

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 14

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte RICHARD S. SUTTON

Appeal No. 94-4200
Application 07/979,139¹

ON BRIEF

Before HAIRSTON, JERRY SMITH, and FLEMING, Administrative Patent Judges.

FLEMING, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the final rejection of claim 1.

The invention relates to a machine for learning a pattern

¹ Application for patent filed November 20, 1992. According to appellant, the application is a continuation in part of Application 07/947,213, filed September 18, 1992.

sequence utilizing an incrementally adjustable gain parameter.

The independent claim 1 is reproduced as follows:

1. A computer system for machine learning of a time dependent pattern sequence $y(t)$ comprising:

input means for receiving a plurality, indexed by i , of time dependent inputs $x_i(t)$ and a meta-step-size parameter $\mathbf{2}$;

calculation means for calculating from said time dependent inputs a predicted value, y^* , of said pattern sequence;

a computer memory associated with the said means for calculating;

said calculating means further including a learning rate, k_i , exponentially related to an incremental gain $\mathbf{S}_i(t)$ and a derivation means for deriving the incremental gain $\mathbf{S}_i(t)$ from previous values of $B_1(t)$ and having means for

Initializing h_i , a per input memory parameter, to 0, and weight coefficients, w_i , and \mathbf{S}_i , the incremental gain parameter, to chosen values, $i=1, \dots, n$,

Repeating for each new inputs (x_1, \dots, x_n, y^*) the steps of:
calculating,

$$y = \mathbf{E} \sum_{i=1}^n w_i x_i$$

calculating,

$$* = y^* - y$$

Repeating for $i = 1, \dots, n$ where k_i is an input learning rate and $\mathbf{2}$ is a positive constant denoted the meta-learning rate:

calculating,

$$S_i = S_i + 2 * x_i h_i$$

$$k_i(t) = x_i(t) e^{S_i(t)} / (R + \sum_{j=1}^n x_j^2(t) S_j(t))$$

$$w_i(t+1) = w_i(t) + k_i(t) * (t) x_i(t)$$
$$h_i(t+1) = [h_i(t) + k_i(t) * (t)] [1 - k_i(t) x_i(t)]^t.$$

The Examiner does not rely on any references.

Claim 1 stands rejected under 35 U.S.C. 101 as being non-statutory subject matter. Claim 1 is also rejected under 35 U.S.C. § 112, second paragraph.

Rather than reiterate the arguments of Appellant and the Examiner, reference is made to the brief and answers² for the respective details thereof.

OPINION

After a careful consideration of the record before us, we will not sustain the 35 U.S.C. § 101 rejection of claim 1.

With respect to the mathematical algorithm exception, the Federal Circuit in ***State Street Bank v. Signature Financial***,

² The Examiner responded to the brief with an Examiner's answer, mailed June 14, 1994. The Examiner mailed a supplemental Examiner's answer on May 20, 1996. The Examiner mailed a second supplemental Examiner's answer on July 30, 1996.

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149 F.3d 1368, 47 USPQ2d 1596 (Fed. Cir. 1998), first identified the three categories that are not patentable--laws of nature, natural phenomena and abstract ideas. The opinion went on to note "the mathematical algorithm is unpatentable only to the extent that it represents an abstract idea" and is thus not "useful." *Id.* at 1373 n.4, 47 USPQ2d at 1600-01 n.4. Later in its opinion, the

court returned to this issue: "[T]he mere fact that a claimed invention involves inputting numbers, calculating numbers, outputting numbers, and storing numbers, in and of itself, would not render it nonstatutory subject matter, unless, of course, its operation does not produce a 'useful, concrete and tangible result.'" *Id.* at 1374, 47 USPQ2d at 1602. In this case, the court stated that "the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm . . . because it produces 'a useful, concrete and

tangible result' " *Id.* at 1373, 47 USPQ2d at 1601.

Significantly, the court concluded its analysis of the mathematical algorithm issue as follows: "The question of whether a claim encompasses statutory subject matter should not focus on which of the four categories of subject matter a claim is directed to . . .but rather on the essential characteristics of the subject matter, in particular, its practical utility." *Id.* at 1375, 47 USPQ2d at 1602.

With respect to the Freeman-Walter-Abele test, the Federal Circuit held the district court erred in applying it. According

to the court, after *Diehr* [602 F.2d 982, 203 USPQ 44 (CCPA 1979)] and *Chakrabarty* [571 F.2d 40, 197 USPQ 72 (CCPA 1978)] were decided by the Supreme Court, the test had "little, if any, applicability to determining the presence of statutory subject matter." *Id.* at 1374, 47 USPQ2d at 1601.

Appellant's claim 1 recites a "machine" claim having

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"means" clauses. Machine claims having means clauses may only be reasonably viewed as process claims if there is no supporting structure in the written description that corresponds to the claimed "means" element. *See State Street Bank*, 149 F.3d at 1371, 47 USPQ2d at 1599 citing *In re Alappat*, 33 F.3d 1526, 1540-41, 31 USPQ2d 1545, 1554 (Fed. Cir. 1994)(in banc). This is not the case now before us.

When claim 1 is properly construed in accordance with 35 U.S.C. § 112, sixth paragraph, it is directed to a specific machine. As demonstrated below, the relevant part of claim 1 is set forth with the brackets stating the structure the written description discloses as corresponding to the respective "means" recited in the claim.

1. A computer system for machine learning of a time dependent pattern sequence $y(t)$ comprising:

input means [input ports 115 shown in Figure 1 and described on page 5 of the specification] for receiving a plurality, indexed by i , of time dependent inputs $x_i(t)$ and a meta-step-size parameter **2**;

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calculation means [processor 105 shown in Figure 1 and described on page 5 of the specification] for calculating from said time dependent inputs a predicted value, y^* , of said pattern sequence;

a computer memory [memory 110 shown in Figure 1 and described on page 5 of the specification] associated with said means for calculating

Thus, when properly construed, claim 1 claims a machine for receiving a plurality of time dependent inputs and for learning of a time dependent pattern sequence based upon these inputs having the specific structures disclosed in the written description and corresponding to the means-plus-function elements recited in the claim.

We agree with the Examiner that the claim recites a mathematical algorithm. The mere fact that a claimed invention involves inputting numbers, calculating numbers, outputting numbers, and storing numbers, in and of itself, would not render it nonstatutory subject matter, unless, of course, its operation does not produce a 'useful, concrete and tangible result.' In this case, we find that the claim language recites a specific machine for learning of a time dependent pattern sequence

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comprising an input port for receiving a plurality of time dependent inputs, a processor for calculating from the time dependent input a predicted value and a computer memory associated with the processor. Furthermore, we find that Appellant's claim 1 recites subject matter that constitutes a practical application of a mathematical algorithm because it produces a useful, concrete and tangible result by using a specific machine to learn a time dependent pattern sequence from receiving a plurality of time dependent inputs.

Therefore, we find statutory subject matter.

Claim 1 stands rejected under 35 U.S.C. § 112, second paragraph. The Examiner argues that h_i is not clearly defined and the language "a per input memory parameter" is unclear.

Analysis of 35 U.S.C. § 112, second paragraph, should begin with the determination of whether claims set out and circumscribe the particular area with a reasonable degree of precision and particularity; it is here where definiteness of the language must be analyzed, not in a vacuum, but always in light of teachings of the disclosure as it would be interpreted by one possessing ordinary skill in the art. **In**

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re Johnson, 558 F.2d 1008, 1015, 194 USPQ 187, 193 (CCPA
1977), *citing In re Moore*, 439 F.2d 1232,

1235, 169 USPQ 236, 238 (1971). Furthermore, our reviewing
court points out that a claim which is of such breadth that it
reads on subject matter disclosed in the prior art is rejected
under 35 U.S.C. § 102 rather than under 35 U.S.C. § 112,
second paragraph. *See In re Hyatt*, 708 F.2d 712, 715, 218
USPQ 195, 197 (Fed. Cir. 1983) and *In re Borkowski*, 422 F.2d
904, 909, 164 USPQ 642, 645-46 (CCPA 1970).

In light of the specification, h_i is a parameter which is
influenced by previous sample inputs. Thus, the language in
the claim, " h_i , a per input memory parameter," is simply set
forth this parameter that is influenced by previous sample
inputs. Therefore, we find the claim language sets out and
circumscribes the particular area with a reasonable degree of
precision and particularity when read in light of teachings of
the disclosure as it would be interpreted by one possessing
ordinary skill in the art.

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We have not sustained the rejection of claim 1 under 35 U.S.C. § 101 or 112. Accordingly, the Examiner's decision is reversed.

REVERSED

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KENNETH W. HAIRSTON)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
JERRY SMITH)	
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)	INTERFERENCES
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MICHAEL R. FLEMING)	
Administrative Patent Judge)	

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