Paper No. 22

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte SEIICHI AIKAWA, FUMIKO MATSUZAWA and MAYUMI TOMIKAWA

Appeal No. 1998-2378
Application No. 08/390,862

ON BRIEF

Before HAIRSTON, KRASS, and DIXON, Administrative Patent Judges.

KRASS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the final rejection of claims 1, 5, 6, 12, 16, 20, 24, 28 and 30-32, all of the pending claims.

The invention is directed to a common structure extraction apparatus. More particularly, structures common to two three-dimensional structures formed by two

sequenced point sets are extracted by relatively moving the two point sets in parallel and by rotating in accordance with partial matching information to superpose the two point sets on each other. A common portion length for pairs of points in each common portion of the two point sets is calculated, distances between the points paired with each other in each common portion are accumulated and a common structure of the two point sets is extracted based on maximizing the common portion length and minimizing cumulative distance.

Independent claim 1 is reproduced as follows:

> 1. A common structure extraction apparatus for extracting, from two point sets of sequenced points, a set of points of a common portion between the two point sets as a common structure between two three-dimensional structures formed by the two point sets, comprising:
>
> an entire structure superposition section for relatively moving the two point sets in parallel and by rotating in accordance with partial matching information for partial matching between the two point sets to superpose the two point sets on each other;
>
> a common portion length calculation section for calculating a number of points paired with each other to form at least one common portion between the two point sets superposed on each other by said entire structure superposition section as a common portion length;
>
> a cumulative distance calculation section for accumulating distances between the points paired with each other to form the at least one common portion between the two point sets superposed on each other by said entire structure superposition section to obtain cumulative distance information for each of the at least one common portion; and

> a common portion extraction section for extracting from the at least one common portion between the two point sets an extracted common portion representing a common structure, based on maximizing the common portion length calculated by said common portion length calculation section while minimizing the cumulative distance information calculated by said cumulative distance calculation section.

The examiner relies on the following references:

Huang et al. (Huang)	5,058,200	Oct. 15, 1991
Eisenberg et al. (Eisenberg)	5,436,850	Jul. 25, 1995 (effective filing date Jul. 11, 1991)
Robb et al. (Robb)	5,568,384	Oct. 22, 1996 (filed Oct. 13, 1992)

Claims 1, 5, 6, 12, 16, 20, 24, 28 and 30-32 stand rejected under 35 U.S.C. § 103. As evidence of obviousness, the examiner offers Robb and Eisenberg with regard to claims 1 and 31, adding Huang to this combination with regard to claims 5, 6, 12, 16, 20, 24, 28, 30 and 32.

Reference is made to the briefs and answer for the respective positions of appellants and the examiner.

OPINION

We reverse as it is our view that the examiner has not established a prima facie case of obviousness with regard to the instant claimed subject matter.

The examiner cites various portions of Robb purporting to show extracting common portions from two three-dimensional sets, superposing the two sets, calculating a number of points paired to form a common portion between the two sets, and accumulating distances between paired points. The examiner hedges on whether Robb provides for extracting common portions with the greatest length but contends that Robb suggests considering the greatest length "(which is considered as the greatest number of points - claim 1, line 13) in the abstract, lines 15-16, by using a large number of starting points, and where this is most desirable as noted in column 5, lines 12-13" [answer-page 5].

The examiner then notes that Eisenberg also provides for extracting a common portion from two 3-D sets, superposing for partial matching, calculating a number of points paired for a common portion where length is specifically noted.

The examiner concludes that it would have been obvious to extract common portions with the greatest length "since it is well known to extract common portions such as residues...as taught by Eisenberg...because both Robb and Eisenberg both provide for matching common portions...and because Eisenberg provides for the further advantage of analyzing three-dimensional proteins" [answer-page 5].

The examiner blends the teachings of Robb and Eisenberg together in some manner but we are unclear as to the exact nature of the combination or of the reason that would have led the artisan to make the combination, especially since Robb is directed to accurate registration of biomedical images and Eisenberg is directed to identifying proteins.

More importantly, we do not find every feature of independent claim 1 disclosed or suggested by the applied references. The claim requires a calculation of a number of points "paired with each other" and then distances "between the points paired with each other" are accumulated.

The examiner contends that Robb discloses the calculation of a number of points paired to form a common portion between the two sets and identifies column 4, lines 6-9, and Figure 8, blocks 115, 119 and 131 as showing this feature. We have reviewed the cited portions of the reference but fail to see the claimed limitation. The column 4 citation recites a limited number of points uniformly sampled from the match contour data set at 115 and that only these points are used during image registration. The cited boxes in Figure 8 merely describe sampling registration points, selecting a new starting point and questioning whether there are more starting points.

We fail to see how any of these cited portions of the reference provides for calculating a number of points paired to form a common portion and then accumulating distances between these paired points, as claimed.

We agree with appellants [principal brief-page 6] that Robb appears to be measuring distances between sampled points to a surface of a graphical figure since the data compared is only graphical. Therefore, it is unclear how the examiner is interpreting the Robb disclosure to provide for "distances between the points paired with each other to form the at least one common portion between the two point sets." As appellants point out, at page 8 of the principal brief, the instant claimed "invention calculates the distances between discrete points in the data sets, i.e., a point-to-point calculation, not from one point to a surface, as taught by Robb."

Not claimed, but noted as a point of understanding, the data points in the instant invention represent the arrangement of elements in a chemical substance, not just a three-dimensional structure.

Furthermore, as appellants state, convincingly, instant claim 1 recites that the two point sets are "sequenced points." This is different from the uniformly sampled points "used to register the match surface in the system taught by Robb...because

when the match surface points are sampled in Robb..., the points are no longer in sequence" [reply brief-page 5].

Robb does not provide for forming "at least one common portion between the two point sets superposed on each other" and "maximizing the common portion length calculated by said common portion length calculated by said common portion length calculation section while minimizing the cumulative distance information." The best that can be said for the Robb disclosure is that it samples points on one surface and minimizes the total distance between those points and another surface.

We also do not find the disclosure of Eisenberg to be of any help in providing for the deficiencies of Robb. Eisenberg matches protein sequences but does not provide for the specifically claimed paired points calculation and accumulation of distances between the paired points, nor does Eisenberg extract a common portion "based on maximizing the common portion length calculated by said common portion length calculation section while minimizing the cumulative distance information calculated by said cumulative distance calculation section," as claimed.

Huang also does not provide for the deficiencies noted above with regard to independent claim 1.

The examiner's rejection of claims 1, 5, 6, 12, 16, 20, 24, 28 and 30-32 under § 35 U.S.C. 103 is reversed.

Accordingly, the examiner's decision is reversed.

REVERSED

KENNETH W. HAIRSTON Administrative Patent Judge	)
ERROL A. KRASS Administrative Patent Judge	) BOARD OF PATENT) APPEALS) AND) INTERFERENCES
JOSEPH L. DIXON Administrative Patent Judge	)

eak/vsh

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