

METHODS AND A COMPUTING DEVICE FOR DETERMINING WHETHER A MARK IS GENUINE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority to U.S. Provisional Patent Application 62/180,477, filed June 16, 2015, the contents of which are incorporated herein by reference.

TECHNICAL FIELD

[0002] The present disclosure is related generally to anti-counterfeiting technology and, more particularly, to methods and a computing device for determining whether a mark is genuine.

BACKGROUND

[0003] Counterfeit products are, unfortunately, widely available and often hard to spot. When counterfeiters produce fake goods, they typically copy the labeling and bar codes in addition to the actual products. At a superficial level, the labels and bar codes may appear genuine and even yield valid data when scanned (e.g., decode to the appropriate Universal Product Code). While there are many technologies currently available to counter such copying, most of these solutions involve the insertion of various types of codes, patterns, microfibers, microdots, and other indicia to help thwart counterfeiting. Such techniques require manufacturers to use additional equipment and material and add a layer of complexity to the production process.

SUMMARY OF INVENTION

[0003a] According to a first aspect of the present invention, there is provided a method, on a computing device, for determining whether a mark is genuine, the method comprising: receiving an image of a candidate mark; using the received image, measuring a characteristic of a feature of the candidate mark, resulting in a set of measurements; creating a profile for the feature based on the set of measurements; creating a first filtered profile for the feature by filtering, from the profile of the feature, all spatial frequency components except for those in a first spatial frequency band; creating a second filtered profile for the feature by filtering, from the profile of the feature, all spatial frequency components except for those in a second spatial frequency band; comparing the first filtered profile of the feature with an equivalent first filtered profile of a feature of a genuine mark; comparing the second filtered profile of the feature with an equivalent second filtered profile of a feature of the genuine mark;

determining whether the candidate mark is genuine based on the first filtered profile comparison and the second filtered profile comparison; and indicating a result of the determination to a user.

[0003b] According to a second aspect of the present invention, there is provided a computing device comprising a hardware processor that carries out actions comprising: receiving an image of a candidate mark; using the received image, making a plurality of measurements of a feature of the candidate mark; creating a profile for the feature based on the plurality of measurements; creating a first filtered profile for the feature by filtering, from the profile of the feature, all spatial frequency components except for those in a first spatial frequency band; creating a second filtered profile for the feature by filtering, from the profile of the feature, all spatial frequency components except for those in a second spatial frequency band; comparing the first filtered profile of the feature with an equivalent first filtered profile of a feature of a genuine mark; comparing the second filtered profile of the feature with an equivalent second filtered profile of a feature of the genuine mark; determining whether the candidate mark is genuine based on the first filtered profile comparison and the second filtered profile comparison; and indicating a result of the determination to a user.

[0003c] According to a third aspect of the present invention, there is provided a non-transitory computer-readable medium having stored thereon computer-executable instructions for carrying out actions comprising: receiving an image of a candidate mark; using the received image, making a plurality of measurements of a feature of the candidate mark; creating a profile for the feature based on the plurality of measurements; creating a first filtered profile for the feature by filtering, from the profile of the feature, all spatial frequency components except for those in a first spatial frequency band; creating a second filtered profile for the feature by filtering, from the profile of the feature, all spatial frequency components except for those in a second spatial frequency band; comparing the first filtered profile of the feature with an equivalent first filtered profile of a feature of a genuine mark; comparing the second filtered profile of the feature with an equivalent second filtered profile of a feature of the genuine mark; determining whether the candidate mark is genuine based on the first filtered profile comparison and the second filtered profile comparison; and indicating a result of the determination to a user.

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:

[0005] FIG. 1 is an example of a system in which various embodiments of the disclosure may be implemented;

[0006] FIG. 2 is another example of a system in which various embodiments of the disclosure may be implemented;

[0007] FIG. 3 shows the architecture of a computing device according to an embodiment;

[0008] FIG. 4 shows an example of a mark according to an embodiment;

assigning a second correlation score to the second spatial frequency band based on the comparison of the second filtered profile of the feature with the equivalent second filtered profile of the feature of the genuine mark; and

creating a spatial frequency spectrum correlation profile using the first correlation score and the second correlation score,

wherein determining whether the candidate mark is genuine comprises determining whether the candidate mark is genuine based on at least one of the first and second correlation scores.

10. The method of claim 9, wherein

creating the spatial frequency spectrum correlation profile comprises:

mapping the first correlation score to a first band-pass filter of the first spatial frequency band; and

mapping the second correlation score to a second band-pass filter of the second spatial frequency band, and

determining whether the candidate mark is genuine comprises analyzing the mapped correlation scores and spatial frequency bands.

11. The method of claim 1, wherein

creating the first filtered profile comprises applying a first band-pass filter to the feature profile;

creating the second filtered profile comprises a second band-pass filter to the feature profile separately from the application of the first band-pass filter.

12. The method of claim 1, wherein the feature is an artifact.

13. The method of claim 1, wherein the feature is a subarea of the candidate mark, and the measurement is a measurement of the average pigmentation of the subarea.

14. The method of claim 1, wherein the feature is a subarea of the candidate mark, and the measurement is a measurement of deviation in the position of the subarea from a best-fit grid.

15. The method of claim 1, wherein the feature is a subarea of the candidate mark, and the measurement is a measurement of stray marks or voids in the subarea.

16. The method of claim 1, wherein receiving the image of the candidate mark comprises receiving the image from a camera built into the computing device.

17. The method of claim 1, wherein receiving the image of the candidate mark comprises receiving via a network.

18. The method of claim 1, wherein the mark is selected from a group consisting of a barcode, a logo, and a decoration.

19. A computing device comprising a hardware processor that carries out actions comprising:

- receiving an image of a candidate mark;

- using the received image, making a plurality of measurements of a feature of the candidate mark;

- creating a profile for the feature based on the plurality of measurements;

- creating a first filtered profile for the feature by filtering, from the profile of the feature, all spatial frequency components except for those in a first spatial frequency band;

- creating a second filtered profile for the feature by filtering, from the profile of the feature, all spatial frequency components except for those in a second spatial frequency band;

- comparing the first filtered profile of the feature with an equivalent first filtered profile of a feature of a genuine mark;

- comparing the second filtered profile of the feature with an equivalent second filtered profile of a feature of the genuine mark;

- determining whether the candidate mark is genuine based on the first filtered profile comparison and the second filtered profile comparison; and

- indicating a result of the determination to a user.

20. A non-transitory computer-readable medium having stored thereon computer-executable instructions for carrying out actions comprising:

- receiving an image of a candidate mark;

- using the received image, making a plurality of measurements of a feature of the candidate mark;

- creating a profile for the feature based on the plurality of measurements;

creating a first filtered profile for the feature by filtering, from the profile of the feature, all spatial frequency components except for those in a first spatial frequency band;

creating a second filtered profile for the feature by filtering, from the profile of the feature, all spatial frequency components except for those in a second spatial frequency band;

comparing the first filtered profile of the feature with an equivalent first filtered profile of a feature of a genuine mark;

comparing the second filtered profile of the feature with an equivalent second filtered profile of a feature of the genuine mark;

determining whether the candidate mark is genuine based on the first filtered profile comparison and the second filtered profile comparison; and

indicating a result of the determination to a user.