Paper No. 35

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte GORDON J. SMITH

Appeal No. 1998-2472
Application No. 08/614,324

ON BRIEF

Before JERRY SMITH, GROSS, and BLANKENSHIP, Administrative Patent Judges.

GROSS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 4 through 8 and 12 through 24, which are all of the claims pending in this application.

Appellant's invention relates to a method for detecting defects in a disk drive storage device. The method includes the steps of deriving a test signal indicative of a parameter to be measured, detecting an abnormal value by identifying a sample of the test signal that exceeds a threshold value,

identifying a window of samples relative to the abnormal value, and analyzing the window of samples with a neural network. Claim 4 is illustrative of the claimed invention, and it reads as follows:

4. A method for detecting defects in a disk drive storage device, said disk drive storage device comprising at least one disk, said method comprising the steps of:

deriving a test signal from said disk drive, said test signal being indicative of a disk surface parameter to be measured, said test signal varying as a function of at least one input parameter over a range of values of said at least one input parameter;

identifying a sample of said test signal exceeding a predetermined threshold value to detect an abnormal value of said test signal indicative of a parameter to be measured;

identifying a window of a plurality of samples of said signal relative to said detected abnormal value in response to detecting said abnormal value;

providing a neural network for receiving said identified window of said plurality of samples including at least one neural network data structure defining data path adaptive weights for said disk drive storage device; and

analyzing said identified window of said plurality of samples with said neural network to determine whether a predefined defect exists in said disk drive storage device.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Meyer 4,942,609 Jul. 17, 1990

Sheppard et al. (Sheppard)	5,130,936	Jul. 14, 1992
Coker et al. (Coker)	5,168,413	Dec. 01, 1992

Claims 4, 5, 7, 8, 12, 13, 15 through 18, and 20 through 24 stand rejected under 35 U.S.C. § 103 as being unpatentable over Meyer in view of Sheppard.

Claims 6, 14, and 19 stand rejected under 35 U.S.C. § 103 as being unpatentable over Meyer in view of Sheppard and Coker.

Reference is made to the Examiner's Answer (Paper No. 29, mailed April 15, 1997) for the examiner's complete reasoning in support of the rejections, and to appellant's Brief (Paper No. 28, filed February 21, 1997) for appellant's arguments thereagainst.[1]

OPINION

As a preliminary matter, we note that appellant indicates on pages 11-12 of the Brief that the claims do not stand or fall together. Appellant argues the claims in the following four groups: (1) claims 4, 7, 8, 17, and 20; (2) claims 5, 6, 13, 14, 18, 19, 23, and 24; (3) claims 21 and 22; and (4)

[1] Since the examiner did not permit entry of the Reply Brief (Paper No. 30, filed June 20, 1997), we will not consider the arguments made therein.

claims 12, 15, and 16. However, the limitation argued for group two does not appear in claims 18 and 19 and the limitation argued for group 3 does not appear in claim 22. Accordingly, we will treat the claims according to the following six groups: (1) claims 4, 7, 8, 17, and 20; (2) claims 5, 6, 13, 14, 23, and 24; (3) claims 18 and 19, (4) claim 21; (5) claim 22, and (6) claims 12, 15, and 16, with claims 4, 5, 18, 21, 22, and 12, respectively, as representative.[2]

We have carefully considered the claims, the applied prior art references, and the respective positions articulated by appellant and the examiner. As a consequence of our review, we will affirm the obviousness rejections of claims 4, 7, 8, 12, 15 through 20, and 22, but reverse the obviousness rejection of claims 5, 6, 13, 14, 21, 23, and 24.

With regard to the first group of claims, according to the examiner (Answer, page 4), Meyer discloses all of the limitations of claim 4 except for analyzing the samples using a neural network which includes a neural network data

[2] We note that the examiner added Coker to the primary combination of Meyer and Sheppard to reject claims 6, 14, and 19. However, since appellant has relied solely on the arguments for claims 4, 12, and 17, respectively, with no separate arguments regarding Coker, we will treat claims 6, 14, and 19 with the claims from which they depend, claims 5, 13, and 18.

structure defining data path adaptive weights. The examiner turns to Sheppard for a suggestion to use such a neural network in Meyer's detection of defects. Specifically, the examiner asserts (Answer, page 4) that "Sheppard et al. teaches neural network means 100 (Figure 12) for diagnosing a system defect based on a number of test samples, ... so that the type of defect of a system can be identified with a great degree of certainty (col. 3)."

Appellant, in the Brief, does not contest the examiner's analysis of Meyer. Therefore, we will focus our attention on the combinability of Sheppard's neural network with Meyer's method. Appellant argues (Brief, page 15) that neither Meyer nor Sheppard suggests the last two steps of claim 4, which involve a neural network. Further, appellant states (Brief, page 16) that "[t]here is no suggestion found in the cited Meyer et al.
reference or the Sheppard et al. reference, other than the teachings of applicant's own application, to justify the modifications of the Meyer et al. reference as proposed by the Examiner."

Sheppard's diagnostic tester "has broad application in determining the nature or condition of a variety of systems,

ranging, for example, from determining faults and malfunctions in electronic or electromechanical systems" (see Sheppard, column 6, lines 60-64). Thus, Sheppard's tester would clearly apply to defect detection in a disk drive storage device such as Meyer's. Further, Sheppard states (column 8, lines 10-21) that for analyzing test data "[e]xamples of commonly used diagnostic approaches include ... neural networks," among others. Therefore, Sheppard would have suggested to the skilled artisan that neural networks are commonly used for analyzing test data. Accordingly, appellant's argument notwithstanding, it would have been obvious to one of ordinary skill in the art to employ such a commonly used neural network in Meyer's system to analyze the test data "to determine whether a predefined defect exists," as recited in claim 4.

Appellant also contends (Brief, pages 16-17) that only appellant teaches diagnosing the type of defect existing in a disk drive. However, claim 4 merely requires determining the existence of a defect, which Meyer clearly does. Therefore, we will affirm the rejection of claim 4 and the claims grouped therewith, claims 7, 8, 17, and 20.

Regarding the second group of claims, appellant argues (Brief, page 17) that the references do not teach or suggest a

square wave data pattern. We agree. There is no indication in either reference that the test signal used is a square wave data pattern. Consequently, we must reverse the rejection of claims 5, 6, 13, 14, 23, and 24.

Claim 18 requires that the parameter signal be indicative of the flyheight of the transducer head with respect to the disk surface. Meyer states (column 3, lines 42-46) that "[t]he amplitude of the test output signal is proportional to the magnitude of the air bearing disturbance." Since the air bearing disturbance is a disruption in the flying height of the read/ write transducer, the signal of Meyer is indicative of the flyheight. Therefore, we will affirm the rejection of claims 18 and 19.

As to claim 21, appellant contends (Brief, page 17) that neither reference teaches or suggests normalizing the samples, as recited in claim 21. We agree. Although Sheppard shows normalizing values in the flowcharts of Figures 10 and 11, nowhere does Sheppard suggest a reason for normalizing the values in the method of Meyer. Accordingly, we will reverse the rejection of claim 21.

Regarding claims 22 and 12, appellant asserts (Brief, page 18) that neither reference discloses or suggests using a

window of samples which includes a selected number both before and after the detected abnormal value. Meyer teaches (column 3, lines 52-54) using a set of five adjacent tracks. Although Meyer does not explicitly state that the window should include a certain number of samples both before and after a detected abnormal value, the indication to use five adjacent tracks would have suggested to the skilled artisan to check the tracks both before and after the abnormal value. Therefore, we will reverse the rejection of claims 22, 12 and the claims grouped with claim 12, claims 15 and 16.

CONCLUSION

The decision of the examiner rejecting claims 4 through 8 and 12 through 24 under 35 U.S.C. § 103 is affirmed as to claims 4, 7, 8, 12, 15 through 20, and 22 and reversed as to claims 5, 6, 13, 14, 21, 23, and 24. Accordingly, the decision of the examiner is affirmed-in-part.

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

AFFIRMED-IN-PART

JERRY SMITH Administrative Patent Judge	)
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