

METHODS AND A SYSTEM FOR VERIFYING THE IDENTITY OF A PRINTED ITEM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority to U.S. Provisional Patent Application 61/945,917 filed February 28, 2014, and to U.S. Patent Application 14/561,215 filed December 4, 2014, the contents of which are incorporated herein by reference. This application is related to U.S. Patent No. 8,950,662 issued February 10, 2015, and to U.S. Provisional Patent Applications 61/605,369 filed March 1, 2012; 61/676,113 filed July 26, 2012; and 61/717,711 filed October 24, 2012. The contents of each of these documents are incorporated herein by reference.

TECHNICAL FIELD

[0002] The present disclosure is related generally to machine vision technology and, more particularly, to methods and a system for verifying the identity of a printed item.

BACKGROUND

[0003] Some current methods for verifying the identity of a printed item are generally based on overt or covert marks deliberately applied to an item, usually by printing. Other methods rely on natural variations in a material substrate (fiber orientation in paper, for example) to be used as a unique identifier. Significant deficiencies exist in the existing technology. These include the need to deliberately add overt or covert marks to the item in addition to any marks already present on the item for other purposes. In the case of the substrate variation method, a specialized system that perceives the variations is necessary. Also, for substrates that do not present a readily identifiable unique feature (some plastic films for example) this method cannot be employed. These deficiencies seriously reduce the utility of these methods in the technical fields considered here

SUMMARY OF INVENTION

[0003a] According to a first aspect of the invention, there is provided a method of verifying an identity of an unverified printed item, the method comprising:

- on an image capturing device, capturing an image of the unverified printed item,
- wherein the unverified printed item includes artifacts and at least some of the artifacts were not controllably producible in producing the unverified printed item;

on a processor:

- extracting information associated with the artifacts of the unverified printed item;

- ranking the information associated with the artifacts of the unverified printed item;

- retrieving stored ranked information associated with artifacts of an original printed item from a storage device;

- in a first range of magnitudes, comparing the ranked information associated with the artifacts of the unverified printed item with the ranked information associated with the artifacts of the original printed item;

- in a second range of magnitudes, comparing the ranked information associated with the artifacts of the unverified printed item with the ranked information associated with the artifacts of the original printed item,

- wherein the second range includes artifacts smaller than a smallest artifact in the first range; and

- when a difference between the ranked information associated with the artifacts of the unverified printed item and the ranked information associated with the artifacts of the original item is greater for the second range than for the first range by more than a threshold amount, identifying the unverified printed item as a copy.

[0003b] According to a second aspect of the invention, there is provided a system for verifying an identity of an unverified printed item, the system comprising:

- an image capturing device that captures an image of the unverified printed item,

- wherein the unverified printed item includes artifacts and at least some of the artifacts were not controllably producible in producing the unverified printed item;

- a processor that carries out steps comprising:

- extracting information associated with the artifacts of the unverified printed item;

- ranking the information associated with the artifacts of the unverified printed item;

retrieving stored ranked information associated with artifacts of an original printed item from a storage device;

in a first range of magnitudes, comparing the ranked information associated with the artifacts of the unverified printed item with the ranked information associated with the artifacts of the original printed item;

in a second range of magnitudes, comparing the ranked information associated with the artifacts of the unverified printed item with the ranked information associated with the artifacts of the original printed item,

wherein the second range includes artifacts smaller than a smallest artifact in the first range; and

when a difference between the ranked information associated with the artifacts of the unverified printed item and the ranked information associated with the artifacts of the original item is greater for the second range than for the first range by more than a threshold amount, identifying the unverified printed item as a copy.

[0003c] According to a third aspect of the invention, there is provided a system for verifying the authenticity of a printed item, the system comprising:

an image acquisition device that acquires an image of the printed item; and

one or more processors that carry out actions comprising:

receiving the image from the image acquisition device;

analyzing the image to identify imperfections in the printed item,

wherein the imperfections are associated with metrics of a plurality of magnitudes;

retrieving a genuine mark signature from a database of genuine mark signatures,

wherein the genuine mark signature is based on imperfections of an original printed item,

wherein the genuine mark signature contains data of a plurality of magnitudes;

in a first range of magnitudes of the identified imperfections and the genuine mark signature, comparing the identified imperfections with the genuine mark signature;

in a second range of magnitudes of the identified imperfections and the genuine mark signature, comparing the identified imperfections with the genuine mark signature;

wherein the second range of magnitudes includes artifacts smaller than a smallest artifact in the first range; and

when a difference between the identified imperfections and the genuine mark signatures is greater for the second range than for the first range by more than a threshold amount, identifying the unverified printed item as a copy.

DRAWINGS

[0004] While the appended claims set forth the features of the present techniques with particularity, these techniques, together with their objects and advantages, may be best understood from the following detailed description taken in conjunction with the accompanying drawings of which:

an image acquisition device that acquires an image of the printed item; and
one or more processors that carry out actions comprising:

- receiving the image from the image acquisition device;
- analyzing the image to identify imperfections in the printed item,
wherein the imperfections are associated with metrics of a plurality of
magnitudes;
- retrieving a genuine mark signature from a database of genuine mark
signatures,
wherein the genuine mark signature is based on imperfections of an
original printed item,
wherein the genuine mark signature contains data of a plurality of
magnitudes;
- in a first range of magnitudes of the identified imperfections and the
genuine mark signature, comparing the identified imperfections with the
genuine mark signature;
- in a second range of magnitudes of the identified imperfections and the
genuine mark signature, comparing the identified imperfections with the
genuine mark signature;
- wherein the second range of magnitudes includes artifacts smaller than
a smallest artifact in the first range; and
- when a difference between the identified imperfections and the genuine
mark signatures is greater for the second range than for the first range by more
than a threshold amount, identifying the unverified printed item as a copy.

17. The system of claim 18, wherein the printed mark includes coded information regarding a manufactured item.

18. The system of claim 16, wherein the printed mark is a logo.

19. The system of claim 17, wherein
the coded information includes a unique identifier, and
the one or more processors retrieve the genuine mark signature from the database using the unique identifier.

20. The system of claim 16, wherein the image acquisition device comprises a bar code reader.