A NEW COLOR AND MULTIPLE ATTRIBUTE DETECTION TECHNIQUE FOR FACE RECOGNITION

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ABSTRACT

We aim to utilize automatically detected human attributes. Photos with people (e.g., family, friends, celebrities, etc.) are the major interest of users. Thus, with the exponentially growing photos, large-scale content-based face image retrieval is an enabling technology for many emerging applications. That contains semantic cues of the face photos to improve content based face retrieval by constructing semantic code words for efficient large-scale face image Retrieval. By leveraging human attributes in a scalable and systematic framework, we propose two orthogonal methods named attribute-enhanced sparse coding and attribute embedded inverted indexing to improve the face retrieval in the offline and online stages. We investigate the effectiveness of different attributes and vital factors essential for face retrieval. Experimenting on two public datasets, the results show that the proposed methods can achieve up to 43.5% relative improvement in MAP compared to the existing methods. We will use lab feature extraction for to detect the color and to identify the texture using multi dimensional texture analysis then the edge orientation histogram is used for shape detection. We propose two orthogonal methods named attribute-enhanced sparse coding and attribute-embedded inverted indexing. Attribute-enhanced sparse coding exploits the global structure of feature space and uses several important human attributes combined with low-level features to construct semantic code words in the offline stage. Attribute-embedded inverted indexing locally considers human attributes of the designated query image in a binary signature and provides efficient retrieval in the online stage.

INTRODUCTION

In this paper the importance and the sheer amount of human face photos make manipulations (e.g., search and mining) of large-scale human face images a really important research problem and enable many real world applications. Our goal in this paper is to address one of the important and challenging problems large-scale content-based face image retrieval. Given a query face image, content-based face image retrieval tries to find similar face images from a large image database. It is an enabling technology for many applications including automatic face annotation, crime investigation, etc. Traditional methods for face image retrieval usually use Low-level features to represent faces, but low-level features are lack of semantic meanings and face images usually have high intra-class variance (e.g., expression, posing), so the retrieval results are unsatisfactory this problem, propose to use identity based quantization and, propose to use identity constrained sparse coding, but these methods might require clean training data and massive human annotations. Human attributes have been shown useful on applications related to face images; it is non-trivial to apply it in content-based face image retrieval task due to several reasons. First, human attributes only contain limited dimensions. When there are too many people in the dataset, it loses discriminability because certain people might have similar attributes. Second, human attributes are represented as a vector of floating points. It does not work well with developing large scale indexing methods, and therefore it suffers from slow response and scalability issue when the data size is huge. To leverage promising human attributes automatically detected by attribute detectors for improving content-based face image retrieval, we propose two orthogonal methods named attribute-enhanced sparse coding and attribute-embedded inverted indexing. Attribute-enhanced sparse coding exploits the global structure of feature space and uses several important human attributes combined with low-level features to construct semantic code words in the offline stage. On the other hand, attribute-embedded inverted indexing locally considers human attributes of the designated query image in a binary signature and provides efficient retrieval in the online stage.

By incorporating these two methods, we build a large-scale content-based face image retrieval system by taking advantages of both low level (appearance) features and high-level (facial) semantics. In this paper proposed method use in following by the data set. LFW and Pub fig. These two datasets contain faces taken in unconstrained environment and are really challenging for content-based face image retrieval. LFW provides information for supervised learning under two different training paradigms: image-restricted and unrestricted. Under the image-restricted setting, only binary "matched" or "mismatched" labels are given, for pairs of images. Under the unrestricted setting, the identity information of the person appearing in each image is also available, allowing one to potentially form additional image pairs. For more information, see the readme. Often, algorithms designed for LFW will also make use of additional, external sources of training information. For instance, this issue originally arose when facial landmark detectors were being used to align the images (Huang et al.). These detectors were pre-trained on face part images outside of LFW, so this algorithm was implicitly making use of this additional source of information. As these outside sources of training data can have a large impact on recognition accuracy, the use of such data must be considered when comparing algorithm performance. Therefore, we have roughly divided the image-restricted results into several classes based on the amount of use of outside training data. There are also additional notes on this issue. Results in red indicate methods accepted but not yet published (e.g. accepted to an upcoming conference). Results in green indicate commercial recognition systems whose algorithms have not been published and peer-reviewed. We emphasize that researchers should not be compelled to compare against either of these types of results. The proposed methods can leverage the context information from human attributes to achieve relative improvement up to 43.55% in mean average precision on face retrieval task compared to the existing methods using local binary pattern (LBP) and sparse coding. We also analyze the effectiveness of different human attributes across datasets and find informative human attributes. To sum up, the contributions of this paper include:

1. We combine automatically detected high-level human attributes and low-level features to construct semantic code words. To the best of our knowledge, this is the first proposal of such combination for content-based face image retrieval.
2. To balance global representations in image collections and locally embedded facial characteristics, we propose two orthogonal methods to utilize automatically detected human attributes to improve content-based face image retrieval under a scalable framework.
3. We conduct extensive experiments and demonstrate the performances of the proposed methods on two separate public datasets and still ensure real time response.

4. We further identify informative and generic human attributes for face image retrieval across different datasets. The selected descriptors are promising for other applications

The first proposal of combining low-level features and automatically detected human attributes for content-based face image retrieval. Attribute-enhanced sparse coding exploits the global structure and uses several human attributes to construct semantic aware code words in the offline stage. Attribute-embedded inverted indexing further considers the local attribute signature of the query image and still ensures efficient retrieval in the online stage. The experimental results show that using the codeword generated by the proposed coding scheme, we can reduce the quantization error and achieve salient gains in face retrieval on two public datasets; the proposed indexing scheme can be easily integrated into inverted index, thus maintaining a scalable framework.

FACE DETECTION

Face detection is a computer technology that determines the locations and sizes of human faces in digital images. It detects face and ignores anything else, such as buildings, trees and bodies. Face detection can be regarded as a more general case of face localization. In face localization, the task is to find the locations and sizes of a known number of faces (usually one). In face detection, face is processed and matched bitwise with the underlying face image in the database. Any slight change in facial expression, e.g. smile, lip movement, will not match the face.

Face detection is also the psychological process by which we locate and attend to faces in a visual scene. Research shows that our ability to detect faces is affected by a range of visual properties such as color and orientation.

In this algorithms focus on the detection of frontal human faces. It is analogous to image detection in which the image of a person is matched bit by bit. Image matches with the image stores in database. Any facial feature changes in the database will invalidate the matching process.

FACIAL RECOGNITION

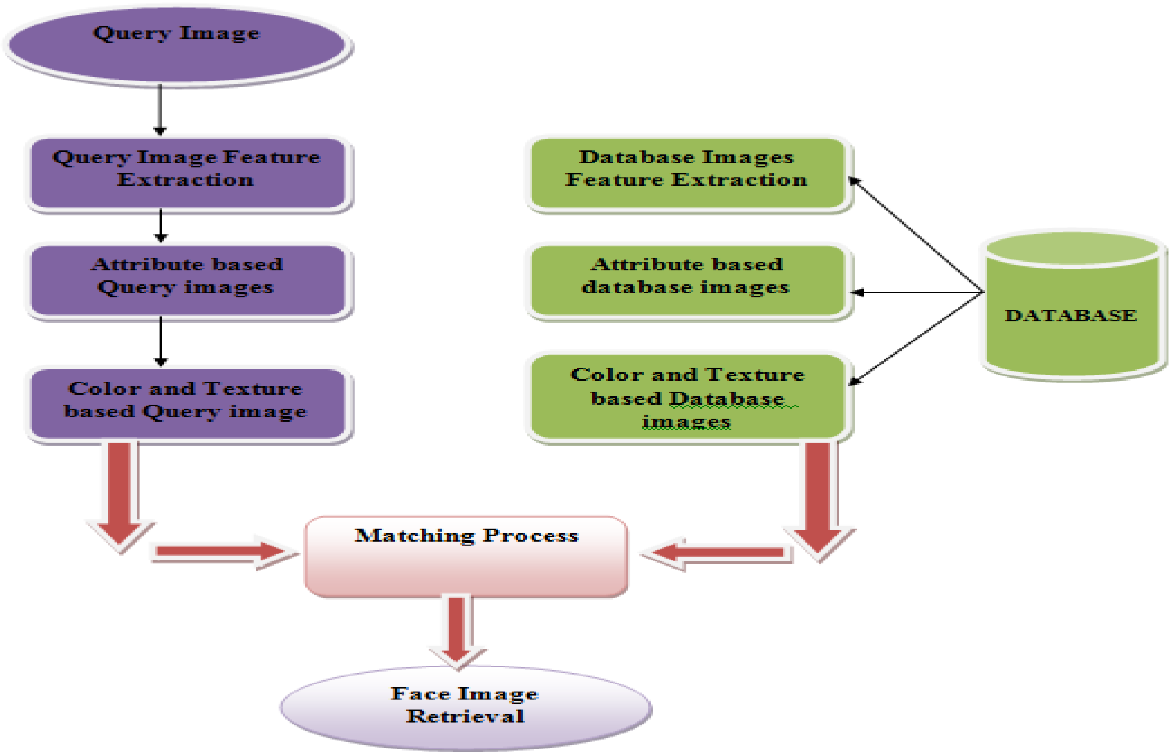
An image may be defined as a two-dimensional function, $f(x, y)$, where x and y are spatial coordinates and the amplitude of f at any pair of coordinates (x, y) is called the intensity or gray level of the image at that point. When x, y, and gray level of '*f*' are all finite, discrete quantities, the image is then digital image. The processing of digital images by means of a digital computer is called digital image processing. Digital image is composed of a finite number of elements, each of which has a particular value and location, called as pixels. The different stages for image processing are low-level, mid-level and higher-level processing. It contains preprocessing to reduce noise, contrast enhancement, image sharpening, segmentation, classification (recognition) and finally "making sense" of recognized objects performing the cognitive functions normally associated with vision. Today, there is almost no area of technical that are not impacted in some way by digital image processing such as in medical, space and day to day life. Images based on radiation from the electromagnetic spectrum are most familiar such as gamma ray, X-ray, microwave imaging. Image compression, facial recognition, iris detection and finger print detection are more common as security point of view.

One of the more remarkable abilities of human vision is that of face recognition. Facial recognition and synthesis are important research fields to study how human beings reflect to environments in affective computing. With the rapid development of mathematical theory on multivariate statistics and multi-media technology especially image processing, facial expressions recognition researchers have achieved many useful results[3].The face recognition algorithm needs to compare a given face with a given template and verify their equivalence. Such a setup (one-to-one matching) can occur when biometric technology is used to secure fina ncial transactions, for example, in an automatic teller machine (ATM). Facial recognition system will provide more security and to identify the culprit.

Facial image processing is an area of research dedicated to the extraction and analysis of information about human faces; information which is known to play a central role in social interactions including recognition, emotion, and intention. Over the last decade, it has become a very active research field that deals with face detection and tracking, facial feature detection, face recognition, facial expression and emotion recognition, face coding, and virtual face synthesis. With the introduction of new powerful machine learning techniques, statistical classification methods, and complex deformable models, recent progresses have made possible a large number of applications in areas such as image retrieval, surveillance and biometrics, visual speech under-standing, virtual characters for e-learning, online marketing or entertainment, intelligent human-computer interaction, and others. However, much remains to be done to provide more robust systems, especially when dealing with pose and illumination changes in complex natural scenes. If most approaches focus naturally on processing from still images, emerging techniques may also consider different inputs. For instance, video is becoming ubiquitous and very affordable, and there is a growing demand for vision-based human oriented applications, ranging from security to human computer interaction and video annotation. Capturing 3D data mayas well become very affordable and processing such data can lead to enhanced systems, more robust to illumination effects and where discriminant information may be more easily retrieved. The scope of this special issue of the EURASIP Journal on Image and Video Processing is to present original contributions in the field of facial image processing, and especially on face verification and recognition, facial feature detection, face synthesis, and 3D face acquisition. Among the 20 submitted papers, six articles have been selected for this special issue. The paper by Arya and DiPaola addresses the construction of a behavioral face model for affective social agents based on three independent but interacting parameter spaces which are knowledge, personality, and mood. While a geometry space provides an MPEG-4 compatible set of parameters for low-level control, the behavioral extensions available through the triple spaces provide flexible means of designing complicated personality types, facial expression, and dynamic interactive scenarios.

Robust facial feature detection for facial expression recognition in uncontrolled environments is the focus of investigation in the work presented by Ionone et al. The proposed system is based on a multicar feature extraction and fusion technique, which provides MPEG-4-compatible features assorted with a confidence measure, used to weight their importance in the recognition of the observed facial expression, while the fusion process ensures that the final result will be based on the extraction technique that performed better given the particular lighting or color conditions. Miteran et al. address 3D face acquisition, which is becoming of great importance in face recognition.

WORKING PROCESS



FACE RECOGNITION SYSTEM

• In clear terms face recognition system is a system, which turns your face to computer code so that it can be compared with thousands of faces.

• In order for face recognition system to work it has to know what a basic face looks like.

• Face recognition system is based on ability to first recognize faces, which is a technological feat in itself and then measure the various features of each face.

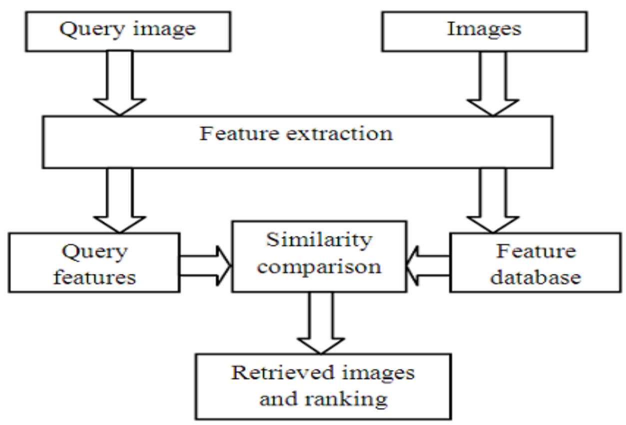
• If you look into mirror you can see that your face has certain distinguishable landmarks sometimes called as nodal points.

• There are about 80 nodal points on human face like

1. distance between eyes
2. width of nose
3. depth of eye sockets
4. cheekbones
5. jaw line
6. Chin etc...

• These nodal points are used to create numerical code, a string of numbers that represents the face in database (called face print).

MODULE DESCRIPTION:



1. QUERY IMAGE SEARCH
2. ATTRIBUTE BASED SEARCH

3. FACE REGION DETECTION AND FACIAL FEATURE EXTRACTION
4. COLOR BASED IMAGE SEARCH
5. TEXTURE BASED SEARCH
6. FACE IMAGE RETRIEVAL

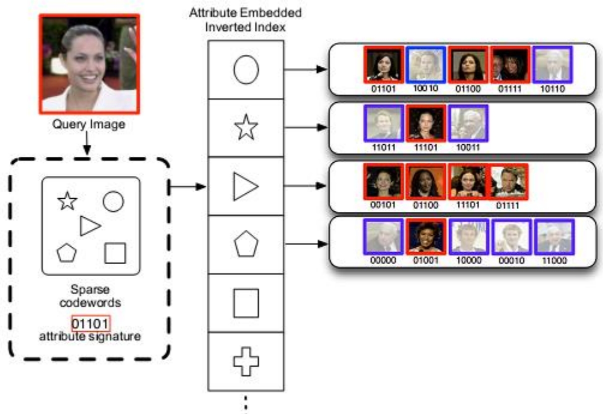
QUERY IMAGE SEARCH:

- To select the query image from the data base.
- In that query image, no need to consider that image format and size.
- It will be help to support all type of image format.

- Finally that query image find out the extract result given it.

ATTRIBUTE BASED SEARCH:

Query image find out the image attribute like vice (pixel of face, hair, eyes, nose, mouth, each and every part verify it). So this method help to used Content-based image retrieval (CBIR) query by image content (QBIC), Edge detection technique (EDT).its helps to use identify the image attribute. And also data base image search using this technique in identifying the image attribute. We divide the sparse representation into multiple segments based on the number of attributes, and each segment of sparse representation is generated depending on single attribute.

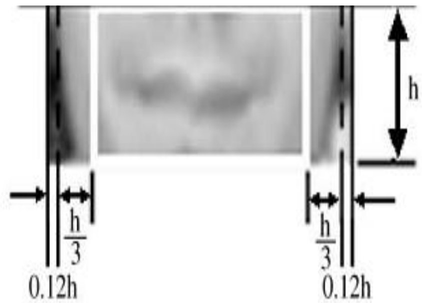


FACE REGIONS DETECTION AND FACIAL FEATURE EXTRACTION

The possible face candidates with a highness value are passed on to the second stage. The functions of the second stage are to verify whether the candidates are human faces or not, and to extract the respective facial features in the face region. The verification process is based on the characteristics of the projected face images At this stage, the symmetry of a face candidate is measured. As every face region is normalized for the shirring select and the illumination select, the difference between the left half and the right half of a face region should be small due to its symmetry. In our method, the size of a face region is normalized to 2831, and the symmetrical measure is calculated as follows:

$$T_S = \frac{1}{434} \sum_{y=0}^{30} \sum_{x=0}^{13} |f(x, y) - f(27 - x, y)|,$$

(a)



The bottom window, the mouth corner can be detected based on two assumptions; the mouth corners are close to the horizontal position of the corresponding iris and the gray-level intensity changes significantly at the mouth corner. Fig. (a) illustrates the x-projection and the determination of the detected mouth corners. The detection result for the respective facial features is shown in Fig. Similarly, if any horizontal position of the facial features cannot be located, the candidate is assumed to be a non-facial image. Otherwise, a true face region is declared, as are the different facial features being located.

COLOR BASED IMAGE SEARCH

Several methods for retrieving images on the basis of color similarity have been described in the literature, but most are variations on the same basic idea. Each image added to the collection is analyzed to compute a color histogram which shows the proportion of pixels of each color within the image. The color histogram for each image is then stored in the database. At search time, the user can either specify the desired proportion of each color (75% olive green and 25% red, for example), or submit an example image from which a color histogram is calculated. Either way, the matching process then retrieves those images whose color histograms match those of the query most closely

- Problems with color variances
    - Surface Orientation
    - Camera Viewpoint

- Position of Illumination
- Intensity of the Light

Color Image Processing

- Opponent color axes

$$(R-G, 2B-R-G, R+G+B)$$

Advantage of isolating the brightness information on the third axis.

Invariant to changes in illumination intensity and shadows.

- HSV-representation

Invariant under the orientation of the object with respect to the illumination and camera direction.

- Search for clusters in a color histogram to identify which pixels in the image originate from one uniformly colored object.

TEXTURE BASED IMAGE SEARCH

The ability to retrieve images on the basis of texture similarity may not seem very useful. But the ability to match on texture similarity can often be useful in distinguishing between areas of images with similar color (such as sky and sea, or leaves and grass). A variety of techniques has been used for measuring texture similarity; the best-established rely on comparing values of what are known as second order statistics calculated from query and stored images. Essentially, these calculate the relative brightness of selected pairs of pixels from each image. From these it is possible to calculate measures of image texture such as the degree of contrast, coarseness, directionality and regularity, or periodicity, directionality and randomness.

A texture is distinguished by a 14 statistical measurement value suggested by Haralick et al. (1973). The following formulas are used to calculate the features and which are shown in Eq.

$$\text{Energy} = \sum_{i,j} P(i,j)^2$$

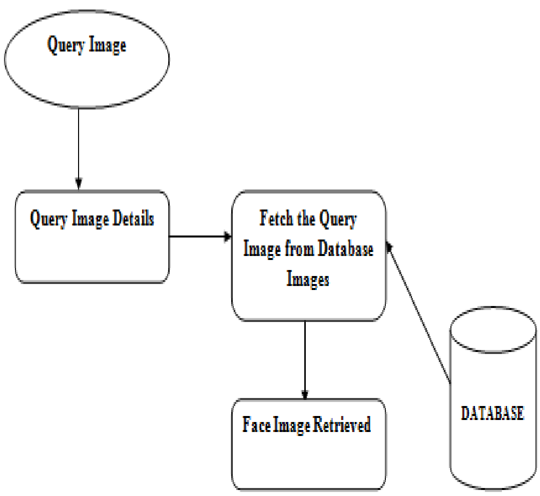
$$\text{Entropy} = -\sum_{i,j} P(i,j)\log(P(i,j))$$

$$\text{Correlation} = \sum_{i,j} \frac{(i - \mu i)(j - \mu j)p(i,j)}{\sigma_i \sigma_j}$$

$$\text{Homogeneity} = \sum_{i,j} \frac{P(i,j)}{1+|i - j|}$$

FACE IMAGE RETRIEVAL

The proposed work is a facial image retrieval model for problem of similar facial images searching and retrieval in the search space of the facial images by integrating content-based image retrieval (CBIR) techniques and face recognition techniques, with the semantic description of the facial image. The aim is to reduce the semantic gap between high level query requirement and low level facial features of the human face image such that the system can be ready to meet human nature way and needs in description and retrieval of facial image. We will use lab feature extraction for to detect the color, and to identify the texture using multi dimensional



texture analysis another one then the edge orientation histogram is used for shape detection.

BLOCK DIAGRAM

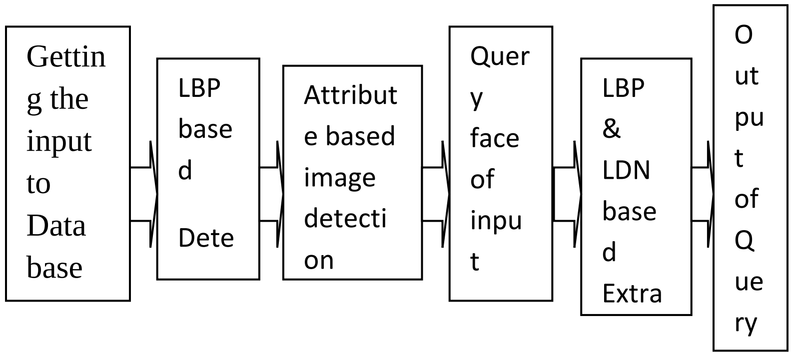


Fig 1.1 Face Detection Algorithm

Getting the input to data base image. This image can be detected in LBP based detection of the all data base image. The data base image to attribute based functions is during. That function of the name is attribute based image detection.

This block diagram functional algorithm can be used Gaussian algorithm. This attribute based image detection to used input of the query face detection. In this query face detection to be used LDN and LBP based extraction to be used output of query image detection.

CONCLUSION

A novel introduced encoding scheme, LDN, that takes advantage of the structure of the face's textures and that encodes it efficiently into a compact code. LDN uses directional information that is more stable against noise than intensity, to code the different patterns from the face's textures. Additionally, a novel analyzed the use of two different compass masks (a derivative-Gaussian and Kirsch) to extract this directional information, and their performance on different applications. In general, LDN, implicitly, uses the sign information of the directional numbers which allows it to distinguish similar texture's structures with different intensity transitions—e.g., from dark to bright and vice versa. A novel found that the derivative-Gaussian mask is more stable against noise and illumination variation in the face recognition problem, which makes LDNG a reliable and stable coding scheme for person identification. Furthermore, a novel found that the use of Kirsch mask makes the code suitable for expression recognition, as the LDNK code is more robust to detect structural expression features than features for identification. Moreover, a novel proposed a face descriptor that combines the information from several neighborhoods at different sizes to encode micro patterns at those levels. Consequently, LDN recovers more information, and uses it to increase its discriminating novel. Furthermore, a novel found that the combination of different sizes (small, medium and large) gives better recognition rates for certain conditions Also, a novel evaluated LDN under expression, time lapse and illumination variations, and found that it is reliable and robust throughout all these conditions, unlike other methods. For example, Gradient faces had excellent results under illumination variation but failed with expression and time lapse variation. Also, LBP and LDiP recognition rate deteriorates faster than LDN in presence of noise and illumination changes.

FUTURE WORK

In the future, we plan to improve processing speed and accuracy of the GOBER FILTER algorithm. Furthermore, we plan to apply the algorithm to movies and to apply an automatic detection, whether an image is low DOF or not.

REFERENCES

1. E. Ibe, H. Taniguchi, Y. Yahagi, K. Shimbo, and T. Toba, "Impact of scaling on neutron induced soft error in SRAMs from an 250 nm to a 22 nm design rule," *IEEE Trans. Electron Devices*, vol. 57, no. 7, pp. 1527–1538, Jul. 2010.

2. S. Baeg, S. Wen, and R. Wong, "Interleaving distance selection with a soft error failure model," *IEEE Trans. Nucl. Sci.*, vol. 56, no. 4, pp. 2111–2118, Aug. 2009.

3. P. Reviriego and J. A. Maestro,"Efficient error detection codes for multiple-bit upset correction in SRAMs with BICS," *ACM Trans. Design Autom. Electron. Syst.*, vol. 14, no. 1, pp. 18:1–18:10, Jan. 2009.

4. S. Liu, P. Reviriego, and J. A. Maestro, "Efficient majority logic fault detection with difference-set codes for memory applications," *IEEE Trans. Very Large Scale Integr. (VLSI) Syst.*, vol. 20, no. 1, pp. 148–156, Jan. 2012.

5. A. Sanchez-Macian, P. Reviriego, and J. A. Maestro, "Hamming SEC-DAED and extended hamming SEC-DED-TAED codes through selective shortening and bit placement," *IEEE Trans. Device Mater. Rel.*,to be published.

6. R. Naseer and J. Draper, "Parallel double error correcting code design to mitigate multi-bit upsets in SRAMs," in *Proc. 34th Eur. Solid-State Circuits*, Sep. 2008, pp. 222–225.

7. C. Argyrides and D. K. Pradhan, "Improved decoding algorithm for high reliable reed muller coding," in *Proc. IEEE Int. Syst. On Chip Conf.*, Sep. 2007, pp. 95–98.

8. D. Radaelli, H. Puchner, S. Wong, and S. Daniel, "Investigation of multi-bit upsets in a 150 nm technology SRAM device," *IEEE Trans. Nucl. Sci.*, vol. 52, no. 6, pp. 2433–2437, Dec. 2005.

9. M. Zhu, L. Y. Xiao, L. L. Song, Y. J. Zhang, and H. W. Luo, "New mix codes for multiple bit upsets mitigation in fault-secure memories," *Microelectron. J.*, vol. 42, no. 3, pp. 553–561, Mar. 2011.

10. G. Neuberger, D. L. Kastensmidt, and R. Reis, "An automatic technique for optimizing Reed-Solomon codes to improve fault tolerance in memories," *IEEE Design Test Comput.*, vol. 22, no. 1, pp. 50–58, Jan.–Feb. 2005.

11. P. Reviriego, M. Flanagan, and J. A. Maestro, "A (64,45) triple error correction code for memory applications," *IEEE Trans. Device Mater. Rel.*, vol. 12, no. 1, pp. 101–106, Mar. 2012.

12. K. Pagiamtzis and A. Sheikholeslami, "Content addressable memory (CAM) circuits and architectures: A tutorial and survey," *IEEE J. Solid-State Circuits*, vol. 41, no. 3, pp. 712–727, Mar. 2003.

13. S. Baeg, S. Wen, and R. Wong, "Minimizing soft errors in TCAM devices: A probabilistic approach to determining scrubbing intervals," *IEEE Trans. Circuits Syst. I, Reg. Papers*, vol. 57, no. 4, pp. 814–822, Apr. 2010.

14. C. Argyrides, R. Chipana, F. Vargas, and D. K. Pradhan, "Reliability analysis of H-tree random access memories implemented with built in current sensors and parity codes for multiple bit upset correction," *IEEE Trans. Rel.*, vol. 60, no. 3, pp. 528–537, Sep. 2011.

15.C. Argyrides, D. K. Pradhan, and T. Kocak, "Matrix codes for reliable and cost efficient memory chips," *IEEE Trans. Very Large Scale Integr. (VLSI) Syst.*, vol. 19, no. 3, pp. 420–428, Mar. 2011.

16. C. A. Argyrides, C. A. Lisboa, D. K. Pradhan, and L. Carro, "Single element correction in sorting algorithms with minimum delay overhead," in *Proc. IEEE Latin Amer. Test Workshop*, Mar. 2009, pp. 652–657.