porated within scanning systems or copiers, recognizes and authenticates images. The system is first trained off-line with example images. A template is created by recording the image pattern which will be compared against test images subsequently scanned by the system. Training of the system includes generating templates and selecting one or several pairs of anchor lines within the templates which should be identifiable within test images. The anchor lines are typically straight, and desirably long lines; they can be lines within a image pattern, or edges along an image. Each pair contains two lines which are orthogonal to each other in direction. The detector is trained off-line with currency images resulting in a template generated by recording a pattern similar to a test pattern to be sampled. Anchor lines are identified within said template.

During detection the disclosed line detection method is first performed to detect long straight lines. The long lines detected are then grouped into pairs, each of which contain two long lines that are in orthogonal directions. Under the assumption that the detected long line pairs are the anchor line pairs, the test pattern is matched to the templates. FIG. **2**A illustrates a sample template. Specifically, the template is first rotated and shifted before matching so that the anchor lines align with the long lines to be detected. This is best illustrated in FIG. **2**B where the anchor lines are similar to the template are shown in the upper part of the Figure. A legitimate image pattern is declared to be detected after the template (FIG. **2**A) is matched with the anchor lines within the tested image (FIG. **2**B), as shown in FIG. **2**C, wherein the template (FIG. **2**A) is overlayed on top of the test pattern anchor lines of FIG. **2**B. The test result may then be determined as positive.

Referring to FIG. **3**, system hardware necessary for the image detection system **5** would utilize a scanner **1** for receiving the test image, a microprocessor **2** programmed with the Hough transform to detect an image match by utilizing local edge information to detect lines and curves in scanned images, memory **3** for storing test patterns, and a indicator means **4** to indicate match detection. The detection system **5** facilitates the training of the microprocessor **2** (also referred to as "detector") off-line with sample images which are scanned **1** into said system wherein a template is generated by recording **3** an image pattern of said example notes similar to a test pattern to be detected. Anchor lines within the template would be identified by the microprocessor **2**. The microprocessor system be programmed further to allow for the detection of the long lines using the disclosed line detection method and rotation and shifting of the template before matching it to the test pattern so that anchor lines may align with long lines which may be detected within the test pattern. The system **2** would then compare the template, held in memory **3**, to the test pattern that is scanned **1** or viewed by an image capturing means to determine whether the anchor lines exist within the test pattern.

While the invention is described with reference to a particular embodiment, this particular embodiment is intended to be illustrative, not limiting. Various modifications may be made without departing from the spirit and scope of the invention as defined in the amended claims. Modifications and alterations will occur to others upon reading and understanding this specification; therefore, it is intended that all such modifications and alterations are included insofar as they come within the scope of the appended claims or equivalents thereof.

I claim:

1. An image detection method using local edge information for detecting lines and curves comprising;

a) indexing a 2-D array by (θ,b) so as to construct a line for each detected point $P_i=(x_i,y_i)$ as:

$$b=k\,x_i-y_i$$

in a kb-plane wherein k=tan θ, for $\phi+\Delta<\theta<\phi-\Delta$, φ is the edge orientation and Δ is a preset parameter;

b) lines corresponding to all of said each detected point P_i, and obtaining peaks at (θ,b) corresponding to collinear sets of said each detected point P_i, and determining a position for said each detected point P_i through equations of corresponding lines;

wherein total computation for determining lines and curves during image detection is obtained by calculating:

$$b=k\,x_i-y_i$$

K times for each detected point, where K=Δ/R, wherein R is the resolution for θ estimation:

wherein θ is a local edge estimated and Δ is a parameter dependent on the accuracy of a local edge orientation estimation.

2. The method of claim **1** comprising a detector trained off-line with example images resulting in a template generated by recording a test pattern similar to a pattern to be tested;

anchor lines or curves identified within said template;

long lines detected using the method of claim **1**;

said template is rotated and shifted before matching said template to said test pattern so that said anchor lines or curves align with long lines or curves detected within said test pattern; and

said template and said test pattern are compared to determine whether there is a match.

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