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A Secure Hybrid Key Establishment Scheme for Wireless Sensor Network

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***Abstract:** This paper is based on the field of Augmented Reality, in which 3D virtual objects are integrated into a 3D real environment in real time. What makes augmented reality so interesting is the user's ability to interact in a real-time environment around them .While augmented reality are in incipiency, the advertising opportunities behind these applications are robust. MODEL-BASED visual tracking has become increasingly attractive in recent years in many domains, such as robotics and Augmented Reality (AR) [1] [7]. The presented system uses web services to increase the mobile platform's effective processing power for character recognition. We have the proposed approach in NESTOR, a system that operates in real time on a mobile phone. The system can read letter files or collection of letters that is a word, or perform a learning step in which the user introduces new words to the camera. The new words are analyzed and inserted into the library, which is used to maintain the set of words to be tracked, as well as different properties, such as model assigned to them. New shapes are present to the camera either frontally or in the plane of another tracked shape. In the letter case, the system automatically recognizes the new shape before learning it .Virtual content can be automatically assigned to anew texts according to a class library. Namely, when learning a new text, the system classify it to a new text, the system can define the default virtual content that should be automatically assigned to it. Letters offer various benefits for AR they lend themselves to identification and pose estimation in cases of partial blockage and moderate projective distortion. They are used in the field of education, navigation, visual search feature to identify book cover & DVDs, landmarks, logos, business cards, artwork, businesses, products, barcodes, and text.*

Keywords: **Multimedia information systems, artificial, augmented, and virtual realities, image processing and computer vision, scene analysis and tracking.**

I. INTRODUCTION

Augmented reality (AR) is a live, direct or indirect, view of a physical, real-world environment whose elements are augmented by generated sensory input such as sound, video, graphics or GPS data [4]. It is related to a more general concept called mediated reality, in which a view of reality is modified (possibly even diminished rather than augmented), by a computer. As a result, the technology functions by enhancing one's current perception of reality.

Augmented Reality (AR) enhances user perception by supplementing the real world with virtual content. The virtual content is commonly stored in a local or remote library and is fetched by the AR system for rendering. Research explores the application of computer-generated imagery in live-video streams as a way to enhance the perception of the real world. AR technology includes head-mounted displays and virtual retinal displays for visualization purposes, and construction of controlled environments containing sensors and actuators.

Augmented reality is considered an extension of virtual reality. Virtual reality (VR) is a virtual space in which players immerse themselves into that space and exceed the bounds of physical reality. In virtual reality, time, physical laws and material properties may no longer be thought of as true, in contrast to the real-world environment. Instead of considering AR and VR as exact opposite concepts, Milgram et al. claim them as the reality-virtual (RV) continuum (Milgram, Takemura, Utsumi and Kishino, 1994).

This paper is based on the field of Augmented Reality, in which 3D virtual objects are integrated into a 3D real environment in real time. While augmented reality applications are in incipiency, the advertising opportunities behind these applications are robust. MODEL-BASED visual tracking has become increasingly attractive in recent years in many domains, such as robotics and Augmented Reality (AR). The presented system uses web services to increase the mobile platform's effective processing power for character recognition. We have implemented the proposed approach in Nestor, a system that operates in real time on a mobile phone.

The system can read letter files or collection of letters that is a word, or perform a learning step in which the user introduces new words to the camera. The new words are analyzed and inserted into the library, which is used to maintain the set of words to be tracked, as well as different properties, such as model assigned to them. New shapes are present to the camera either frontally or in the plane of another tracked shape. In the letter case, the system automatically recognizes the new shape before learning it.

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Virtual content can be automatically assigned to new texts according to a class library. Namely, when learning a new text, the system classify it to a new text, the system can define the default virtual content that should be automatically assigned to it. Letters offer various benefits for AR they lend themselves to identification and pose estimation in cases of partial blockage and moderate projective distortion. They are used in the field of education, navigation, visual search feature to identify book cover & DVDs, landmarks, logos, business cards, artwork, businesses, products, barcodes, and text.

II. CONCEPT DESCRIPTION

A. PREPROCESSING STEPS

Input format

Input à Printed à AR CARD à Scanned by mobile. The input is given in the AR card which is AR stands for Augmented Reality.AR Cards are specially made cards for the 3DS that allow the user to play augmented reality in mobile with the AR application. It is all just image based. It recognizes the image on the card, similar to a barcode. And then pulls up the related image on the 3D. A picture from a 3ds that was generating a character off of mobile screen, the mobile screen had an image of an AR card on the screen. The input is printed in the AR card as an alphabet or collection of alphabet with the help of a specific marker. The card is viewed with the help of an android mobile which produce the virtual 3D image which is assigned.

Grey Scale Algorithm

Grayscale images are often the result of measuring the intensity of light at each pixel in a single band of the electromagnetic spectrum (e.g. infrared, visible light, ultraviolet, etc.), and in such cases they are monochromatic proper when only a given frequency is captured. But also they can be synthesized from a full color image; see the section about converting to grayscale. A grayscale or grey scale digital image is an image in which the value of each pixel is a single sample, that is, it carries only intensity information. Images of this sort, also known as black-and-white, are composed exclusively of shades of gray, varying from black at the weakest intensity white at the strongest. This process of conversion of grayscale is done by seven different methods.

- Method 1- Averaging
- Method 2- Correcting the human eye
- Method 3- Desaturation
- These three methods are used for the conversion in this paper. Two modules in the paper use these methods.

B. PATTERN RECOGNITION

For conversion to binary, we need to pass through the gray-scale intermediate. Pixels that are of and above a certain brightness level in the gray-scale equivalent will be designated white for the binary image, and the rest will be designated black. For the conversion of grey scale images to binary images us using the algorithm"Nearest-Neighbour Algorithm". The cheapest pattern recognition algorithm you can use is the nearest neighbour algorithm. Take the vector you get from the unknown and compute its distance from all the patterns in your database, the smallest distance gives the best match.

The concept that we using here is "Thresholding". It is a method to convert a Gray Scale Image into a Binary Image, so that objects that we need are separated from the background.

Fig 1: Grey Scale Conversion to Binary Image

For Tiny character recognition of the size 5x5 or 5x7 or any other lower resolution we just list the matrix as vector as follows:

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11111
10000
11111 ⇨ 1111110000111111000011111
10000
11111

For bigger characters of size 21x21 we need to do some pre-processing to cut down on the size of the vector.

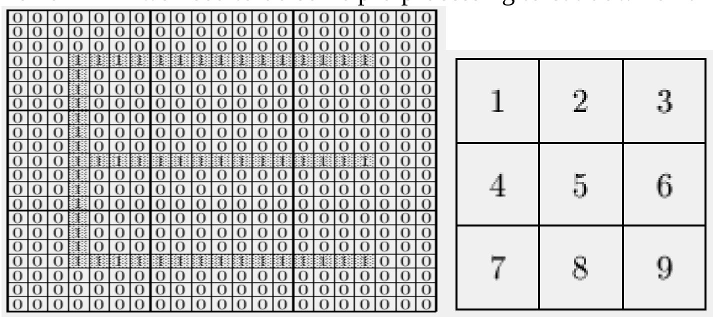

Fig 2: Splitted Sub-matrices for Letter E

The matrix has been divided up into 9 sub-matrices of 7x7, the number of each sub-matrix is given on the right. Features in each sub-matrix are as follows:

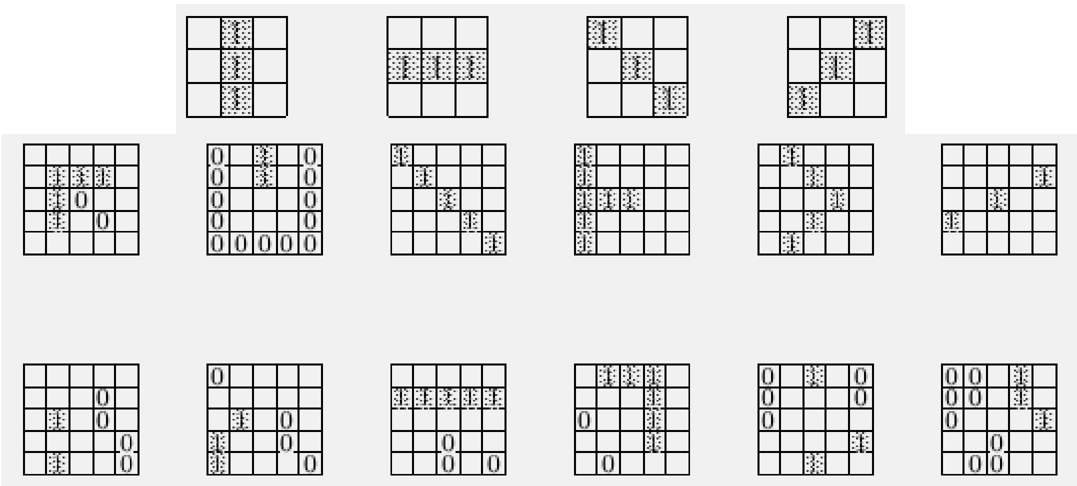

Fig 3: Features of sub matrix

In this matrices the 1 requires that the 1 be present in the picture, a 0 requires that a 0 be present in the picture and the blank was a don't care marker. The vertical and horizontal patterns are found in region 1 of the letter E pattern and there are no diagonals present, code this as the sequence (1,1,0,0).Repeat this search process for all 9 regions. Repeat this search process for all 9 regions. Given the letters E, F and H you get these 36-bit vectors

	1	2	3	4	5	6	7	8	9
	| — \ /	| — \ /	| — \ /	| — \ /	| — \ /	| — \ /	| — \ /	| — \ /	| — \ /
E:	1 1 0 0	0 1 0 0	0 1 0 0	1 1 0 0	0 1 0 0	0 1 0 0	1 1 0 0	0 1 0 0	0 1 0 0
F:	1 1 0 0	0 1 0 0	0 1 0 0	1 1 0 0	0 1 0 0	0 1 0 0	1 0 0 0	0 0 0 0	0 0 0 0
H:	1 0 0 0	0 0 0 0	1 0 0 0	1 1 0 0	0 1 0 0	1 1 0 0	1 0 0 0	0 0 0 0	1 0 0 0

Fig 4: 36 Bit Vectors

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C. CHARACTER RECOGNIZATION

To recognize the character that we obtained from the image segmentation template we use a specialized algorithm called as Optical Character Recognition which is in short known as OCR algorithm .The OCRchie recognition algorithm relies on a set of learned characters and their properties. It compares the characters in the scanned image file to the characters in this learned set. It requires that an image file with the desired characters in the desired font be created, and a text file representing the characters in this image file. Once the learned set has been read in from the image file and its properties recognized, it can be written out to a "learn" file.

This file stores the properties of the learned characters in abbreviated form, eliminating the need for retaining the images of the learned characters, and can be read is very quickly.

Image defects are introduced along the way between the process and the page image submitted for OCR. Defects may arise as soon as the slug or print head hits the paper. Porous paper causes the ink to spread, or bleed through from the verso. Coated, glossy paper does not absorb ink or toner and is liable to smudge. Very high speed printers, like newspaper presses, typically produce fuzzier type. New, heavily-inked typewriter or dot-matrix printer ribbons give rise to blotchy characters while worn ribbons and printer cartridges result in faint impressions. Copying the page, especially on older copiers, results in further loss of definition. Copying the copies rapidly escalates the deterioration: even with modern copier technology, tenth-generation copies are barely legible. In our snippets, most of the imaging defects were already present in the hardcopy. Character extraction has three phases:

- Detection of lines of text
- Detection of connected components
- Projection upward and downward to grab dots on "i"s and "j"s .

Line Detection

To detect lines of text (which is later useful in determining the order of characters and possibly their layout on the page) we do a horizontal projection of the page.

Component Extraction/Projection Above and Below

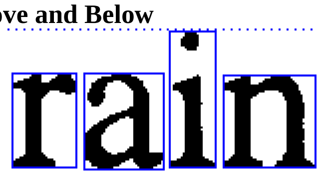

Fig 5: Component Extraction

To extract the connected components from each line, OCRchie, starting at the upper right corner of each line, removes touching intervals of black pixels from the run-length-encoded representation of the image until nothing more connected can be found.

Character Property Extraction

After isolating what are believed to be the characters in a document, we determine a set of properties for each of these characters. The property set is currently a 29 -element vector, but can be modified to accommodate more or less features if necessary. The first 25 elements are the ratio of black: white (grayscale) in each of 25 equal-sized sub regions of the character. After isolating what are believed to be the characters in a document, we determine a set of properties for each of these characters. The property set is currently a 29 -element vector, but can be modified to accommodate more or less features if necessary. The first 25 elements are the ratio of black: white (grayscale) in each of 25 equal-sized sub regions of the character.

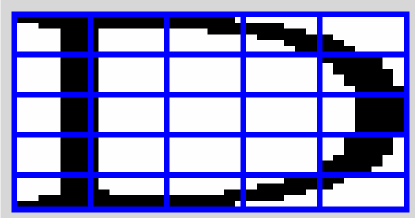

Fig 6: Character Property Extraction

D. POSE ESTIMATION OF THE CHARACTER RECOGNISED

The process to calculate the real camera's location and orientation is called pose estimation. In many AR applications pose estimation is done by the use of an attached camera and computer vision algorithms. The algorithm is described in "*Model-Based Object Pose in 25 Lines of Code*" paper. It estimates 3D pose of an

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object, which includes rotation over X/Y/Z axes and shift along X/Y/Z axes. Three-dimensional (3D) shape measurement of an aspheric mirror with fringe reflection photogram metric involves three steps: correspondence matching, triangulation, and bundle adjustment. Correspondence matching is realized by absolute phase tracking and triangulation is computed by the intersection of reflection and incidence rays. The main contribution in this paper is constraint bundle adjustment for carefully dealing with lens distortion in the process of ray intersection, as compared to the well-known grating reflection photogrammetric. Additionally, a free frame is proposed to alleviate troublesome system geometrical calibration, and constraint bundle adjustment is operated in the free frame to refine the 3D shape. Simulation and experiment demonstrate that constraint bundle adjustment can improve absolute measurement accuracy of aspheric mirrors. Use complete transformation matrix to put a virtual 3D object on top of the image using the same rotation and translation as the real object has. Very important to note is that these points must not be coplanar - i.e. they must not be all on the same plane. This algorithm provides different characteristics:

- Optimizing algorithm.
- Uses weak perspective projection.
- Does not require initial pose estimate.
- Inexpensive in its iteration loop.
- Can be written in 25 lines of code in Mathematical (as the title says)

E. CONVERSION OF 2D TEXT INTO 3D IMAGE

One of the first things to start from is to decide which library/framework to use for 3D rendering. Rendering is the final process of creating the actual 2D image or animation from the prepared scene. This can be compared to taking a photo or filming the scene after the setup is finished in real life.

Fig 7: Conversion of 2D to 3D

Several different, and often specialized, rendering methods have been developed. This range from the distinctly non-realistic wire frame rendering through polygon-based rendering, to more advanced techniques such as: scan line rendering, ray tracing, or grandiosity. Rendering may take from fractions of a second to days for a single image/frame. The above mentioned 3D poses estimation errors also can be handled by tracking glyph's pose. For example, if best estimated pose has error value which is twice (or more) less than the error of alternate pose, then such pose is always believed to be correct. However, if difference in error values for both poses is small, then the tracking algorithm selects the pose, which seems to be closer to the glyph's pose detected on the previous video frame.

III. CONCLUSION

Mobile Based Augmented Reality is a rapidly growing field which shows a lot of promise for supporting both fun and useful tools. Its major challenge at the moment is to provide its users with as much functionality as possible without overloading the still relatively small computational power of most mobile devices. This balance is made much easier by the recent increase in mobile computing power but is still one that should be paid attention to so that such applications don't preclude the use of multiple applications at a time. The field is still growing but there are already many exiting examples of how this technology can be applied. We have described Nestor, recognition and pose estimation system for planar shapes. It performs robust recognition of shapes and maintains accurate and stable 3D registration in extreme slant angles, as well as in the cases of partial occlusion. Nestor allows planar shapes to be used for registration as flexible fiducially for AR. Nestor rectifies new shapes according to previously learned shapes and automatically assigns virtual content to them according to a letter and shape class library.

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