

computing a covariance matrix for the reconstruction points contained within the voxel and its previously identified neighboring voxels based on the centroid; identifying an eigenvector corresponding to the smallest eigenvalue found in the covariance matrix and designating the identified eigenvector as the vector of a normal of the plane that best fits the reconstruction points contained within the voxel and its previously identified neighboring voxels, wherein the normal vector is initially designated without specifying which of two possible directions the normal is directed; and computing the distance from the plane to a prescribed one of the vertices of the voxel along said normal vector of the plane to establish the magnitude of the normal vector; and, determining which of the two possible directions the normal vector is directed, if feasible, and assigning that direction to the vector.

6. The process of claim 5, wherein the process action of assigning the direction to the normal vector, comprises the action of:

assigning a positive sign to the normal vector if it is directed toward the prescribed vertex of the voxel; and assigning a negative sign to the normal vector if it is directed away from the prescribed vertex of the voxel.

7. The process of claim 5, wherein the process action of determining which of the two possible directions the normal vector is directed and assigning that direction to the normal vector, comprises the actions of:

identifying a direction vector from each point in the voxel, and each point in each of the previously identified neighboring voxels associated with the voxel, to the optical center associated with the camera used to capture the original image from which the point was derived, said direction vector hereinafter being referred to as a visibility vector;

for the voxel and each of its associated neighboring voxels, respectively determining the angle between the normal vector of each voxel and the visibility vector associated with each point contained in that voxel;

ascertaining whether a majority of the angles are one of (i) less than 90 degrees by a prescribed threshold amount, (ii) more than 90 degrees by the prescribed threshold amount, or (iii) within the prescribed threshold amount of 90 degrees;

assigning a positive sign to the normal vector to indicate that it is directed toward the prescribed vertex of the voxel whenever a majority of the angles are less than 90 degrees by the prescribed threshold amount;

assigning a negative sign to the normal vector to indicate that it is directed away from the prescribed vertex of the voxel whenever a majority of the angles are more than 90 degrees by the prescribed threshold amount;

assigning an undetermined direction status to the normal vector whenever a majority of the angles are within the prescribed threshold amount of 90 degrees.

8. The process of claim 5, wherein the process action of determining which of the two possible directions the normal vector is directed and assigning that direction to the normal vector, further comprises the actions of:

(a) selecting a previously unselected voxel having a normal vector with an undetermined direction status and designating it the currently selected voxel;

(b) identifying which directly adjacent neighboring voxel produces the largest absolute value for the cross prod-

uct of the normal vector associated with the currently selected voxel and the normal vector associated with the neighboring voxel;

(c) ascertaining whether the neighboring voxel identified as having said largest cross product value has been assigned a direction,

(d) applying the direction assigned to the neighboring voxel identified as having said largest cross product value to the normal vector associated with the currently selected voxel and proceeding to process action (I), whenever said neighboring voxel's normal vector has been assigned a direction, and otherwise,

(e) designating the neighboring voxel identified as having said largest cross product value to the normal vector associated with the currently selected voxel, as the currently selected voxel in lieu of the previously selected voxel, whenever said neighboring voxel's normal vector has not been assigned a direction;

(f) identifying which directly adjacent neighboring voxel produces the largest absolute value for the cross product of the normal vector associated with the currently selected voxel and the normal vector associated with the neighboring voxel;

(g) ascertaining whether the neighboring voxel identified as having said largest cross product value has been assigned a direction,

(h) applying the direction assigned to the neighboring voxel identified as having said largest cross product value to the normal vector associated with the currently selected voxel and any previously selected voxels still having an undetermined direction status, and then proceeding to process action (I), whenever said neighboring voxel's normal vector has been assigned a direction; and otherwise,

(i) designating the neighboring voxel identified as having said largest cross product value to the normal vector associated with the currently selected voxel, as the currently selected voxel in lieu of the previously selected voxel, whenever said neighboring voxel's normal vector has not been assigned a direction, as long as a prescribed propagation limit pertaining to the number voxels that have been designated as a currently selected voxel in a current iteration has not been exceeded;

(j) continuing the current iteration by repeating process actions (f) through (h) or (i), whenever the currently selected voxel's normal vector has not been assigned a direction and said propagation limit has not been reached;

(k) retaining the undetermined direction status of the currently selected voxel and any previously selected voxels still having an undetermined direction status, whenever said propagation limit has been reached; and

(l) performing a new iteration by repeating the appropriate ones of process actions (a) through (I) until there are no remaining previously unselected voxels having a normal vector with an undetermined direction status.

9. The process of claim 5, further comprising performing a local consistency check to ensure that the assigned normal vector direction for each voxel having an assigned direction is accurate, said local consistency check comprising, for each voxel containing at least one reconstruction point, the actions of:

identifying a prescribed number of voxels neighboring the voxel under consideration;

ascertaining the direction assigned to the normal vector associated with the voxel under consideration and its