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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* CLIFFORD R. JACK and PETER C. O'BRIEN

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Appeal 2009-015192  
Application 10/115,334  
Technology Center 3700

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Before DEMETRA J. MILLS, ERIC GRIMES, and JEFFREY N.  
FREDMAN, *Administrative Patent Judges*.

GRIMES, *Administrative Patent Judge*.

DECISION ON APPEAL<sup>1</sup>

This is an appeal under 35 U.S.C. § 134 involving claims to a magnetic resonance imaging (MRI) method. The Examiner has rejected the

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<sup>1</sup> The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, or for filing a request for rehearing, as recited in 37 C.F.R. § 41.52, begins to run from the "MAIL DATE" (paper delivery mode) or the "NOTIFICATION DATE" (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

claims as being directed to nonstatutory subject matter and obvious in view of the prior art. We have jurisdiction under 35 U.S.C. § 6(b). We reverse.

#### STATEMENT OF THE CASE

The Specification discloses a method for “automatically measuring the volume of tissue in a region of interest by acquiring a magnetic resonance image, constructing a pixel intensity histogram of the image, and segmenting the histogram using a statistical regression analysis” (Spec. 5, ¶ 18). The “histogram is produced by counting the number of image pixels at each possible image intensity level and plotting the result as a frequency versus intensity graph” (*id.* at 5, ¶ 20).

Claims 1-34 are on appeal. Claims 1 and 4 are representative and read as follows:

1. A method of classifying tissue in a magnetic resonance image, the method comprising:  
(a) acquiring a magnetic resonance image of a region of interest;  
(b) constructing a pixel intensity histogram of the magnetic resonance image; and  
(c) applying a statistical regression analysis to the histogram to determine a pixel intensity threshold value for segmenting the histogram into at least two regions, wherein at least one of the regions is representative of a tissue of interest.

4. The method as defined in claim 1, wherein the statistical regression analysis of step (c) comprises:  
(i) identifying a consistently identifiable statistical characteristic of the histogram;  
(ii) determining a statistical parameter of the consistently identifiable statistical characteristic; and  
(iii) applying the statistical parameter as an independent variable in a regression analysis to determine a threshold value to classify pixels based on pixel signal intensity.

The claims stand rejected as follows:

- Claims 1-34 under 35 U.S.C. § 101 as being directed to nonstatutory subject matter (Answer 3);
- Claims 1-13, 15-27, and 29-34 under 35 U.S.C. § 103(a) based on Nyul<sup>2</sup> and Gosche<sup>3</sup> (Answer 3); and
- Claims 14 and 28 under 35 U.S.C. § 103(a) based on Nyul, Gosche, and Komiya<sup>4</sup> (Answer 5).

## I.

The Examiner has rejected all of the claims on appeal on the basis that they are directed to nonstatutory subject matter under the machine-or-transformation test set out by the Court of Appeals for the Federal Circuit in *In re Bilski*, 545 F.3d 943 (2008) (Answer 3). The U.S. Supreme Court subsequently held, however, that while “the machine-or-transformation test is a useful and important clue” to determining whether a claimed process passes muster under § 101, it is “not the sole test for deciding whether an invention is a patent-eligible ‘process.’” *Bilski v. Kappos*, 130 S.Ct 3218, 3227 (2010).

The Federal Circuit, applying *Bilski v. Kappos*, noted that the “Supreme Court has articulated only three exceptions to the Patent Act’s broad patent-eligibility principles: ‘laws of nature, physical phenomena, and abstract ideas.’” *Research Corporation Technologies, Inc. v. Microsoft Corp.*, 627 F.3d 859, 867 (quoting *Diamond v. Chakrabarty*, 447 U.S. 303,

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<sup>2</sup> Nyul et al., US 6,584,216, June 24, 2003

<sup>3</sup> Gosche, US 6,430,430, Aug. 6, 2002

<sup>4</sup> Komiya et al., US 5,754,676, May 19, 1998

309 (1980)). The Court held that, for a claimed method to be disqualified under § 101 because it is too abstract, “this disqualifying characteristic should exhibit itself so manifestly as to override the broad statutory categories of eligible subject matter.” *Id.* at 868.

The claims in *Research Corporation* were directed to methods “for rendering a halftone image of a digital image by comparing, pixel by pixel, the digital image against a blue noise mask.” *Id.* The *Research Corporation* court held that the claims at issue there were not directed to abstract ideas. *Id.* at 869.

Similar to the *Research Corporation* claims, the instant claims are directed to a method for interpreting a magnetic resonance image by measuring, pixel-by-pixel, the image intensity and statistically analyzing a frequency-versus-intensity histogram. The Examiner has not alleged that the claims are directed to a law of nature or physical phenomenon, and we conclude that the claimed process is not so manifestly abstract as to override the broad statutory categories of eligible subject matter recited in § 101. *See Research Corporation*, 627 F.3d at 868. The rejection of the claims as directed to nonstatutory subject matter is reversed.

## II.

The Examiner has rejected claims 1-13, 15-27, and 29-34 as obvious based on Nyul and Gosche (Answer 3) and has rejected claims 14 and 28 as obvious based on Nyul, Gosche, and Komiya. All of the claims on appeal require using a statistical regression analysis to distinguish between tissue types based on pixel intensity in an MRI image (see independent claims 1, 11, and 26).

Appellants argue that Nyul and Gosche do not disclose or suggest a statistical regression analysis (Appeal Br. 22-23).

The Examiner finds that Nyul discloses statistical regression analysis at col. 17, ll. 11-37 (Answer 4) and discloses an analysis corresponding to the steps of claim 4 at column 11 (Answer 9).

We agree with Appellants that the Examiner has not adequately explained how Nyul and Gosche would have made obvious the statistical regression analysis required by the claimed method. Appellants dispute the Examiner's finding that Nyul discloses statistical regression analysis at column 17 (Appeal Br. 13). The Examiner concedes that "the references do not explicitly teach the term 'regression'" (Answer 10), but does not explain how Nyul's column 17 nonetheless discloses statistical regression analysis.

Instead, the Examiner attempts to match Nyul's disclosure to the steps recited in dependent claim 4, as follows:

The statistical characteristic of the histogram is the identification of the landmark points and this is clearly disclosed in the Nyul reference (see col. 11). The statistical parameter is the mode and the Nyul reference clearly teaches constructing unimodal, bimodal and multi-modal histograms. The statistical thresholding to identify pixels or classify pixels is disclosed in both Nyul and Gosche references. While the references do not explicitly teach the term 'regression', it [is] obvious that the references meet the requirements of 'statistical regression analysis' (as defined in the claims . . .).

(Answer 10.)

We cannot agree with the Examiner that it is obvious, based on the above reasoning, how the identified passage of Nyul describes statistical regression analysis. Claim 4 describes a statistical regression analysis encompassed by claim 1, and requires identifying a statistical characteristic

of a histogram and determining a statistical parameter of that characteristic. The Examiner's reasoning does not explain how constructing a unimodal, bimodal or multi-modal histogram corresponds to determining a statistical parameter of the landmark points identified by Nyul. Nor has the Examiner pointed to any step in Nyul corresponding to step (iii) of claim 4: "applying the statistical parameter as an independent variable in a regression analysis."

The Specification describes one exemplary method as follows: "[T]he first step of the segmentation portion 18 of the method comprises identifying a consistently identifiable statistical characteristic of the histogram which can be a mean, a median, a mode or other parameters" (Spec. 10-11, ¶ 32). Then statistical parameters are calculated based on the region of the histogram near the selected characteristic (e.g., near the mode) (*id.*) and "the statistical parameters . . . are used as independent variables in a regression equation analysis" (*id.* at 11, ¶ 33).

The Examiner has not pointed to any disclosure in Nyul or Gosche of using histogram parameters, determined based on a selected characteristic of the histogram, as independent variables in an analysis that distinguishes tissue types based on pixel intensity. Nor has the Examiner provided reasoning sufficient to support a conclusion that such an analysis would have been obvious based on the cited references. The Examiner therefore has not adequately shown that Nyul and Gosche, even in combination, would have made obvious the statistical regression analysis required by the claims on appeal.

Appeal 2009-015192  
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SUMMARY

We reverse the rejections of claims 1-34 under 35 U.S.C. §§ 101 and 103(a).

REVERSED

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