applications, e.g., for extreme high-rise buildings over 500m in height, different assumptions would be made, and the arbitrary volume will be larger.

[00206] A user selects an initial image which the selection method accepts. The initial camera model's location, rotation, orientation, sensor shape and lens distortion are accepted into the method. The user selects a point (2D pixel coordinate) in the initial image which is accepted into the method as the geometric feature of interest whose geometry in 3D is to be determined.

[00207] The embodiment C method disclosed herein assumes that an average ground height in the initial image is known, and similarly the information about the maximum feature height at the location of interest is known. For example, the maximum feature height could be obtained by knowing that a city has height restrictions on its buildings.

[00208] As in the case of method embodiment A, it is assumed that the sensor of the initial camera model has quadrilateral shape. Such shape and the lens distortion are used to cast rays from the boundary corners of the sensor to the surface (i.e., the corners of the initial image). The volume formed by the intersection of these rays with the surface forms a volume referred to as a frustum.

[00209] Again, as in the case of method embodiment A, using the initial camera model's location, rotation and orientation a transformation matrix is determined that can transform the above calculated frustum volume geometry to actual real location in space, such that the method now has a frustum volume from the initial image's camera location to the initial images location on the surface, as shown in FIG. 3 and in FIG. 5.

[00210] The method includes creating an estimated volume by selecting the points on the surface where the initial camera frustum intersects with the surface. The method includes elevating these points to the inputted average ground height, and creating a cuboid at those elevated points that extended upwards to the height of "maximum feature height." FIG. 7 shows a simple drawing to illustrate these method steps.

[00211] The method includes for each of the potential optimal images in the image set, accepting potential optimal image's camera model location, rotation, orientation, sensor shape and lens distortion model. As per the frustum calculation for the initial image, for each potential optimal image, using the potential optimal image's camera model's location, rotation and orientation a transformation matrix is determined that can transform the frustum volume geometry to actual real location in space, such that the method now has a frustum volume from each potential optimal image's camera location to each images location on the surface. The method includes creating an estimated volume by selecting the points on the surface where

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CLAIMS.

We claim:

1. A method, implemented by a digital processing system, for selecting complementary images from a plurality of images captured from distinct views and/or locations, each respective image captured from a respective camera having respective camera properties, the method comprising:

accepting the plurality of images, including, for each accepted image, parameters related to the accepted image and to properties of the camera that captured the accepted image;

accepting input from a user to select one of the accepted images to be an initial image;

accepting input from the user indicating one or more geometric features of interest; and

automatically selecting from the accepted plurality of images and using an optimality criterion an optimal image that is complementary to the initial image for the purpose of determining one or more 3D properties of the indicated one or more geometric features.

2. The method of claim 1, wherein the one or more geometric features of interest in the initial image include one of the set of features consisting of a point, a line, and a surface.

3. The method as recited in claim 1, wherein the automatically selecting includes automatically selecting from the accepted plurality of images one or more additional images forming with the optimal image an optima set, each image of the optimal set being complementary to the initial image for determining 3D properties of the indicated one or more geometric features.

4. The method as recited in claim 3, further comprising ranking some or all of the images in the optimal set according to the optimality criterion, the ranking according to suitability for use as a complementary image to the initial image, with the highest ranked image being the optimal image.

5. The method as recited in claim 2, further comprising:

displaying to the user the optimal image, with the one or more geometric features of interest displayed.

6. The method as recited in claim 5, wherein the automatically selecting uses as the optimality criterion an overall measure of complementarity of the initial image and the geometric feature or features to a potential optimal image, and wherein the overall measure of complementarity includes one or more specific measures and corresponding selection criteria, and wherein the one or more specific measures include one or more of a measure of the intersection between frustums, a measure of coverage, a measure of the intersection between the frustum and an estimated extrusion or arbitrary volume, a measure of angular deviation, and a measure of resolution.

7. The method of claim 6, further comprising:

accepting from the user a correction of at least one of the one or more displayed geometric features of interest, such that the location of the correction can be used for determining one or more geometric properties of the geometric feature or features of interest; and

determining one or more 3D properties of the indicated geometric feature or features.

8. The method as recited in claim 7, wherein the automatically selecting includes automatically selecting from the accepted plurality of images one or more additional images forming with the optimal image an optima set, each image of the optimal set being complementary to the initial image for determining 3D properties of the indicated one or more geometric features, the method further comprising:

accepting from the user a selection of one of the other images from the optimal set to be a new optimal image;

displaying to the user the new optimal image, with the one or more geometric features of interest displayed on the new optimal image;

accepting from the user a correction of at least one of the one or more displayed geometric features of interest on the new optimal image, such that the location on the new optimal image of the correction can be used for determining the one or more geometric properties of the geometric feature or features of interest; and

determining the one or more 3D properties of the indicated geometric feature or features.

9. The method as recited in claim 8, further comprising ranking some or all of the images in the optimal set according to the optimality criterion, the ranking according to suitability for use as a complementary image to the initial image, with the highest ranked image being the optimal image.

10. The method of claim 9, wherein each of the accepting input from a user to select; the accepting input from the user an indication, and the accepting from the user a correction is via a graphic user interface that displays images.

11. The method of claim 10, wherein the one or more 3D properties include the slope of a roof of a building.

12. The method of claim 7, further comprising:

accepting an indication from the user of one or more new geometric features of interest, which may be the same geometric features earlier selected in the current initial image, wherein the optimal image after the accepting the indication of one or more new geometric features of interest becomes a new initial image;

automatically selecting from the accepted plurality of images and using the optimality criterion a new optimal image that is complementary to the new initial image for the purpose of deter; and

displaying to the user the new optimal image, with the one or more new geometric features of interest displayed.

13. The method of claim 12, further comprising:

accepting from the user a new correction of at least one of the displayed one or more new geometric features of interest, such that the location of the new correction can be used for determining one or more geometric properties of the new geometric feature or features of interest; and

determining one or more 3D properties of the indicated new geometric feature or features.

14. A digital processing system comprising:

an input port configured to accept a plurality of images captured from distinct views and/or locations, each respective image having been captured from a respective camera, the accepting including accepting, for each respective accepted image, respective parameters related to the respective accepted image and to properties (collectively the "camera model") of the respective camera that captured the respective accepted image;

a user terminal having a display screen and a user interface that enable displaying on the display screen and that that enables a user to provide input, and otherwise interact with an image displayed on the display screen;

a digital image processing system coupled to the user terminal, the digital image processing system including one or more digital processors, and a storage subsystem that includes instructions that when executed by the digital processing system, cause the digital processing system to carry out a method of selecting one or more complementary images from a plurality of images accepted via the input port, the method according to any one of method claims 1 to 13.

15. A non-transitory machine-readable medium comprising instructions that when executed on one or more digital processors of a digital processing systems cause carrying out a method according to any one of method claims 1 to 13.

16. A processing system comprising:

a storage subsystem; and

one or more processors;

wherein the storage subsystem includes a non-transitory machine-readable medium as recited in claim 15.