approach. *Journal of Electronic Imaging* **12**:1, 97. [[CrossRef](#)]
1112. Juwei Lu, K.N. Plataniotis, A.N. Venetsanopoulos. 2003. Face recognition using kernel direct discriminant analysis algorithms. *IEEE Transactions on Neural Networks* **14**:1, 117-126. [[CrossRef](#)]
1113. H.S. Sahambi, K. Khorasani. 2003. A neural-network appearance-based 3-D object recognition using independent component analysis. *IEEE Transactions on Neural Networks* **14**:1, 138-149. [[CrossRef](#)]
1114. M.A. Sipe, D. Casasent. 2002. Feature space trajectory methods for active computer vision. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **24**:12, 1634-1643. [[CrossRef](#)]
1115. USHA SINHA, ALEX BUI, RICKY TAIRA, JOHN DIONISIO, CRAIG MORIOKA, DAVID JOHNSON, HOOSHANG KANGARLOO. 2002. A Review of Medical Imaging Informatics. *Annals of the New York Academy of Sciences* **980**:1, 168-197. [[CrossRef](#)]
1116. USHA SINHA, HOOSHANG KANGARLOO. 2002. Image Study Summarization of MR Brain Images by Automated Localization of Relevant Structures. *Annals of the New York Academy of Sciences* **980**:1, 278-286. [[CrossRef](#)]
1117. H Wilson. 2002. Synthetic faces, face cubes, and the geometry of face space. *Vision Research* **42**:27, 2909-2923. [[CrossRef](#)]
1118. Matthew N. Dailey, Garrison W. Cottrell, Curtis Padgett, Ralph Adolphs. 2002. EMPATH: A Neural Network that Categorizes Facial Expressions. *Journal of Cognitive Neuroscience* **14**:8, 1158-1173. [[Abstract](#)] [[PDF](#)] [[PDF Plus](#)]
1119. M.S. Bartlett, J.R. Movellan, T.J. Sejnowski. 2002. Face recognition by independent component analysis. *IEEE Transactions on Neural Networks* **13**:6, 1450-1464. [[CrossRef](#)]
1120. Chongzhen Zhang, F.S. Cohen. 2002. 3-D face structure extraction and recognition from images using 3-D morphing and distance mapping. *IEEE Transactions on Image Processing* **11**:11, 1249-1259. [[CrossRef](#)]
1121. Z MARKZHANG, R SRIHARI. 2002. Subspace morphing theory for appearance based object identification. *Pattern Recognition* **35**:11, 2389-2396. [[CrossRef](#)]
1122. A LEONARDIS, H BISCHOF, J MAVER. 2002. Multiple eigenspaces. *Pattern Recognition* **35**:11, 2613-2627. [[CrossRef](#)]
1123. PABLO NAVARRETE, JAVIER RUIZ-DEL-SOLAR. 2002. ANALYSIS AND COMPARISON OF EIGENSPACE-BASED FACE RECOGNITION APPROACHES. *International Journal of Pattern Recognition and Artificial Intelligence* **16**:07, 817-830. [[CrossRef](#)]
1124. K NamChoi. 2002. Recovering facial pose with the EM algorithm. *Pattern Recognition* **35**:10, 2073-2093. [[CrossRef](#)]
1125. R VanRullen. 2002. Surfing a spike wave down the ventral stream. *Vision Research* **42**:23, 2593-2615. [[CrossRef](#)]
1126. ZHI-QIANG LIU. 2002. ADAPTIVE SUBSPACE SELF-ORGANIZING MAP AND ITS APPLICATIONS IN FACE RECOGNITION. *International Journal of Image and Graphics* **02**:04, 519-540. [[CrossRef](#)]
1127. Trista Pei-chun Chen, Tsuhan Chen. 2002. Second-generation error concealment for video transport over error-prone channels. *Wireless Communications and Mobile Computing* **2**:6, 607-624. [[CrossRef](#)]

1128. G. A. KHUWAJA, M. S. LAGHARI. 2002. ADAPTIVE CLASSIFIER INTEGRATION FOR INVARIANT FACE RECOGNITION (ACIIFR). *International Journal of Pattern Recognition and Artificial Intelligence* **16**:06, 749-772. [[CrossRef](#)]
1129. A. Pitiot, A.W. Toga, P.M. Thompson. 2002. Adaptive elastic segmentation of brain MRI via shape-model-guided evolutionary programming. *IEEE Transactions on Medical Imaging* **21**:8, 910-923. [[CrossRef](#)]
1130. YONGSHENG GAO, MAYLOR K. H. LEUNG. 2002. COMBINED CLASSIFICATION OF MULTIPLE VIEWS USING FACIAL CORNERS. *International Journal of Pattern Recognition and Artificial Intelligence* **16**:05, 589-602. [[CrossRef](#)]
1131. Yongsheng Gao, M.K.H. Leung. 2002. Face recognition using line edge map. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **24**:6, 764-779. [[CrossRef](#)]
1132. A.M. Martinez. 2002. Recognizing imprecisely localized, partially occluded, and expression variant faces from a single sample per class. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **24**:6, 748-763. [[CrossRef](#)]
1133. T Tan. 2002. The fractal neighbor distance measure. *Pattern Recognition* **35**:6, 1371-1387. [[CrossRef](#)]
1134. P Yuen. 2002. Face representation using independent component analysis. *Pattern Recognition* **35**:6, 1247-1257. [[CrossRef](#)]
1135. L HockKoh. 2002. An integrated automatic face detection and recognition system. *Pattern Recognition* **35**:6, 1259-1273. [[CrossRef](#)]
1136. O Ayinde. 2002. Face recognition approach based on rank correlation of Gabor-filtered images. *Pattern Recognition* **35**:6, 1275-1289. [[CrossRef](#)]
1137. RAYMOND S. T. LEE. 2002. ELASTIC FACE RECOGNIZER: INVARIANT FACE RECOGNITION BASED ON ELASTIC GRAPH MATCHING MODEL. *International Journal of Pattern Recognition and Artificial Intelligence* **16**:04, 463-479. [[CrossRef](#)]
1138. JUN-WEI HSIEH, YEA-SHUAN HUANG. 2002. MULTIPLE-PERSON TRACKING SYSTEM FOR CONTENT ANALYSIS. *International Journal of Pattern Recognition and Artificial Intelligence* **16**:04, 447-462. [[CrossRef](#)]
1139. SHIGANG LI, FUJI REN. 2002. REALIZING FACE-TO-FACE INTERACTION BY VIEW-BASED TRACKING. *International Journal of Information Technology & Decision Making* **01**:02, 331-347. [[CrossRef](#)]
1140. Dan Roth , Ming-Hsuan Yang , Narendra Ahuja . 2002. Learning to Recognize Three-Dimensional Objects. *Neural Computation* **14**:5, 1071-1103. [[Abstract](#)] [[PDF](#)] [[PDF Plus](#)]
1141. Baoxin Li, R. Chellappa. 2002. A generic approach to simultaneous tracking and verification in video. *IEEE Transactions on Image Processing* **11**:5, 530-544. [[CrossRef](#)]
1142. Xiaojun Wu, Yang Jingyu, Shitong Wang, Guo Yuefei, Qiyang Cao. 2002. A new algorithm for generalized optimal discriminant vectors. *Journal of Computer Science and Technology* **17**:3, 324-330. [[CrossRef](#)]
1143. Meng Joo Er, Shiqian Wu, Juwei Lu, Hock Lye Toh. 2002. Face recognition with radial basis function (RBF) neural networks. *IEEE Transactions on Neural Networks* **13**:3, 697-710. [[CrossRef](#)]
1144. Chengjun Liu, H. Wechsler. 2002. Gabor feature based classification using the enhanced fisher linear discriminant model for face recognition. *IEEE Transactions on Image Processing* **11**:4, 467-476. [[CrossRef](#)]
1145. S. Belongie, J. Malik, J. Puzicha. 2002. Shape matching and object recognition using shape contexts. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **24**:4, 509-522. [[CrossRef](#)]
1146. F Marques. 2002. Face segmentation and tracking based on connected operators and partition projection. *Pattern Recognition* **35**:3, 601-614. [[CrossRef](#)]
1147. X Ge. 2002. Learning the parts of objects by auto-association. *Neural Networks* **15**:2, 285-295. [[CrossRef](#)]
1148. Kwang In Kim, Keechul Jung, Hang Joon Kim. 2002. Face recognition using kernel principal component analysis. *IEEE Signal Processing Letters* **9**:2, 40-42. [[CrossRef](#)]
1149. F Jurie. 2002. Real time tracking of 3D objects: an efficient and robust approach. *Pattern Recognition* **35**:2, 317-328. [[CrossRef](#)]
1150. KWANG IN KIM, JIN HYUNG KIM, KEECHUL JUNG. 2002. FACE RECOGNITION USING SUPPORT VECTOR MACHINES WITH LOCAL CORRELATION KERNELS. *International Journal of Pattern Recognition and Artificial Intelligence* **16**:01, 97-111. [[CrossRef](#)]
1151. Nobuyuki OTSU. 2002. Perspective of Behaviormetrics from an Information Engineering Standpoint. *Kodo Keiryogaku (The Japanese Journal of Behaviormetrics)* **29**:1, 12-19. [[CrossRef](#)]
1152. C. Sanderson, K.K. Paliwal. 2002. Fast feature extraction method for robust face verification. *Electronics Letters* **38**:25, 1648. [[CrossRef](#)]
1153. Ming-Hsuan Yang, D.J. Kriegman, N. Ahuja. 2002. Detecting faces in images: a survey. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **24**:1, 34-58. [[CrossRef](#)]

1154. K Sengupta. 2002. Face posture estimation using eigen analysis on an IBR (image based rendered) database. *Pattern Recognition* **35**:1, 103-117. [[CrossRef](#)]
1155. M Bhuiyan. 2002. Identification of actors drawn in Ukiyoe pictures. *Pattern Recognition* **35**:1, 93-102. [[CrossRef](#)]
1156. Peter J.B. Hancock, Charlie D. Frowd. Evolutionary Generation of Faces 409-423. [[CrossRef](#)]
1157. D. Ramasubramanian, Y.V. Venkatesh. 2001. Encoding and recognition of faces based on the human visual model and DCT. *Pattern Recognition* **34**:12, 2447-2458. [[CrossRef](#)]
1158. Yusako Sako, Emilie E. Regnier, Tim Daoust, Kikuo Fujimura, S. Kent Harrison, Miller B. McDonald. 2001. Computer image analysis and classification of giant ragweed seeds. *Weed Science* **49**:6, 738-745. [[CrossRef](#)]
1159. A Burton. 2001. Human and automatic face recognition: a comparison across image formats. *Vision Research* **41**:24, 3185-3195. [[CrossRef](#)]
1160. A.M. Martinez, J. Vitria. 2001. Clustering in image space for place recognition and visual annotations for human-robot interaction. *IEEE Transactions on Systems, Man and Cybernetics, Part B (Cybernetics)* **31**:5, 669-682. [[CrossRef](#)]
1161. Y Wang. 2001. A novel approach for human face detection from color images under complex background. *Pattern Recognition* **34**:10, 1983-1992. [[CrossRef](#)]
1162. K Wong. 2001. An efficient algorithm for human face detection and facial feature extraction under different conditions. *Pattern Recognition* **34**:10, 1993-2004. [[CrossRef](#)]
1163. H Yu. 2001. A direct LDA algorithm for high-dimensional data with application to face recognition. *Pattern Recognition* **34**:10, 2067-2070. [[CrossRef](#)]
1164. H.Z. Tan, L.A. Slivovsky, A. Pentland. 2001. A sensing chair using pressure distribution sensors. *IEEE/ASME Transactions on Mechatronics* **6**:3, 261-268. [[CrossRef](#)]
1165. Yi D. Cheng, Alice J. O'Toole, Hervé Abdi. 2001. Classifying adults' and children's faces by sex: computational investigations of subcategorical feature encoding. *Cognitive Science* **25**:5, 819-838. [[CrossRef](#)]
1166. C. Gentile, M. Szaier. 2001. An improved Voronoi-diagram-based neural net for pattern classification. *IEEE Transactions on Neural Networks* **12**:5, 1227-1234. [[CrossRef](#)]
1167. R. Cappelli, D. Maltoni. 2001. Multispace KL for pattern representation and classification. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **23**:9, 977-996. [[CrossRef](#)]
1168. E Hjelm. 2001. Face Detection: A Survey. *Computer Vision and Image Understanding* **83**:3, 236-274. [[CrossRef](#)]
1169. D. Keren, M. Osadchy, C. Gotsman. 2001. Antifaces: a novel, fast method for image detection. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **23**:7, 747-761. [[CrossRef](#)]
1170. A. Tefas, C. Kotropoulos, I. Pitas. 2001. Using support vector machines to enhance the performance of elastic graph matching for frontal face authentication. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **23**:7, 735-746. [[CrossRef](#)]
1171. T.W. Nattkemper, H.J. Ritter, W. Schubert. 2001. A neural classifier enabling high-throughput topological analysis of lymphocytes in tissue sections. *IEEE Transactions on Information Technology in Biomedicine* **5**:2, 138-149. [[CrossRef](#)]
1172. A.S. Georgiades, P.N. Belhumeur, D.J. Kriegman. 2001. From few to many: illumination cone models for face recognition under variable lighting and pose. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **23**:6, 643-660. [[CrossRef](#)]
1173. C Lin. 2001. Triangle-based approach to the detection of human face. *Pattern Recognition* **34**:6, 1271-1284. [[CrossRef](#)]
1174. P. McGuire, G.M.T. D'Eleuterio. 2001. Eigenpixels and a neural-network approach to image classification. *IEEE Transactions on Neural Networks* **12**:3, 625-635. [[CrossRef](#)]
1175. G Feng. 2001. Multi-cues eye detection on gray intensity image. *Pattern Recognition* **34**:5, 1033-1046. [[CrossRef](#)]
1176. Chengjun Liu, H. Wechsler. 2001. A shape- and texture-based enhanced Fisher classifier for face recognition. *IEEE Transactions on Image Processing* **10**:4, 598-608. [[CrossRef](#)]
1177. Jyh-Yeong Chang, Jia-Lin Chen. 2001. Automated facial expression recognition system using neural networks. *Journal of the Chinese Institute of Engineers* **24**:3, 345-356. [[CrossRef](#)]
1178. A Calder. 2001. A principal component analysis of facial expressions. *Vision Research* **41**:9, 1179-1208. [[CrossRef](#)]
1179. HONG YAN. 2001. HUMAN FACE IMAGE PROCESSING TECHNIQUES. *International Journal of Image and Graphics* **01**:02, 197-215. [[CrossRef](#)]
1180. Norbert Krüger. 2001. Learning Object Representations Using A Priori Constraints Within ORASSYLL. *Neural Computation* **13**:2, 389-410. [[Abstract](#)] [[PDF](#)] [[PDF Plus](#)]
1181. A.M. Martinez, A.C. Kak. 2001. PCA versus LDA. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **23**:2, 228-233. [[CrossRef](#)]
1182. A. Shashua, T. Riklin-Raviv. 2001. The quotient image: class-based re-rendering and recognition with varying illuminations. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **23**:2, 129-139. [[CrossRef](#)]

1183. R Campbell. 2001. A Survey Of Free-Form Object Representation and Recognition Techniques. *Computer Vision and Image Understanding* **81**:2, 166-210. [[CrossRef](#)]
1184. Otto H. MacLin, Michael A. Webster. 2001. Influence of adaptation on the perception of distortions in natural images. *Journal of Electronic Imaging* **10**:1, 100. [[CrossRef](#)]
1185. Dongge Li, Gang Wei, Ishwar K. Sethi, Nevenka Dimitrova. 2001. Person identification in TV programs. *Journal of Electronic Imaging* **10**:4, 930. [[CrossRef](#)]
1186. Baoxin Li, Rama Chellappa. 2001. Face verification through tracking facial features. *Journal of the Optical Society of America A* **18**:12, 2969. [[CrossRef](#)]
1187. R. Feraund, O.J. Bernier, J.-E. Viallet, M. Collobert. 2001. A fast and accurate face detector based on neural networks. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **23**:1, 42-53. [[CrossRef](#)]
1188. N. Strobel, S. Spors, R. Rabenstein. 2001. Joint audio-video object localization and tracking. *IEEE Signal Processing Magazine* **18**:1, 22-31. [[CrossRef](#)]
1189. David Zhang, Hui Peng, Kuanquan Wang. 2001. Hybrid neural method for locating eyes in facial images. *Optical Engineering* **40**:10, 2151. [[CrossRef](#)]
1190. J. Mitehran, J. P. Zimmer, F. Yang, M. Paindavoine. 2001. Access control: adaptation and real-time implantation of a face recognition method. *Optical Engineering* **40**:4, 586. [[CrossRef](#)]
1191. Y. Gao, M.K.H. Leung, W. Wang, S.C. Hui. 2001. Fast face identification under varying pose from a single 2-D model view. *IEE Proceedings - Vision, Image, and Signal Processing* **148**:4, 248. [[CrossRef](#)]
1192. Serdar Ozturk, Builent Sankur, A. Toygar Abak. 2001. Font clustering and cluster identification in document images. *Journal of Electronic Imaging* **10**:2, 418. [[CrossRef](#)]
1193. J LAI. 2001. Face recognition using holistic Fourier invariant features. *Pattern Recognition* **34**:1, 95-109. [[CrossRef](#)]
1194. J PENG. 2001. Local discriminative learning for pattern recognition. *Pattern Recognition* **34**:1, 139-150. [[CrossRef](#)]
1195. L Chen. 2001. Why recognition in a statistics-based face recognition system should be based on the pure face portion: a probabilistic decision-based proof. *Pattern Recognition* **34**:7, 1393-1403. [[CrossRef](#)]
1196. M. Pantie, L.J.M. Rothkrantz. 2000. Automatic analysis of facial expressions: the state of the art. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **22**:12, 1424-1445. [[CrossRef](#)]
1197. SHUMEET BALUJA. 2000. USING LABELED AND UNLABELED DATA FOR PROBABILISTIC MODELING OF FACE ORIENTATION. *International Journal of Pattern Recognition and Artificial Intelligence* **14**:08, 1097-1107. [[CrossRef](#)]
1198. Norio Katayama, Shin'ichi Satoh. 2000. Application of multidimensional indexing methods to massive processing of multimedia information. *Systems and Computers in Japan* **31**:13, 31-41. [[CrossRef](#)]
1199. G.C. Feng, P.C. Yuen. 2000. Recognition of head-and-shoulder face image using virtual frontal-view image. *IEEE Transactions on Systems, Man, and Cybernetics - Part A: Systems and Humans* **30**:6, 871-882. [[CrossRef](#)]
1200. Yao Wang, Zhu Liu, Jin-Cheng Huang. 2000. Multimedia content analysis-using both audio and visual clues. *IEEE Signal Processing Magazine* **17**:6, 12-36. [[CrossRef](#)]
1201. J. Weng, W.-S. Hwang. 2000. Hierarchical discriminant regression. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **22**:11, 1277-1293. [[CrossRef](#)]
1202. R. Kuhn, J.-C. Junqua, P. Nguyen, N. Niedzielski. 2000. Rapid speaker adaptation in eigenvoice space. *IEEE Transactions on Speech and Audio Processing* **8**:6, 695-707. [[CrossRef](#)]
1203. Chu-Yin Chang, A.A. Maciejewski, V. Balakrishnan. 2000. Fast eigenspace decomposition of correlated images. *IEEE Transactions on Image Processing* **9**:11, 1937-1949. [[CrossRef](#)]
1204. Juyang Weng, Shaoyun Chen. 2000. State-based SHOSLIF for indoor visual navigation. *IEEE Transactions on Neural Networks* **11**:6, 1300-1314. [[CrossRef](#)]
1205. B Moghaddam. 2000. Bayesian face recognition. *Pattern Recognition* **33**:11, 1771-1782. [[CrossRef](#)]
1206. P.J. Phillips, Hyeonjoon Moon, S.A. Rizvi, P.J. Rauss. 2000. The FERET evaluation methodology for face-recognition algorithms. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **22**:10, 1090-1104. [[CrossRef](#)]
1207. C Han. 2000. Fast face detection via morphology-based pre-processing. *Pattern Recognition* **33**:10, 1701-1712. [[CrossRef](#)]
1208. L Chen. 2000. A new LDA-based face recognition system which can solve the small sample size problem. *Pattern Recognition* **33**:10, 1713-1726. [[CrossRef](#)]
1209. J. Weng, S. Chen. 2000. Visual learning with navigation as an example. *IEEE Intelligent Systems* **15**:5, 63-71. [[CrossRef](#)]
1210. Peter J.B. Hancock, Vicki Bruce, A.Mike Burton. 2000. Recognition of unfamiliar faces. *Trends in Cognitive Sciences* **4**:9, 330-337. [[CrossRef](#)]

1211. Michel A. Audette, Frank P. Ferrie, Terry M. Peters. 2000. An algorithmic overview of surface registration techniques for medical imaging. *Medical Image Analysis* **4**:3, 201-217. [[CrossRef](#)]
1212. ROBERT MARIANI. 2000. FACE LEARNING USING A SEQUENCE OF IMAGES. *International Journal of Pattern Recognition and Artificial Intelligence* **14**:05, 631-648. [[CrossRef](#)]
1213. Joshua B. Tenenbaum , William T. Freeman . 2000. Separating Style and Content with Bilinear Models. *Neural Computation* **12**:6, 1247-1283. [[Abstract](#)] [[PDF](#)] [[PDF Plus](#)]
1214. C. Liu, H. Wechsler. 2000. Evolutionary pursuit and its application to face recognition. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **22**:6, 570-582. [[CrossRef](#)]
1215. Peter J. B. Hancock. 2000. Evolving faces from principal components. *Behavior Research Methods, Instruments, & Computers* **32**:2, 327-333. [[CrossRef](#)]
1216. GEORGE BEBIS, SATISHKUMAR UTHIRAM, MICHAEL GEORGIOPOULOS. 2000. FACE DETECTION AND VERIFICATION USING GENETIC SEARCH. *International Journal on Artificial Intelligence Tools* **09**:02, 225-246. [[CrossRef](#)]
1217. Y Cui. 2000. Appearance-Based Hand Sign Recognition from Intensity Image Sequences. *Computer Vision and Image Understanding* **78**:2, 157-176. [[CrossRef](#)]
1218. A Leonardis. 2000. Robust Recognition Using Eigenimages. *Computer Vision and Image Understanding* **78**:1, 99-118. [[CrossRef](#)]
1219. C.L. Kotropoulos, A. Tefas, I. Pitas. 2000. Frontal face authentication using discriminating grids with morphological feature vectors. *IEEE Transactions on Multimedia* **2**:1, 14-26. [[CrossRef](#)]
1220. A Kouzani. 2000. Towards invariant face recognition. *Information Sciences* **123**:1-2, 75-101. [[CrossRef](#)]
1221. CHENG-YUAN TANG, ZEN CHEN, YI-PING HUNG. 2000. AUTOMATIC DETECTION AND TRACKING OF HUMAN HEADS USING AN ACTIVE STEREO VISION SYSTEM. *International Journal of Pattern Recognition and Artificial Intelligence* **14**:02, 137-166. [[CrossRef](#)]
1222. A. Pentland, T. Choudhury. 2000. Face recognition for smart environments. *Computer* **33**:2, 50-55. [[CrossRef](#)]
1223. J Horneegger. 2000. Appearance-based object recognition using optimal feature transforms. *Pattern Recognition* **33**:2, 209-224. [[CrossRef](#)]
1224. Frank Tong, Ken Nakayama, Morris Moscovitch, Oren Weinrib, Nancy Kanwisher. 2000. RESPONSE PROPERTIES OF THE HUMAN FUSIFORM FACE AREA. *Cognitive Neuropsychology* **17**:1, 257-280. [[CrossRef](#)]
1225. A. Pentland. 2000. Looking at people: sensing for ubiquitous and wearable computing. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **22**:1, 107-119. [[CrossRef](#)]
1226. Chengjun Liu, H. Wechsler. 2000. Robust coding schemes for indexing and retrieval from large face databases. *IEEE Transactions on Image Processing* **9**:1, 132-137. [[CrossRef](#)]
1227. Estille Whittenberger, Alejandro E. Brito, Sergio D. Cabrera. 2000. Applying the eigenfaces and Fisherfaces methods to circuit-board inspection. *Optical Engineering* **39**:12, 3154. [[CrossRef](#)]
1228. S. Valente, J.-L. Dugelay. 2000. Face tracking and realistic animations for telecommunicant clones. *IEEE Multimedia* **7**:1, 34-43. [[CrossRef](#)]
1229. G. C. Feng, P. C. Yuen, D. Q. Dai. 2000. Human face recognition using PCA on wavelet subband. *Journal of Electronic Imaging* **9**:2, 226. [[CrossRef](#)]
1230. Elzbieta Marszalec, Birgitta Martinkauppi, Maricor Soriano, Matti Pietikainen. 2000. Physics-based face database for color research. *Journal of Electronic Imaging* **9**:1, 32. [[CrossRef](#)]
1231. N. Vasconcelos, A. Lippman. 2000. Statistical models of video structure for content analysis and characterization. *IEEE Transactions on Image Processing* **9**:1, 3-19. [[CrossRef](#)]
1232. Azriel Rosenfeld, Harry Wechsler. 2000. Pattern recognition: Historical perspective and future directions. *International Journal of Imaging Systems and Technology* **11**:2, 101-116. [[CrossRef](#)]
1233. N Krueger. 2000. ORASSYLL: Object Recognition with Autonomously Learned and Sparse Symbolic Representations Based on Metrically Organized Local Line Detectors. *Computer Vision and Image Understanding* **77**:1, 48-77. [[CrossRef](#)]
1234. Horst D. Simon, Hongyuan Zha. 2000. Low-Rank Matrix Approximation Using the Lanczos Bidiagonalization Process with Applications. *SIAM Journal on Scientific Computing* **21**:6, 2257. [[CrossRef](#)]
1235. A O'Toole. 1999. 3D shape and 2D surface textures of human faces: the role of averages in attractiveness and age. *Image and Vision Computing* **18**:1, 9-19. [[CrossRef](#)]
1236. M.J. Lyons, J. Budynek, S. Akamatsu. 1999. Automatic classification of single facial images. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **21**:12, 1357-1362. [[CrossRef](#)]

1237. L. Prssoa, A.P. Leita. 1999. Complex cell prototype representation for face recognition. *IEEE Transactions on Neural Networks* **10**:6, 1528-1531. [[CrossRef](#)]
1238. M Dailey. 1999. Organization of face and object recognition in modular neural network models. *Neural Networks* **12**:7-8, 1053-1074. [[CrossRef](#)]
1239. O. De Vel, S. Aeberhard. 1999. Line-based face recognition under varying pose. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **21**:10, 1081-1088. [[CrossRef](#)]
1240. G. Donato, M.S. Bartlett, J.C. Hager, P. Ekman, T.J. Sejnowski. 1999. Classifying facial actions. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **21**:10, 974-989. [[CrossRef](#)]
1241. P Weeks. 1999. Species####identification of wasps using principal component associative memories. *Image and Vision Computing* **17**:12, 861-866. [[CrossRef](#)]
1242. P.S. Huang, C.J. Harris, M.S. Nixon. 1999. Recognising humans by gait via parametric canonical space. *Artificial Intelligence in Engineering* **13**:4, 359-366. [[CrossRef](#)]
1243. S. Ben-Yacoub, Y. Abdeljaoued, E. Mayoraz. 1999. Fusion of face and speech data for person identity verification. *IEEE Transactions on Neural Networks* **10**:5, 1065-1074. [[CrossRef](#)]
1244. Shigeru Akamatsu. 1999. Computer recognition of human face?A survey. *Systems and Computers in Japan* **30**:10, 76-89. [[CrossRef](#)]
1245. ZHENGYOU ZHANG. 1999. FEATURE-BASED FACIAL EXPRESSION RECOGNITION: SENSITIVITY ANALYSIS AND EXPERIMENTS WITH A MULTILAYER PERCEPTRON. *International Journal of Pattern Recognition and Artificial Intelligence* **13**:06, 893-911. [[CrossRef](#)]
1246. I. Craw, N. Costen, T. Kato, S. Akamatsu. 1999. How should we represent faces for automatic recognition?. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **21**:8, 725-736. [[CrossRef](#)]
1247. A Berman. 1999. A Flexible Image Database System for Content-Based Retrieval. *Computer Vision and Image Understanding* **75**:1-2, 175-195. [[CrossRef](#)]
1248. R Rao. 1999. An optimal estimation approach to visual perception and learning. *Vision Research* **39**:11, 1963-1989. [[CrossRef](#)]
1249. D.L. Swets, Juyang Weng. 1999. Hierarchical discriminant analysis for image retrieval. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **21**:5, 386-401. [[CrossRef](#)]
1250. J Figue. 1999. A method for still image interpretation relying on a multi-algorithms fusion scheme. Application to human face characterization. *Fuzzy Sets and Systems* **103**:2, 317-337. [[CrossRef](#)]
1251. B. Duc, S. Fischer, J. Bigun. 1999. Face authentication with Gabor information on deformable graphs. *IEEE Transactions on Image Processing* **8**:4, 504-516. [[CrossRef](#)]
1252. D Dollfus. 1999. Fat neural network for recognition of position-normalised objects. *Neural Networks* **12**:3, 553-560. [[CrossRef](#)]
1253. S.Z. Li, Juwei Lu. 1999. Face recognition using the nearest feature line method. *IEEE Transactions on Neural Networks* **10**:2, 439-443. [[CrossRef](#)]
1254. P. J. D. Weeks, M. A. O####Neill, K. J. Gaston, I. D. Gauld. 1999. Automating insect identification: exploring the limitations of a prototype system. *Journal of Applied Entomology* **123**:1, 1-8. [[CrossRef](#)]
1255. P. S. Huang, C. J. Harris, M. S. Nixon. 1999. Human gait recognition in canonical space using temporal templates. *IEE Proceedings - Vision, Image, and Signal Processing* **146**:2, 93. [[CrossRef](#)]
1256. A.Mike Burton, Vicki Bruce, P.J.B. Hancock. 1999. From Pixels to People: A Model of Familiar Face Recognition. *Cognitive Science* **23**:1, 1-31. [[CrossRef](#)]
1257. S. Satoh, Y. Nakamura, T. Kanade. 1999. Name-It: naming and detecting faces in news videos. *IEEE Multimedia* **6**:1, 22-35. [[CrossRef](#)]
1258. Manish Singh, Gregory D. Seyranian, Donald D. Hoffman. 1999. Parsing silhouettes: The short-cut rule. *Perception & Psychophysics* **61**:4, 636-660. [[CrossRef](#)]
1259. R Scheuchenpflug. 1999. Predicting face similarity judgements with a computational model of face space. *Acta Psychologica* **100**:3, 229-242. [[CrossRef](#)]
1260. Matthew N. Dailey, Garrison W. CottrellChapter 10 Prosopagnosia in modular neural network models **121**, 165-184. [[CrossRef](#)]
1261. Lin Hong, Anil Jain. 1998. Integrating faces and fingerprints for personal identification. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **20**:12, 1295-1307. [[CrossRef](#)]
1262. Yue Wang, Shang-Hung Lin, Huai Li, Sun-Yuan Kung. 1998. Data mapping by probabilistic modular networks and information-theoretic criteria. *IEEE Transactions on Signal Processing* **46**:12, 3378-3397. [[CrossRef](#)]

1263. R VANRULLEN. 1998. Face processing using one spike per neurone. *Biosystems* **48**:1-3, 229-239. [[CrossRef](#)]
1264. J Weng. 1998. Vision-guided navigation using SHOSLIF. *Neural Networks* **11**:7-8, 1511-1529. [[CrossRef](#)]
1265. D Reissfeld. 1998. Preprocessing of Face Images: Detection of Features and Pose Normalization,. *Computer Vision and Image Understanding* **71**:3, 413-430. [[CrossRef](#)]
1266. M Bichsel. 1998. Analyzing a Scene's Picture Set under Varying Lighting,. *Computer Vision and Image Understanding* **71**:3, 271-280. [[CrossRef](#)]
1267. Tomaso Poggio , Federico Girosi . 1998. A Sparse Representation for Function Approximation. *Neural Computation* **10**:6, 1445-1454. [[Abstract](#)] [[PDF](#)] [[PDF Plus](#)]
1268. P HANCOCK. 1998. A comparison of two computer-based face identification systems with human perceptions of faces. *Vision Research* **38**:15-16, 2277-2288. [[CrossRef](#)]
1269. Kin-Man Lam, Hong Yan. 1998. An analytic-to-holistic approach for face recognition based on a single frontal view. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **20**:7, 673-686. [[CrossRef](#)]
1270. C. Nebauer. 1998. Evaluation of convolutional neural networks for visual recognition. *IEEE Transactions on Neural Networks* **9**:4, 685-696. [[CrossRef](#)]
1271. Kohtaro Ohba, Katsushi Ikeuchi. 1998. Stable recognition of specular objects by the eigenwindow method. *Systems and Computers in Japan* **29**:7, 12-20. [[CrossRef](#)]
1272. Sun-Yuan Kung, Jenq-Neng Hwang. 1998. Neural networks for intelligent multimedia processing. *Proceedings of the IEEE* **86**:6, 1244-1272. [[CrossRef](#)]
1273. M. Pontil, A. Verri. 1998. Support vector machines for 3D object recognition. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **20**:6, 637-646. [[CrossRef](#)]
1274. E Saber. 1998. Frontal-view face detection and facial feature extraction using color, shape and symmetry based cost functions. *Pattern Recognition Letters* **19**:8, 669-680. [[CrossRef](#)]
1275. S Jeng. 1998. Facial feature detection using geometrical face model: An efficient approach. *Pattern Recognition* **31**:3, 273-282. [[CrossRef](#)]
1276. J. Martin, A. Pentland, S. Sclaroff, R. Kikinis. 1998. Characterization of neuropathological shape deformations. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **20**:2, 97-112. [[CrossRef](#)]
1277. G Chungmou Lee. 1998. Detection of object wings in fused range and intensity imagery. *Pattern Recognition* **31**:2, 137-158. [[CrossRef](#)]
1278. K.-K. Sung, T. Poggio. 1998. Example-based learning for view-based human face detection. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **20**:1, 39-51. [[CrossRef](#)]
1279. Alice J. O'Toole, Kenneth A. Deffenbacher, Dominique Valentin, Karen McKee, David Huff, Hervé Abdi. 1998. The perception of face gender: The role of stimulus structure in recognition and classification. *Memory & Cognition* **26**:1, 146-160. [[CrossRef](#)]
1280. A.F. Bobick, A.D. Wilson. 1997. A state-based approach to the representation and recognition of gesture. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **19**:12, 1325-1337. [[CrossRef](#)]
1281. Morris Moscovitch, Gordon Winocur, Marlene Behrmann. 1997. What Is Special about Face Recognition? Nineteen Experiments on a Person with Visual Object Agnosia and Dyslexia but Normal Face Recognition. *Journal of Cognitive Neuroscience* **9**:5, 555-604. [[Abstract](#)] [[PDF](#)] [[PDF Plus](#)]
1282. S Ranganath. 1997. Face recognition using transform features and neural networks. *Pattern Recognition* **30**:10, 1615-1622. [[CrossRef](#)]
1283. B TAKACS. 1997. Detection of faces and facial landmarks using iconic filter banks. *Pattern Recognition* **30**:10, 1623-1636. [[CrossRef](#)]
1284. Kim Blackwell, Thomas Vogl, Hans P.Dettmar, Michael Brown, Garth Barbour, Daniel Alkon. 1997. Identification of faces obscured by noise: comparison of an artificial neural network with human observers. *Journal of Experimental & Theoretical Artificial Intelligence* **9**:4, 491-508. [[CrossRef](#)]
1285. Yongyue Zhang, Zhenyun Peng, Suyu You, Guangyou Xu. 1997. A multi-view face recognition system. *Journal of Computer Science and Technology* **12**:5, 400-407. [[CrossRef](#)]
1286. A.K. Jain, Lin Hong, S. Pankanti, R. Bolle. 1997. An identity-authentication system using fingerprints. *Proceedings of the IEEE* **85**:9, 1365-1388. [[CrossRef](#)]
1287. S Chandrasekaran. 1997. An Eigenspace Update Algorithm for Image Analysis. *Graphical Models and Image Processing* **59**:5, 321-332. [[CrossRef](#)]
1288. G.I. Chiou, Jenq-Neng Hwang. 1997. Lipreading from color video. *IEEE Transactions on Image Processing* **6**:8, 1192-1195. [[CrossRef](#)]

1289. M. Uenohara, T. Kanade. 1997. Use of Fourier and Karhunen-Loeve decomposition for fast pattern matching with a large set of templates. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **19**:8, 891-898. [[CrossRef](#)]
1290. Hualu Wang, Shih-Fu Chang. 1997. A highly efficient system for automatic face region detection in MPEG video. *IEEE Transactions on Circuits and Systems for Video Technology* **7**:4, 615-628. [[CrossRef](#)]
1291. Y. Adini, Y. Moses, S. Ullman. 1997. Face recognition: the problem of compensating for changes in illumination direction. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **19**:7, 721-732. [[CrossRef](#)]
1292. P.N. Belhumeur, J.P. Hespanha, D.J. Kriegman. 1997. Eigenfaces vs. Fisherfaces: recognition using class specific linear projection. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **19**:7, 711-720. [[CrossRef](#)]
1293. M. Golfarelli, D. Maio, D. Malton. 1997. On the error-reject trade-off in biometric verification systems. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **19**:7, 786-796. [[CrossRef](#)]
1294. B. Moghaddam, A. Pentland. 1997. Probabilistic visual learning for object representation. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **19**:7, 696-710. [[CrossRef](#)]
1295. A. Lanitis, C.J. Taylor, T.F. Cootes. 1997. Automatic interpretation and coding of face images using flexible models. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **19**:7, 743-756. [[CrossRef](#)]
1296. Edgar Koerner, Hiroshi Tsujino, Tomohiko Masutani. 1997. A Cortical-type Modular Neural Network for Hypothetical Reasoning. *Neural Networks* **10**:5, 791-814. [[CrossRef](#)]
1297. L. Wiskott. 1997. Phantom faces for face analysis. *Pattern Recognition* **30**:6, 837-846. [[CrossRef](#)]
1298. R. Brunelli. 1997. Template matching: matched spatial filters and beyond. *Pattern Recognition* **30**:5, 751-768. [[CrossRef](#)]
1299. P.J.D. Weeks, I.D. Gauld, K.J. Gaston, M.A. O'Neill. 1997. Automating the identification of insects: a new solution to an old problem. *Bulletin of Entomological Research* **87**:02, 203. [[CrossRef](#)]
1300. S. Gutta. 1997. Face recognition using hybrid classifiers. *Pattern Recognition* **30**:4, 539-553. [[CrossRef](#)]
1301. J. Deng. 1997. Region-based template deformation and masking for eye-feature extraction and description. *Pattern Recognition* **30**:3, 403-419. [[CrossRef](#)]
1302. C. Nastar. 1997. Flexible Images: Matching and Recognition Using Learned Deformations. *Computer Vision and Image Understanding* **65**:2, 179-191. [[CrossRef](#)]
1303. S. Lawrence, C.L. Giles, Ah Chung Tsoi, A.D. Back. 1997. Face recognition: a convolutional neural-network approach. *IEEE Transactions on Neural Networks* **8**:1, 98-113. [[CrossRef](#)]
1304. Shang-Hung Lin, Sun-Yuan Kung, Long-Ji Lin. 1997. Face recognition/detection by probabilistic decision-based neural network. *IEEE Transactions on Neural Networks* **8**:1, 114-132. [[CrossRef](#)]
1305. G.L. Dudek. 1996. Environment representation using multiple abstraction levels. *Proceedings of the IEEE* **84**:11, 1684-1704. [[CrossRef](#)]
1306. F. Goudail, E. Lange, T. Iwamoto, K. Kyuma, N. Otsu. 1996. Face recognition system using local autocorrelations and multiscale integration. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **18**:10, 1024-1028. [[CrossRef](#)]
1307. D.L. Swets, J.J. Weng. 1996. Using discriminant eigenfeatures for image retrieval. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **18**:8, 831-836. [[CrossRef](#)]
1308. Venu Govindaraju. 1996. Locating human faces in photographs. *International Journal of Computer Vision* **19**:2, 129-146. [[CrossRef](#)]
1309. Dominique Valentin, Hervé Abdi. 1996. Can a linear autoassociator recognize faces from new orientations?. *Journal of the Optical Society of America A* **13**:4, 717. [[CrossRef](#)]
1310. O. Due Trier. 1996. Feature extraction methods for character recognition-A survey. *Pattern Recognition* **29**:4, 641-662. [[CrossRef](#)]
1311. Koichi Arimura, Norihiro Hagita. 1996. Image screening based on projection pursuit for statistical image recognition. *Systems and Computers in Japan* **27**:3, 60-70. [[CrossRef](#)]
1312. Peter J. B. Hancock, A. Mike Burton, Vicki Bruce. 1996. Face processing: Human perception and principal components analysis. *Memory & Cognition* **24**:1, 26-40. [[CrossRef](#)]
1313. Graham D. Finlayson, Janet Dueck, Brian V. Funt, Mark S. Drew. 1996. Colour Eigenfaces 607-610. [[CrossRef](#)]
1314. Anastasios Doulamis, Nicolas Tsapatsoulis, Nikolaos Doulamis, Stefanos Kollias. 1996. Innovative Techniques for Recognition of Faces Based on Multiresolution Analysis and Morphological Filtering 155-159. [[CrossRef](#)]
1315. X. Jia, M.S. Nixon. 1995. Extending the feature vector for automatic face recognition. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **17**:12, 1167-1176. [[CrossRef](#)]
1316. J. Beale. 1995. Categorical effects in the perception of faces. *Cognition* **57**:3, 217-239. [[CrossRef](#)]
1317. R. Rao. 1995. An active vision architecture based on iconic representations. *Artificial Intelligence* **78**:1-2, 461-505. [[CrossRef](#)]

1318. R. Brunelli, D. Falavigna, T. Poggio, L. Stringa. 1995. Automatic person recognition by acoustic and geometric features. *Machine Vision and Applications* **8**:5, 317-325. [[CrossRef](#)]
1319. R. Everson, L. Sirovich. 1995. Karhunen-Loève procedure for gappy data. *Journal of the Optical Society of America A* **12**:8, 1657. [[CrossRef](#)]
1320. A. Jonathan Howell, Hilary Buxton. 1995. Invariance in radial basis function neural networks in human face classification. *Neural Processing Letters* **2**:3, 26-30. [[CrossRef](#)]
1321. S. Sclaroff, A.P. Pentland. 1995. Modal matching for correspondence and recognition. *IEEE Transactions on Pattern Analysis and Machine Intelligence* **17**:6, 545-561. [[CrossRef](#)]
1322. Shimon Edelman. 1995. Representation, similarity, and the chorus of prototypes. *Minds and Machines* **5**:1, 45-68. [[CrossRef](#)]
1323. Usama M. Fayyad, Padhraic Smyth, Nicholas Weir, S. Djorgovski. 1995. Automated analysis and exploration of image databases: Results, progress, and challenges. *Journal of Intelligent Information Systems* **4**:1, 7-25. [[CrossRef](#)]
1324. P. SAJDA. 1995. Integrating neural networks with image pyramids to learn target context. *Neural Networks* **8**:7-8, 1143-1152. [[CrossRef](#)]
1325. D. B. Phillips, A. F. M. Smith. 1994. Bayesian Faces via Hierarchical Template Modeling. *Journal of the American Statistical Association* **89**:428, 1151-1163. [[CrossRef](#)]
1326. Dominique Valentin, Hervé Abdi, Alice J. O'Toole, Garrison W. Cottrell. 1994. Connectionist models of face processing: A survey. *Pattern Recognition* **27**:9, 1209-1230. [[CrossRef](#)]
1327. Leslie M. Novak, Gregory J. Owirka, Christine M. Netishen. 1994. Radar target identification using spatial matched filters. *Pattern Recognition* **27**:4, 607-617. [[CrossRef](#)]
1328. Vicki Bruce. 1994. Stability from variation: The case of face recognition the M.D. Vernon memorial lecture. *The Quarterly Journal of Experimental Psychology Section A* **47**:1, 5-28. [[CrossRef](#)]
1329. Vicki Bruce, Mike A. Burton, Neal Dench. 1994. What's distinctive about a distinctive face?. *The Quarterly Journal of Experimental Psychology Section A* **47**:1, 119-141. [[CrossRef](#)]
1330. L. Spacek, M. Kubat, D. Flotzinger. 1994. FACE RECOGNITION THROUGH LEARNED BOUNDARY CHARACTERISTICS. *Applied Artificial Intelligence* **8**:1, 149-164. [[CrossRef](#)]
1331. L. Bowns, M. J. Morgan. 1993. Facial features and axis of symmetry extracted using natural orientation information. *Biological Cybernetics* **70**:2, 137-144. [[CrossRef](#)]
1332. Nathan Intrator. 1993. Combining Exploratory Projection Pursuit and Projection Pursuit Regression with Application to Neural Networks. *Neural Computation* **5**:3, 443-455. [[Abstract](#)] [[PDF](#)] [[PDF Plus](#)]
1333. A. J. O'Toole, H. Abdi, K. A. Deffenbacher, D. Valentin. 1993. Low-dimensional representation of faces in higher dimensions of the face space. *Journal of the Optical Society of America A* **10**:3, 405. [[CrossRef](#)]
1334. Markus H. Grob, F. Seibert. 1993. Visualization of multidimensional image data sets using a neural network. *The Visual Computer* **10**:3, 145-159. [[CrossRef](#)]
1335. Shang-Hung Lin, S. Y. Kung. Testing for Acceptance-Rejection. [[CrossRef](#)]
1336. Ting Ma, Yan Zhang, Yuang-Ting Zhang. Biometrics. [[CrossRef](#)]
1337. S. Ravela, R. Manmatha. Gaussian Filtered Representations of Images. [[CrossRef](#)]
1338. Juan Andrade-Cetto, Michael Villamizar. Object Recognition. [[CrossRef](#)]
1339. Alice J O'Toole. Face Perception, Psychology of. [[CrossRef](#)]
1340. P. Jonathon Phillips. Face Recognition. [[CrossRef](#)]
1341. Li Yang, Tosiya L. Kunii. Visual Database. [[CrossRef](#)]