UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DAVID N. WEISE

Appeal 2008-0516
Application 09/903,055
Technology Center 2600

Decided: July 9, 2008

Before ROBERT E. NAPPI, SCOTT R. BOALICK,
and JOHN A. JEFFERY, *Administrative Patent Judges*.

JEFFERY, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant appeals under 35 U.S.C. § 134 from the Examiner's rejection of claims 1-3, 5-8, 10, 12-19, 21, and 22. We have jurisdiction under 35 U.S.C. § 6(b). We affirm-in-part. We also enter a new ground of rejection under 35 U.S.C. § 41.50(b).

STATEMENT OF THE CASE

Appellant invented a parser, a computer readable medium and a method for parsing natural language text. Specifically, the parser, medium and method construct a parse tree and generate a score for the nodes of a tree by determining a mutual information metric based on the phrase level for the node and the word class for at least one word that neighbors a text spanned by the node. The mutual information metric may alternatively be based on at least one word or word class for the word in the text segment. This parser, computer readable medium, and method reduce the time needed to form the parse tree.[1] Claim 1 is illustrative:

> 1. A method of generating a score for a node identified during a parse of a text segment, the method comprising:
>
> identifying a phrase level for the node;
>
> identifying a word class for at least one word that neighbors a text spanned by the node; and
>
> generating a score by determining a mutual information metric based on the phrase level and the word class.

The Examiner relies on the following prior art references to show unpatentability:

Kucera	US 4,868,750	Sep. 19, 1989
Su	US 5,418,717	May 23, 1995

[1] *See generally* Spec. 1:4-13, 3:19-30, 13:5-20:21.

The Examiner's rejections are as follows:

(1) Claims 1-3 and 6-8 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Su.

(2) Claims 5, 10, 12-19, 21, and 22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Su and Kucera.

Rather than repeat the arguments of Appellant or the Examiner, we refer to the Briefs[2] and the Answer[3] for their respective details. In this decision, we have considered only those arguments actually made by Appellant. Arguments, which Appellant could have made but did not make in the Briefs, have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(vii).

Appellant groups the claims as follows: (1) claims 1-3, 6, and 8; (2) claim 7; (3) claim 5; (4) claims 10, 12, and 14-18; (5) claim 13; (6) claim 19; and (7) claims 21 and 22 (App. Br. 4-11). Below, each grouping will be addressed.

OPINION

Anticipation

We first address the rejection of claims 1-3 and 6-8 under 35 U.S.C. § 102(b) as being anticipated by Su. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or

[2] We refer to the Appeal Brief filed November 14, 2005 (as supplemented by the Supplemental Brief filed April 10, 2008) and the Reply Brief filed April 10, 2006, throughout this opinion.
[3] We refer to the Examiner's Answer mailed February 9, 2006, throughout this opinion.

inherently described, in a single prior art reference." *Verdegaal Bros., Inc. v. Union Oil Co. of Calif.*, 814 F.2d 628, 631 (Fed. Cir. 1987).

Claims 1-3, 6 and 8

The Examiner finds that Su discloses all the limitations of representative independent claim 1[4] (Ans. 3-4). Appellant argues that Su fails to disclose the limitation, "generating a score by determining a mutual information metric based on the phrase level and the word class" as recited in claim 1 (App. Br. 4). Specifically, Appellant contends that the conditional probability disclosed by Su and used to generate the score for a node is not the same as a mutual information metric because a conditional probability does not provide a correlation between two or more events (App. Br. 4-6; Reply Br. 2-3).

The issue before us is whether Appellant has shown that the Examiner erred in finding that Su discloses the step of "generating a score by determining a mutual information metric based on the phrase level and the word class" as recited in claim 1. For the following reasons, we find that Appellant has not.

As an initial matter, the Specification states that "[m]utual information measures the correlation between two or more events" (Spec. 18:29-30). While the Specification discloses equations that *can* or *may* express mutual information (Spec. 18:29 – 20:15), the Specification does not require, nor has Appellant argued or provided any evidence, that the phrase "mutual

[4] Appellant argues claims 1-3, 6 and 8 as a group (App. Br. 4-6). Accordingly, we select claim 1 as representative. *See* 37 C.F.R. § 41.37(c)(1)(vii).

information" is defined in terms of the equations in the Specification. As such, the phrase "mutual information" will be construed as meaning a correlation between two or more events and a "mutual information metric" will be interpreted as a metric that measures the correlation or relationship between two or more events.

Su discloses the score of a node equals the joint probability or the intersection of the semantic annotation (Sem_i), the syntactic structure (Syn_j), and the lexical categories (Lex_k) given a sequence of words ($w_1 \ldots w_n$). This equation measures a correlation between three events or the semantic annotation, the syntactic structure, and the lexical categories. Su also shows the equation can be expressed in terms of the product of three expressions: the semantic score ($SCORE_{sem}(Sem_i)$), the syntactic score ($SCORE_{syn}(Syn_j)$) and the lexical score ($SCORE_{lex}(Lex_k)$) (Su, col. 11, ll. 6-32).

The lexical score or $SCORE_{lex}(Lex_k)$ in Su includes a word category or class variable, c_i, for a word (Su, col. 9, ll. 5-7 and col. 11, l. 40 – col. 12, l. 21) and includes consideration of the word class for a neighboring word, c_{i-1} and c_{i-2}. The syntactic score or $SCORE_{syn}(Syn_j)$ in Su includes a phrase level, L_i, for the node (Su, col. 13, l. 5-67). Thus, the overall score of a node, SCORE (Sem_i, Syn_j, Lex_k), is expressed, in part, in terms of the product of the syntactic score, which includes a phrase level variable, and the lexical score, which includes a word class for a neighboring word variable. As the overall score for the node is calculated by considering both the phrase level for the node and a word class of a neighboring word, Su discloses a method that includes the step of generating a score for a node by considering a metric that relates the phrase level and the word class of a

neighboring word or measures the correlation between the phrase level and the word class.

Also, Su expresses the syntactic score as a calculation of the joint probability of certain phrase levels, L_2 through L_8, given another phrase level, L_1 (Su, col. 13, ll. 35-67 and col. 14, ll. 32-50). Figure 4 of Su shows some of the phrase levels (e.g., L_1, L_2, L_3, and L_4) in this equation are expressed in terms of or include a subset of word classes (e.g., c_1, c_2, c_3, and c_4). Given that some phase levels or L_1 through L_4 include word classes, Su shows that the syntactic score includes determining a relationship between the phrase level of a node (e.g., L_2) and the word class of a neighboring word (e.g., c_3) of the text being spanned by the node. Moreover, as Su includes the step of generating a score by measuring a metric that correlates the phrase level and the word class for a neighboring word, Su also discloses generating a mutual information metric based on the phrase level and the word class as recited in claim 1.

We are also unpersuaded by Appellant's argument that a conditional probability does not measure mutual information because such a probability does not show a correlation between two events (App. Br. 4-6; Reply Br. 2-3). To generalize, the conditional probability of event X assuming Y is defined as P(X|Y) or P(XY)/P(Y).[5] This expression shows that a conditional probability includes consideration of the probability that both events X and Y will occur or includes a measurement of the correlation between events X

[5] Eric W. Weisstein, *Conditional Probability* in *MathWorld--A Wolfram Web Resource, available at* http://mathworld.wolfram.com/ConditionalProbability.html (last visited June 23, 2008).

and Y. Likewise, the equations in Su that include terms of conditional probability provide a measurement of the correlation between a phrase level and a word class. For example, Su generates the syntactic score by, in part, determining the expression, $P(L_2|L_1)$ (Su, col.13, ll. 50-55 and col. 14, ll. 40-48), which can be expressed as $P(L_2L_1)/P(L_1)$. As L_1 includes word classes in its subset (Su, Fig. 4), this calculation measures the correlation between a phrase level (e.g., L_2) and a word class for a neighboring word (e.g., c_3). The fact that Su does not explicitly use the term "mutual information metric" or such terminology is not required in order to present a proper rejection of the arranged elements required by the claim. *In re Bond*, 910 F.2d 831, 832-33 (Fed. Cir. 1990). Furthermore, even if the phrase level and the word class in Su's score turn out to be independent or no correlation exists, this does not mean that the score for the node in Su was generated without calculating the correlation between the phrase level and the word class of a neighboring word as recited.

Lastly, in light of the Examiner's comments (Ans. 10, 12 and 13), Appellant argues that Su does not suggest "a mutual information metric" as recited (Reply Br. 1, 2 and 4). There is no need to address whether Su suggests such a limitation because, as stated above, Su discloses a mutual information metric as claimed.

For the foregoing reasons, Appellant has not persuaded us of error in the Examiner's anticipation rejection of representative independent claim 1 based on Su. Accordingly, we will sustain the Examiner's rejection of claim 1 and claims 2, 3, 6 and 8 which fall with claim 1.

Claim 7

Claim 7 depends from claim 6. As such, claim 7 recites the steps of (1) identifying all possible word classes for a word to the right and for a word to the left of the text spanned by the node (as claimed in claim 6), and (2) "generating a score based in part on all of the identified word classes." The Examiner finds that Su discloses these limitations (Ans. 5). Appellant argues Su does not disclose the step of "generating a score based in part on all of the identified word classes" because each score, in Appellant's view, is generated using a single part of speech for each word and that the scores are never combined (App. Br. 8; Reply Br. 4-5).

Su discloses the lexical score component of the overall score for a node includes consideration of word classes (Su, col. 11, ll. 19-28 and col. 11, l. 40 – col. 12, l. 22). Su also explains the calculation of the syntactic score includes an examination of some word to the left and the right of the text spanning the node (Su, col. 9, ll. 32-51). However, there is no discussion in Su that explains that the overall score is generated based in part on all of the identified word *classes* for a word to the right and to the left of the text being spanned (Su, col. 11, l. 6 – col. 13, l. 5). Su thus fails to disclose that the score is based in part of all of the identified word classes as recited in claim 7.

For the above reasons, we will not sustain the Examiner's anticipation rejection of claim 7 based on Su.

Obviousness

We now consider the Examiner's rejection of claims 5, 10, 12-19, 21, and 22 over Su and Kucera. Discussing the question of obviousness of a patent that claims a combination of known elements, *KSR Int'l v. Teleflex, Inc*., 127 S. Ct. 1727 (2007), explains:

> When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill. *Sakraida* [*v. AG Pro, Inc.*, 425 U.S. 273 (1976)] and *Anderson's-Black Rock*[, *Inc. v. Pavement Salvage Co*., 396 U.S. 57 (1969)] are illustrative—a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions.

KSR, 127 S. Ct. at 1740.

If the Examiner's burden is met, the burden then shifts to the Appellant to overcome the prima facie case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. *See In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992).

Claim 5

Claim 5 includes the limitations of determining a mutual information metric based on the phrase level of the node and the word class of the word to the right and to the left of the text being spanned by the node. The

Examiner finds that the combination of Su and Kucera teaches all the limitations of claim 5 (Ans. 7-8). Appellant repeats the argument pertaining to claim 1 regarding Su's alleged failure to disclose the mutual information metric limitation. Appellant additionally contends that Kucera's discussion of the collocation probability does not overcome the deficiencies of Su (App. Br. 6-8; Reply Br. 4).

The Examiner admits Su does not disclose the limitations in claim 5 and relies on Kucera (Ans. 7). Kucera teaches identifying words and their word classes in a sentence and assigning tags based on a collocation probability of their occurrence with adjacent tags or words (Kucera, col. 1, l. 51 - col. 2, l. 3 and col. 2, l. 25 – col. 3, l. 11). Kucera, however, does not discuss generating a score for determining a mutual information metric based on a phrase level and a word class to the right and left of the text being spanned. Thus, Kucera fails to provide the necessary teaching and rationale to combine with Su to overcome the missing limitations in claim 5.

For the foregoing reasons, we will not sustain the Examiner's rejection of claim 5.

Claims 10, 12 and 14-18

Representative independent claim 10[6] recites a parser with "a metric calculator for generating a score for a node formed by a rule engine, the score being based in part on mutual information determined based on a phrase level of the node formed by the rule engine and at least one word in

[6] Appellant argues claims 10, 12, and 14-18 as a group (App. Br. 8-9). Accordingly, we select claim 10 as representative. *See* 37 C.F.R. § 41.37(c)(1)(vii).

the text segment." The Examiner states that the combination of Su and Kucera teaches all the limitations found in claim 10 (Ans. 6-7). Appellant argues that neither Su nor Kucera discuss mutual information that is determined based on a phrase level of a node (App. Br. 8-10; Reply Br. 4). We disagree.

Our previous discussions with respect to how Su discloses generating a score based on mutual information determined by a phrase level of the node apply equally here, and we therefore incorporate these discussions by reference. Su also discloses generating a lexical score, which includes consideration of a word, w_i, in the text segment (Su, col. 11, l. 40 – col. 12, l. 22). Thus, the overall score of a node is expressed in terms of the product of the syntactic score, which includes a phrase level term, L_i, and the lexical score, which includes a word in the text segment, w_i. As the overall score is calculated by considering both the phrase level for the node and a word in the text segment, Su discloses a parser that includes a metric calculator for generating a score for a node based in part on considering the correlation between the phrase level and the word or mutual information based on the phrase level and the word in the text segment as claimed.

Appellant also reiterates that the conditional probability disclosed by Su is not mutual information and contends that the collocation probability disclosed by Kucera is not mutual information (App. Br. 9). Our previous discussions with respect to claim 1 and how the conditional probabilities disclosed in Su determine mutual information apply equally here, and we therefore incorporate these discussions by reference. As such, we need not address whether Kucera overcomes the purported deficiencies of Su.

For the above reasons, Appellant has not persuaded us of error in the Examiner's obviousness rejection of representative independent claim 10 based on Su and Kucera. Accordingly, we will sustain the Examiner's rejection of claim 10 and claims 12 and 14-18 which fall with claim 10.

Claim 13

Claim 13 further recites "the mutual information is determined based on all possible word classes for a word in the text segment." The Examiner found that the combination of Su and Kucera teach all the limitations found in claim 13 (Ans. 8-9). The Appellant argues that the prior art does not disclose this limitation and that Su fails to combine the scores and does not generate a value based on all possible word classes for a word (App. Br. 9-10; Reply Br. 6).

Unlike claim 7, the mutual information in claim 13 is determined based on all possible word classes *for a word in the text segment* rather than the score is based in part on all possible word classes for a word to the left and right of the text spanned by the node. With this distinction in the scope between claim 7 and claim 13 noted, we turn to Su.

Su discloses each sentence is parsed by determining grammatical relationships between its elements and scoring nodes based in part on attempting to resolve lexical ambiguities (Su, col. 6, ll. 1-22 and col. 17, l. 47 – col. 18, l. 9; Figs. 6-10B). Figures 7 through 9 show how Su attempts to resolve lexical ambiguities at steps 603 through 605 by: (1) determining all possible lexical combinations; (2) building a lexical ambiguity table; and (3) retaining the category sequences with the highest lexical scores (Su, col.

5, ll. 35-37, col. 17, l. 47 - col. 18, l. 61). For example, the word, "present," is a word in the text segment, "the beautiful rose was a present." Figure 7 shows the word, "present," can be categorized into three different parts-of-speech: noun, verb, or adjective. These categories are *all* the possible word classes for this word and are assigned corresponding probabilities (Su, col. 17, ll. 47-66). Figure 8 further shows all possible lexical combinations for the word, "present." The combinations are evaluated in Figure 9 to determine which sequence(s) to retain based on lexical scores (Su, col. 18, ll. 44-48).

Next, Su calculates a score for a node based on the semantic and syntactic scores (Su, col. 18, l. 62 – col. 20, l. 9; Figs. 10A-B). The probabilities used to calculate the semantic and syntactic scores are based on the categories sequences stored at step 604. Because the retained category sequences were determined by evaluating all possible word classes for a word in the text segment (e.g., "present") in order to arrive at lexical scores, the semantic and syntactic scores are also determined based in part on all possible word classes for a word in the text segment. The probabilities used to calculate the semantic and syntactic scores at 606 are also used to generate a score for a node (Su, col. 11, ll. 6-32 and col. 19, l. 48 - col. 20, l. 9; Figs. 6 and 10A-B). These sections of Su show the overall score, SCORE(Sem_i, Syn_j, Lex_k, Words), is based in part on a phrase level of a node (component L_i in the syntactic score, $SCORE_{syn}(Syn_j)$) and at least one word in the text segment, as previously discussed (Su, col. 11, l. 6 – col. 14, l. 55 and col. 17, l. 47 – col. 20, l. 9). Thus, the score for the node in Su is based, in part, on mutual information determined based on a phrase level of

the node and all possible word classes for a word in the text segment as recited in claim 13.

Appellant disagrees with the position that the score in Su is based on all possible word classes because each lexical score is not combined together but remains a separate score for each part of speech (App. Br. 8). This argument is based on a discussion in the Specification regarding an equation for combining all possible word classes to generate a score for a node (Spec. 20:4-15). However, claim 13 does not require the scores for all possible word classes are combined together to generate the mutual information. Rather, the language of claim 13 is broader in scope and recites "the mutual information is determined based on all possible word classes for a word in the text segment." As discussed above, Su does evaluate each possible word class of a word in a text segment when determining the score and mutual information for a node.

For the foregoing reasons, Appellant has not persuaded us of error in the Examiner's obviousness rejection of claim 13 based on Su and Kucera. Accordingly, we will sustain the Examiner's rejection of that claim.

Claim 19

Claim 19 recites a computer readable medium with instructions for performing the step of scoring a syntax node, "the score being a mutual information score that is based in part on a phrase level of the syntax node." Notably, this claim is broader in scope than independent claims 1 and 10 because the mutual information score is not based on a word or word class. The Examiner found that the combination of Su and Kucera teach all the

limitations found in claim 19 (Ans. 6-7). Appellant reiterates that Su and Kucera do not disclose, teach or suggest a mutual information score based in part on the phrase level of the syntax node (App. Br. 10-11; Reply Br. 4).

Our previous discussions of claim 1 and how Su discloses generating a score based on mutual information determined in part based on a phrase level of the syntax node apply equally here, and we therefore incorporate these discussions by reference. Moreover, the syntactic score, which makes up part of the score of a node, includes calculating the joint probability of L_2 through L_8 (Su, col. 13, ll. 45-50). Thus, Su discloses the score in part correlates the phrase level of the syntax node to other phrase levels or discloses a mutual information score based in part on a phrase level of the syntax node as recited in claim 19.

For the foregoing reasons, Appellant has not persuaded us of error in the Examiner's obviousness rejection of independent claim 19 based on Su and Kucera. Accordingly, we will sustain the Examiner's rejection of claim 19.

Claims 21 and 22

Representative claim 21[7] recites that the mutual information score is "based on all possible word classes of a word in the text segment." The Examiner determined that the combination of Su and Kucera teach the limitations in claim 21 (Ans. 8). Appellant repeats the argument neither Su nor Kucera disclose a mutual information score based on all possible word

[7] Appellant argues claims 21 and 22 as a group (App. Br. 11). Accordingly, we select claim 21 as representative. *See* 37 C.F.R. § 41.37(c)(1)(vii).

classes (App. Br. 11; Reply Br. 6). Our previous discussions with respect to claim 13 and how Su discloses the limitation of the score being based on all possible word classes of a word in a text segment apply equally here, and we therefore incorporate that discussion by reference.

Therefore, for similar reasons, we will sustain the rejection of claims 21 and claim 22 which falls with claim 21.

New Ground of Rejection Under 37 C.F.R. § 41.50(b)

Under 37 C.F.R. § 41.50(b), we enter a new ground of rejection under 35 U.S.C. § 101 for claims 19, 21, and 22. Claims 19, 21, and 22 are rejected under 35 U.S.C. § 101 because the claimed invention is directed to non-statutory subject matter.

Independent claim 19 recites, in pertinent part, a computer readable medium having computer-executable instructions to implement the recited functions. The Specification indicates that computer readable media "may comprise computer storage media and *communication media*" (Spec. 6:22-24) (emphasis added). According to the Specification,

> [c]ommunication media typically embodies computer readable instructions, data structures, program modules or other data in a *modulated data signal, such as a carrier wave or other transport mechanism* and includes any information delivery media. The term 'modulated data signal' means a signal that has one or more of its characteristics set or changed in such a manner as to encode information in the signal" (Spec. 7:7-15) (emphasis added).

Thus, reading independent claim 19 in light of the Specification, the recited "computer-readable medium" of claim 19 encompasses a signal that conveys computer-executable instructions.

Signals are not patentable subject matter under § 101. *In re Nuijten*, 500 F.3d 1346, 1357 (Fed. Cir. 2007). Thus, when read in light of the Specification, independent claim 19 includes both statutory subject matter (computer-executable instructions stored on a tangible medium) and non-statutory subject matter (computer-executable instructions conveyed by a signal). According to USPTO guidelines, however, such claims must be amended to recite solely statutory subject matter.[8]

For the foregoing reasons, independent claim 19 and dependent claims 21 and 22 do not recite statutory subject matter under 35 U.S.C. § 101.

DECISION

We have sustained the Examiner's rejections with respect to claims 1-3, 6, 8, 10-19, 21, and 22 on appeal. We have not, however, sustained the Examiner's rejections of claims 5 and 7. Therefore, the decision of the Examiner to reject claims 1-3, 5-8, 10, 12-19, 21, and 22 is affirmed-in-part.

We have also entered a new ground of rejection under 37 C.F.R. § 41.50(b) for claims 19, 21, and 22.

This decision contains a new ground of rejection pursuant to 37 C.F.R. § 41.50(b). Section 41.50(b) provides that "[a] new ground of rejection . . . shall not be considered final for judicial review."

Section 41.50(b) also provides that the Appellant, WITHIN TWO MONTHS FROM THE DATE OF THE DECISION, must exercise one of

[8] *See* MPEP, Rev. 6, Sept. 2007 ("MPEP") § 2106(C)(2)(2)(a) ("[A] claim that can be read so broadly as to include statutory and nonstatutory subject matter must be amended to limit the claim to a practical application.").

the following two options with respect to the new ground of rejection to avoid termination of the appeal as to the rejected claims:

> (1) Submit an appropriate amendment of the claims so rejected or new evidence relating to the claims so rejected, or both, and have the matter reconsidered by the Examiner, in which event the proceeding will be remanded to the Examiner. . . .
>
> (2) Request that the proceeding be reheard under § 41.52 by the Board upon the same record. . . .

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-IN-PART
37 C.F.R. § 41.50(b)

KIS

WESTMAN CHAMPLIN (MICROSOFT CORPORATION)
SUITE 1400
900 SECOND AVENUE SOUTH
MINNEAPOLIS, MN 55402-3244