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EXAMINER

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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* BOHAO LIAO and MARILYN KRUKOWSKI

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Appeal 2016-000850  
Application 13/132,107  
Technology Center 2400

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Before: ELENI MANTIS MERCADER, SCOTT E. BAIN, and  
ALEX S. YAP, *Administrative Patent Judges*.

MANTIS MERCADER, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF CASE

Appellants appeal under 35 U.S.C. § 134 from a rejection of claims 1–12, 15–25, and 27–34. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

THE INVENTION

The claimed invention is directed to determining a body condition score of an animal using a three-dimensional camera system directed towards the animal and provided for recording at least one three-dimensional image of the animal; an image processing device connected to the three-dimensional camera system and provided for forming a three-dimensional surface representation of a portion of the animal from the three dimensional image recorded by the three-dimensional camera system; statistically analyzing the surface of the three-dimensional surface representation; and determining the body condition score of the animal based on the statistically analyzed surface of the three-dimensional surface representation. Abstract.

Claim 1, reproduced below, is illustrative of the claimed subject matter:

1. An arrangement for determining a body condition score of an animal, comprising:  
a three-dimensional camera system provided for being directed towards the animal and for recording at least one three-dimensional image of the animal; and  
an image processing device connected to the three-dimensional camera system and provided for:  
forming a three-dimensional surface representation of a portion of the animal from the three-dimensional image recorded by the three-dimensional camera system;  
statistically analyzing the surface of the three-dimensional surface representation; and

determining the body condition score of the animal based on the statistically analyzed surface of the three-dimensional surface representation, wherein the statistical analyzing includes calculating statistical properties of a histogram that compares how measurement data may vary over the surface of the three-dimensional surface representation, and wherein the statistical properties comprise at least one of mean value, standard deviation, smoothness, skewness, uniformity, entropy, the width of the histogram, the width at the half maximum value, or parameters of a curve fitted to the histogram.

### REFERENCES

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Kriesel et al.	US 2005/0257748 A1	Nov. 24, 2005
Sharony	US 2006/0126903 A1	June 15, 2006
Anderson et al.	US 2006/0283269 A1	Dec. 21, 2006
Metcalf et al.	US 2008/0273760 A1	Nov. 6, 2008

HETZEL ET AL., *3D Object Recognition from Range Images Using Local Feature Histograms*.

Andrew Edie Johnson, *Spin-Images: A Representation for 3-D Surface Matching* (Aug. 13, 1997) (Ph.D. dissertation, Carnegie Mellon University).

### REJECTIONS

The Examiner made the following rejections:

Claims 1, 3–12, 15–16, 20, 24, 27–28, and 30–34 stand rejected under 35 U.S.C §103(a) as being unpatentable over Sharony, in view Kriesel, and further in view Hetzel.

Claims 2, 19, 21, and 25 stand rejected under 35 U.S.C § 103(a) as being unpatentable over Sharony, in view of Kriesel and Hetzel, and further in view of Metcalfe.

Claim 17–18 stands rejected under 35 U.S.C § 103(a) as being unpatentable over Sharony, in view of Kriesel and Hetzel, as applied to claim 1 above, and further in view of Johnson.

Claims 22 and 23 stand rejected under 35 U.S.C § 103(a) as being unpatentable over Sharony, in view of Kriesel and Hetzel, as applied to claim 1 above, and further in view of Anderson.

### ISSUES

The pivotal issue is whether the Examiner erred in finding that the combination of Sharony, in view of Kriesel, and further in view of Hetzel teaches or suggests the limitation of:

determining the body condition score of the animal based on the statistically analyzed surface of the three-dimensional surface representation, wherein the statistical analyzing includes calculating statistical properties of a histogram that compares how measurement data may vary over the surface of the three-dimensional surface representation

as recited in claim 1.

### ANALYSIS

Appellants disagree with the Examiner’s characterization that the “histogram limitation only requires a histogram that compares how measurement data may vary over a 3D surface” (App. Br. 15). Appellants argue Claim 1 defines that the histogram is calculated when “statistically analyzing . . . the three-dimensional surface representation” of a portion of an animal (App. Br. 15). According to Appellants, claim 1 defines “determining the body condition score of the animal based on the statistically analyzed surface” (App. Br. 15). Appellants assert that the

“histogram” of claim 1 is interrelated to the other claim elements, such as the “statistically analyzing” and “determining” elements (App. Br. 15).

More specifically, Appellants assert that Kriesel teaches solving this problem by comparing measurement data for one animal to histogram data associated with an overall group of animals (App. Br. 16). Kriesel explains that a histogram indicates not only the mean weight of the group but also the spread or standard deviation of the animals in the group (paras. 304, 718; App. Br. 16). Appellants argue that Kriesel’s histograms reflect data for an overall group of animals, and none of the histograms taught by Kriesel are for statistics associated with a portion of *a single animal*, let alone a surface representation of the animal (App. Br. 16).

We do not agree with Appellants’ argument. Appellants’ arguments are not commensurate in scope with the claim language because the term “single” animal is not claimed. With respect to Appellants’ argument regarding the recitation of “an animal” as necessitating a single animal, we are not persuaded because an indefinite article such as “an” in a comprising claim generally means one or more. *Baldwin Graphic Sys. v. Siebert, Inc.*, 512 F.3d 1338, 1342–32 (Fed. Cir. 2008). We further note that the claim does not preclude a histogram of multiple animals, because the claim recitation of “determining the body condition score of the animal based on the statistically analyzed surface of the three-dimensional surface representation, wherein the statistical analyzing includes calculating statistical properties of *a histogram* that compares how measurement data may vary over the surface of the three-dimensional surface representation” (emphasis added), does not in any way limit the histogram to a histogram of a single animal.

However, even if a single animal was claimed, the Examiner finds, and we agree, that Kriesel teaches obtaining herd statistics by first calculating and modeling the individual animal (para. 1270) and also teaches a histogram comparison between *an animal's* data using a 3DAI data compared to *a reference growth curve which might be from a breed standard or historical data from a prize steer* (para. 1274) (Ans. 27). The Examiner notes that Hetzel was relied upon for explicitly teaching single object (i.e., cow body part) histogram, but in essence constitutes cumulative evidence as Kriesel already teaches single animal histograms (Ans. 27). We agree with the Examiner that Kriesel already teaches single animal histograms.

Appellants further argue that one skilled in the art would not have modified the alleged Sharony-Kriesel combination to include the object recognition features of Hetzel (App. Br. 18–19). According to Appellants, both Sharony and Kriesel disclose that an operator would provide or enter information about the actual animal being evaluated by the system, and thus, would not be concerned with recognizing the type of animal (i.e., whether it is a cow) (App. Br. 18–19). Appellants argue that the Sharony-Kriesel system would already know (or recognize) that each object is a cow (App. Br. 18–19).

We do not agree. We note that as we stated above, Hetzel's teaching is cumulative as Kriesel already teaches single animal histograms (*see supra*). Furthermore, the Examiner does not rely on recognizing the animal as a cow, but rather, as recognizing the particular part of the cow under evaluation, using histograms (see Ans. 28–29).

Thus, we affirm the Examiner's rejection of claim 1 and for the same reasons the rejections of claims 2–12, 15–25, and 27–34.

### CONCLUSION

The Examiner did not err in finding that the combination of Sharony, in view Kriesel, and further in view Hetzel, teaches or suggests the limitation of:

determining the body condition score of the animal based on the statistically analyzed surface of the three-dimensional surface representation, wherein the statistical analyzing includes calculating statistical properties of a histogram that compares how measurement data may vary over the surface of the three-dimensional surface representation

as recited in claim 1.

### DECISION

For the above reasons, the Examiner's rejection of claims 1–12, 15–25, and 27–34 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED