

# VI/QCAV'99

(Special session)

## Students poster session

\* These posters were not reviewed  
Ces posters n'ont pas été arbitrés

## **Lighting Calibration Utility for Dimensional Measure**

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A lighting correction method for CCD response is herein proposed. This method is applied prior to dimensional measurements. It was originally inspired by the fact that roughly 10% of the pixels are imperfect photoelements. Toscani's calibration method was used to determine both intrinsic and extrinsic parameters. A subpixel edge detection, based on third order B-Splines functions is achieved prior to the dimensional measurements. The proposed correction method was validated on final results : on average quality cameras improvements as high as 7.8% were obtained. The remaining errors could still be reduced through the use of more optimized edge detectors.

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## **On Line Defects Detection System**

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(\* ) Scholarship of the burgundy regional council

This poster deals with an on line defects detection system. This system is used for controlling surfaces reflecting as mirror. The originality of this work is the lighting used and the filter used to process the images. Developed lighting is a structured one. It is composed of a succession of luminous and dark stripes. Using this lighting, defects appear clearly on the images. Images obtained with this specific lighting are particular and very contrasted, for these reason an original filter, very easy to implement has been developed to process them. This filter looks like a morphological filter. Conception of the operator has been done in accordance to the knowledge of the shape of the defects to be detected. One of the important constraint of the system is the processing time, which must be very short to work on a standard PC at the flow rate of the industrial process.

## **Invariant Contour Description with the Fourier-Mellin Descriptor**

**Zi-liang. Ping, Yunlong. Sheng**

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Shape description with Hu's moment invariants is sensitive to noise and information redundant. The orthogonal Fourier-Mellin moments and Zernike moments use the radial polynomials of high degrees. We show in this paper that the Fourier-Mellin descriptor may well describe shape contours with a single Mellin transform order ( $s = 2$ ) and a small set of circular Fourier components. The original contours can be reconstructed from those Fourier-Mellin features. The description is invariant to rotation, scaling and translation, and does not require the contours being closed curves. The approach is used in the distortion-invariant recognition of 3-D object from 2-D infrared images with the feature space trajectory classification.

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## **A Method for Lighting Characterization : Application to defect detection on textured industrial parts by artificial vision**

**P. Geveaux, S. Kohler, J. Miteran, F. Truchetet**

Université de Bourgogne, France

This paper presents a reliable method which allows to compare several lighting with respect to their capabilities of bringing out defects. This study has been led on textured industrial parts on which four types of defects have to be detected : smooth surfaces, bumps, lacks of material and hollows knocked surfaces. The aim is to determine the best lighting among various experimental sets. This method has two stages : the first one is a definition of a pertinent attribute vector which components are defect sensitive, in the second, discrimination power of this vector is computed and compared under various illumination. This method insures a well-suited illumination in numerous applications in defects detection.

## **Line Junction Detection**

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Our project concerns the detection of line junctions such as road intersections in remotely sensed images. Existing corner detectors mainly concern step edge corners and they are not suitable for line junctions. Our approach is divided into two steps. We first estimate a local measure of line curvature. For this purpose, we tried out two different measures: a) the projection of the change of direction vector along the line; b) the dot product of direction vectors within a given neighborhood. We then localize junctions using line terminations, thresholding and non-maximum suppression. Experimental results will be presented to demonstrate the approach. Automatic Update of a Road Database from Aerial or Satellite Images

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## **Automatic Update of a Road Database Aerial of Satellite Images**

**Marie-Flavie Auclair Fortier<sup>(1)</sup>, Djemel Ziou<sup>(1)</sup>, Costas Armenakis<sup>(2)</sup>  
and  
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Our work addresses the update of road map data from georeferenced aerial and satellite images. This task requires the solution of two underlying problems: a) the weak positional accuracy of the existing road information, and b) the detection of new roads. To positionally correct the existing road network information from the imagery, we use the snakes optimization approach, with is a line enhancement function. The initialization of the snakes is based on a priori knowledge derived from the existing vector road data coming from Geomatics Canada database, and from line junctions computed from the image by a detector developed by our group. To detect new roads, a road following algorithm is applied, starting from the line intersections, which are already in the existing road network. Experimental results will be presented to demonstrate the approach.

## Detection of Text-Line Orientation

Prosenjit Bose <sup>(1)</sup>, Jean-Denis Caron <sup>(2)</sup> and Kilani Ghoudi <sup>(2)</sup>

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In the following communication we describe a method for the detection of text-line orientation. When a document is faxed or scanned, a skew might be introduced in several ways. The most common being imprecise feeding of paper into fax machine or scanner. In a document, skew angle is defined as the difference between the dominant orientation of the text lines and the horizontal. This angle belongs to  $[-90^\circ, 90^\circ]$ . Our method uses image analysis, computational geometry, statistics and is based on the minimum spanning tree. We believe this approach is applied to languages which are based on the assumption that in a text the distance between two consecutive characters in the same line is smaller than between characters from different lines.

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## Méthodes d'extraction statistiques de texture pour la classification d'images

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La texture est une caractéristique importante et omniprésente dans plusieurs types d'images. La classification d'images à l'aide de la texture comporte deux aspects principaux. D'abord, le choix de caractéristiques de texture simples et descriptives. Nous expérimentons quelques méthodes d'extraction statistiques basées sur les niveaux de gris, les matrices de co-occurrence et des suites, l'histogramme des différences et le modèle auto-régressif. Ensuite, nous tentons de réaliser un compromis entre la performance de classification et la complexité de calcul associée en utilisant une méthode de sélection des caractéristiques dite séquentielle vers l'avant. Cette technique utilise l'algorithme des K plus proches voisins.

## **Detection and Classification of Video Shot Boundaries**

**S. Lawrence, D. Ziou and S. Wang**

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Our project concerns shot detection in digital video. Automatic video segmentation is a first step towards video indexing. An efficient yet robust algorithm is needed to separate video sequences into its' smaller segments called shots. Although many researchers have tackled the problem of finding shot boundaries, few have been able to accurately recognize slow transition boundaries such as fades and dissolves. Because shot boundaries correspond to discontinuities in the time domain, we present an algorithm based on the videos' first-order partial derivatives. This algorithm can accurately identify cuts as well as fades, dissolves, wipes and other slow transitions. Preliminary result are promising.

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## **A high accuracy mathematical and numerical method for Fourier transform, integral, derivatives and polynomial splines of any order**

**Normand Beaudoin**

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With Taylor expansions, Dirac delta functions and Fourier transform, a method has been devised which gives from a digitized function, its integral between any limits, its Fourier transform without band limitations, its derivatives of any order and polynomial splines of any order with their best end conditions. The way the method is structured makes easy to adjust its optimum parameters and estimate the error on any obtained result. Tests conducted on numerical functions show that relative and absolute errors can be much smaller than  $10^{-100}$ . Even better results could be obtained. The method works with real and complex functions.

## Conception of a system for the analysis of children's graphomotricity

Céline REMI<sup>1</sup>, Mounir AMARA<sup>1</sup>, Pierre COURTELLEMONT<sup>1</sup>, Denis DE BRUCQ<sup>1</sup> and Daniel MELLIER<sup>2</sup>

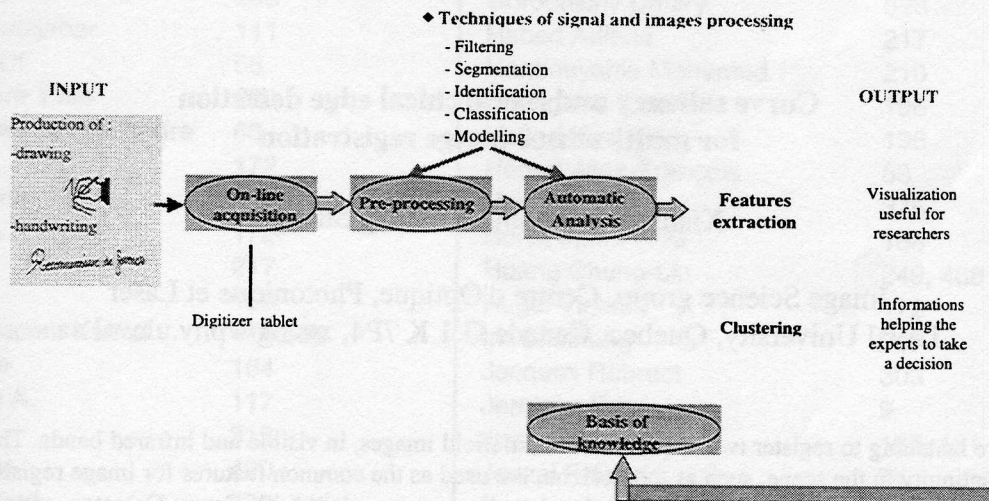
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Some children, labelled as presenting handwriting troubleshooting, saw their access to the written language strongly opposed by graphomotor difficulties. However, in France there is no objective system to evaluate graphomotor skills. My work is the first step of a project which aims at developing a tool to aid to diagnose troubleshooting precociously. Its purpose is to identify spatio-temporal and kinematics features of handwriting which reveal graphomotor skills and to determine those which could allow to discriminate children with graphomotor difficulties from the others. According to a protocol that we have conceived, 4200 layouts were recorded on-line, for children, with and without handwriting troubleshooting, from different grades of primary school. Some methods based on techniques of signal and image processing, were developed to quantify features, likely to be revealing of children's graphomotor skills, on these layouts. Our objective is to compare these data for the different set of children seen during the acquisition step.

### SYNOPSIS OF THE ANALYSIS TOOL



## **Perceptual Textural Features for Content-based Image Retrieval**

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In this project, we are interested in texture-based image retrieval. We represent our textured images by the autoregressive model. We estimate, then, the parameters of this model. These estimated parameters show a good image reconstruction ability. We want, thereafter, to give a perceptual significance to these estimated parameters in order to be able to use them, in a suitable manner, in image retrieval. More precisely, we want to establish a link between perceptual textural features and the estimated parameters of the autoregressive model. Among the most significant perceptual features of texture considered here, we cite the granularity, the contrast and the orientation. Experimental results are very promising.

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### **Curve saliency and hierarchical edge detection for multi-sensor image registration**

**Xiangjie Yang and Yunlong Sheng**

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We use feature matching to register two sequences of battlefield images, in visible and infrared bands. The boundaries of depth discontinuity in the scene, such as the horizon, are used as the common features for image registration against feature inconsistency problem. Our method includes detecting coarse edges with Canny Detector, extracting horizon from the coarse edges by a saliency measure, and using multi-scale Edge Focusing to localize the features at the finest scale. We introduce a new saliency measure to extract salient curves from an edge map. Several first salient curves are then connected to form the most salient curves.