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Enhanced Deployment Algorithms for Heterogeneous Directional Mobile Sensors in a Bounded Monitoring Area

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Abstract **-- Image registration is the process of finding correspondence between all points in two images of a scene. The process spatially aligns the images, making it possible to detect changes in the scene over time, fuse information in the images. Analysis of multiple images of a scene often reduces to find the correspondence between points in the images. Voronoi diagram is a special kind of decomposition of a given space, e.g., a metric space, determined by distances to a specified family of objects (subsets) in the space. Voronoi diagrams that are used in geophysics and meteorology to analyse spatially distributed data (such as rainfall measurements). Voronoi diagram are also related to other geometric structures such as the medial axis which has found applications in image segmentation. While previous methods use the same block size and shape at a hierarchy, the proposed method adapts the block size and shape to the local image details and geometric difference between the images. This adaptation makes it possible to keep geometric difference between corresponding regions small and simplifies the correspondence process. The algorithm is named VorLag which is based on the calculation of the Voronoi-Laguerre diagram determined by the pixel locations over the AoI (Area of Interest) and their related pixels. Such a diagram partitions the AoI into disjoint polygons, each of them related to one generating pixel. Hence each pixel uses the information related to its Voronoi-Laguerre polygon to determine the edge.Ran sac algorithm has been used to find out inliers and eliminate outliers. After that those two images has been merged using link points.**

Index Terms **—Aoi,RANSAC,VorLag, Vornoi-Lagurre.**

I. INTRODUCTION

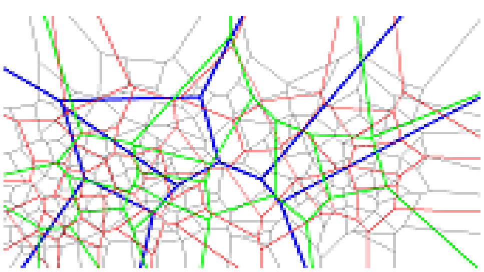
Images with large local geometric differences have been registered by a multiresolution method. Such methods uniformly reduce resolution of images until the images are small and simple enough to be registered by a rigid, similarity, or affine transformation. These multi-resolution methods use the registration result at one resolution to guide registration at a finer resolution. Registration parameters obtained at a resolution are refined by gradually increasing resolution and optimizing a measure of match between the images.

Progressive subdivision algorithm is developed. Using the correspondences at a coarse resolution, the images at one level higher resolution are subdivided into corresponding regions through Voronoi subdivision. The subdivision process is repeated from low to high resolution until images at the highest resolution are subdivided into small enough corresponding regions, each suitable for registration by affine transformation. Correspondence is then established between points within corresponding regions by a RANSAC algorithm with affine transformation.

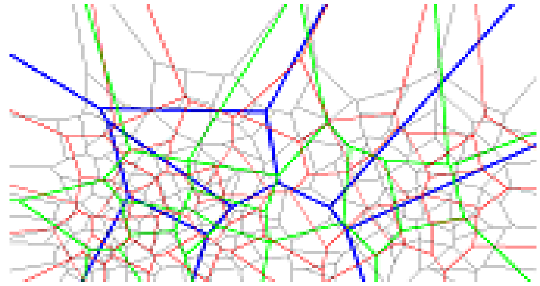
They achieve piecewise registration without initial feature based matching and without the use of fundamental matrix. By keeping the correspondence process local through image subdivision and in a hierarchical manner, an efficient and robust correspondence process is developed. This correspondence process is then used to register images of 3-D scenes captured from different views.Then resolution of images is progressively increased allowing new region to merge. By keeping track of point correspondences, they establish correspondence between newly merged regions without iterations and cooperative processes.The Voronoi Laguerre diagram, also called the power diagram, is one of the important generalizations of the Voronoi diagram in the plane, in which the generating points are generalized to circles and the distance is generalized to the Laguerre distance. The Laguerre distance from a point to a circle on the sphere is defined as the geodesic length of the tangent line segment from the point to the circle.

(a)

(b)



(c)



(d)

To subdivide large images into small corresponding regions and by registering small regions, register the images in a piecewise manner.

- Through Image subdivision, reduce the geometric difference between regions that are registered and simplify the correspondence process.
- To take content of the image pixels into consideration during VorLag subdivision.
- To reduce registration error along depth discontinuities.
- To take same image with different resolution for VorLag subdivision and accomplish the registration.
- To segment the image in which images with different density in different areas are used to fix the mid points.
- To construct the Voronoi polygon by selecting mid points based on image content.
- To construct the VorLag polygon by selecting two points based on density of pixels in image content.
- To compare constructed polygon results from the same image taken with different resolution.
- To adapt different block size and shape based on the local image details and geometric difference between the images.

II.LITERATURE SURVEY

*I*n the paper "Patch Match: A Randomized Correspondence Algorithm for Structural Image Editing" [1] the authors C. Barnes, E. Shecht man, A. Finkelstein, and D. B Goldman, were stated that paper presents interactive image editing tools using a new randomized algorithm for quickly finding approximate nearest neighbor matches between image patches. Previous research in graphics and vision has leveraged such nearest-neighbor searches to provide a variety of high-level digital image editing tools.

In the paper "Piecewise Image Registration in the Presence of Multiple Large Motions" [13] the authors P. Bhat, K. C. Zheng, N. Snavely, A. Agarwala, M. Agrawala, M. F.Cohen, and B. Curless were stated that they present a technique for computing a dense pixel correspondence between two images of a scene containing multiple large, rigid motions. They model each motion with either a homography (for planar objects) or a fundamental matrix.

The various motions in the scene are first extracted by clustering an initial sparse set of correspondences between feature points; then perform a multi-label graph cut optimization which assigns each pixel to an independent motion and computes its disparity with respect to that motion. They demonstrate the technique on several example scenes and compare the results with previous approaches.

In the paper "A new point matching algorithm for non-rigid Registration" the authors H. Chui and A. Rangarajan were described that Feature-based methods for non-rigid registration frequently encounter the correspondence problem. Regardless of whether points, lines, curves or surface parameterizations are used, feature-based non-rigid matching requires to automatically solve for correspondences between two sets of features.

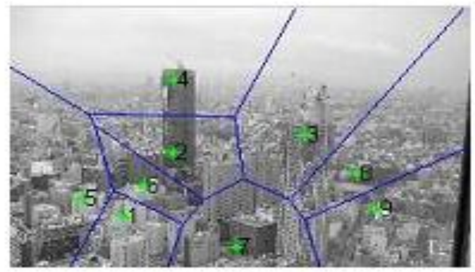
In the paper "Optimal Randomized RANSAC" the authors O. Chum and J. Matas were stated that a randomized model verification strategy for RANSAC is presented. The proposed method finds, like RANSAC, a solution that is optimal with user-specified probability. The solution is found in time that is close to the shortest possible and superior to any deterministic verification strategy.

III.SYSTEM METHODOLOGY

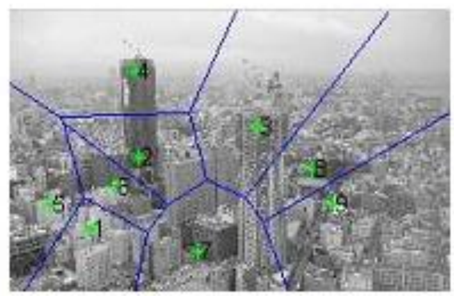
A. VORONOI SUBDIVISION

Given M control points in an image, the Voronoi subdivision or the Voronoi decomposition of the image involves subdividing the image domain into M regions in such a way that each region is centered at a control point and pixels within a region are closer to the control point associated with that region than to any other control point.

Subdivision enables images at each resolution to be broken into regions that approximately correspond to each other. The subdivision breaks down the problem of finding correspondence between two large point sets into the problem of finding correspondence between smaller and more manageable point subsets.



(a)



(b)

Fig 2. (a) and (b) same image taken with slight location difference. Note that the right area contains shades and polygon lines are varying.

When comparing images, it is noted that Image areas covering a pair of corresponding Voronoi regions, although many of the points detected in the regions accurately correspond to each other, the correspondence between some points is not accurate.

B. VORLAG SUBDIVISION

Unlike Voronoi subdivision, the VorLag method fixes the two points when a point is surrounded with area that is having same color values above the given threshold. Then the polygon is constructed. This results in exact sub division of the image based on the local spatial information. Thus two images (same image taken at two different angles or resolution) can be compared for similarity.

C. RANSAC ALGORITHM

The Random Sample Consensus (RANSAC) algorithm is a general parameter estimation approach

designed to cope with a large proportion of outliers in the input data. Unlike many of the common robust estimation techniques such as M- estimators and least-median square s that have been adopted by the computer vision community from the statistics literature, RANSAC was developed from within the computer vision community. RANSAC is a re sampling technique that generates candidate solutions by using the minimum number observations (data points) required to estimate the underlying model parameters.
Ransac Algorithm process:

- Select randomly the minimum number of points required to determine the model parameters.
- Solve for the parameters of the model.
- Determine how many points from the set of all points fit with a pre defined tolerance.
- If the fraction of the number of inliers over the total number points in the set exceeds a pre defined threshold τ , re estimate the mo del parameters using all the identified inliers and terminate. Otherwise, repeat steps 1 through 4 (maximum of N times).

D. END USER

A point location data structure can be built on top of the Voronoi diagram in order to answer nearest neighbor queries, where one wants to find the object that is closest to a given query point. Nearest neighbor queries have numerous applications. For example, one might want to find the nearest hospital or the most similar object in a database. A large application is vector quantization, commonly used in data compression.

In geometry, Vorlag diagrams can be used to find the largest empty circle amid a set of points, and in an enclosing polygon; e.g. to build a new supermarket as far as possible from all the existing ones, lying in a certain city.

Vorlag diagrams together with farthest-point Voronoi diagrams are used for efficient algorithms to compute the roundness of a set of points. The Voronoi approach is also put to good use in the evaluation of circularity / roundness while assesing the dataset from a Coordinate-measuring machine. In networking, Voronoi diagrams can be used in derivations of the capacity of a wireless network. In ecology, Voronoi diagrams are used to study the growth patterns of forests and forest canopies, and may also be helpful in developing predictive models for forest fires.

In computational chemistry, Voronoi cells defined by the positions of the nuclei in a molecule are used to compute atomic charges. This is done using the Voronoi deformation density method. In mining, Voronoi polygons are used to estimate thereserves of valuable materials, minerals or other resources. Exploratory drillholes are used as the set of points in the Voronoi polygons.

IV. PROPOSED METHODOLOGY

Image registration is the process of finding correspondence between all points in two images of a scene. The process spatially aligns the images, making it possible to detect changes in the scene over time, fuse information in the images, and estimate the structure of the scene. Analysis of multiple images of a scene often reduces to finding correspondence between points in the images.

Images with large local geometric differences have been registered by a multi resolution method. Such methods uniformly reduce resolution of images until the images are small and simple enough to be registered by a rigid, similarity, or affine transformation.

These multi resolution methods use the registration result at one resolution to guide registration at a finer resolution. Registration parameters obtained at a resolution are refined by gradually increasing resolution and optimizing a measure of match between the images. The process is repeated until images at the highest resolution are registered.

- The weaknesses of these multiresolution methods are they treat all areas in an image similarly when going from low to high resolution without regard to image content.
- Content of the image pixels are not taken during voronoi subdivision.
- It is not possible to reduce registration error along depth discontinuities.
- It may not be possible to find sufficient corresponding points in lowest resolution images.
- Outliers are not detected perfectly
- Images have been segmented same block size for all areas in same images.

A. NEED FOR PROPOSED SYSTEM

Images with large local geometric differences have been registered by a multi-resolution method. Such methods uniformly reduce resolution of images until the images are small and simple enough to be registered by a rigid, similarity, or affine transformation. These multi-resolution methods use the registration result at one resolution to guide registration at a finer resolution. Registration parameters obtained at a resolution are refined by gradually increasing resolution and optimizing a measure of match between the images. The process is repeated until images at the highest resolution are registered.

The weaknesses of these multi-resolution methods are:

1) They treat all areas in an image similarly when going from low to high resolution without regard to image content.

2) They are computationally very expensive as the optimization process that aligns the images at each resolution is global in nature.

Hence, if a new approach that addresses the weaknesses by developing a multi-resolution approach that changes resolution adaptively based on local image details, then the image registration will be improved. Then, point correspondence and image registration will be achieved locally in a piecewise manner, making all computations local and efficient.

If the image is examined closely, it seams continuous and mostly smooth. Therefore, when images of a scene are locally compared, there is continuity in the correspondences, and if the scene is subdivided into sufficiently small regions, each region can be approximated by a plane. Therefore, if sufficiently small corresponding regions can be located in the given images, each region pair can be registered by an affine transformation.

B. FRAMEWORK

Unlike the existing system where the weaknesses of these multi resolution methods are they treat all areas in an image similarly when going from low to high resolution without regard to image content; to treat the image with different density in different areas, a generalization of the Voronoi-based approach which exploits the Laguerre geometry is introduced so that the mid-points for Voronoi sub division is better. The new approach is termed as VorLag which means Voronoi-Lauguerre.

Hence each pixel uses the information related to its Voronoi-Laguerre polygon to determine the edge.

- Content of the image pixels are taken into consideration during VorLag subdivision.
- It is possible to reduce registration error along depth discontinuities.
- Same image with different resolution are taken for VorLag subdivision and registration is accomplished.
- Images with different density in different areas are used to fix the mid points and thereby segmentation is made.
- The proposed registration can be improved when the images to be registered are large; a large number of correspondences are obtained, producing a large number of triangular regions.
- Our method is a feature-based one and points used are referred as feature points.
- Using Ransac algorithm for merging two images into one which has taken from different angles with slight location difference.
- ➢ The multiple images are segmented in same time with novel efficient algorithm for more efficiency result.

V.CONCLUSION

By progressively subdividing images from low to high resolution and establishing correspondence between regions at each resolution, a robust and efficient mechanism for registering very large images is achieved.

Corresponding points obtained in images at one resolution are then used to subdivide the images at one level higher resolution and produce approximate corresponding regions.

High efficiency is achieved by subdividing the search space when determining the correspondences. The subdivision process makes it possible to establish correspondence between large point sets by working on small point subsets.

The images are segmented by using VORONOI Polygons and VORLAG diagram depend upon the image resolution value. After analysis and comparison of thesis concept, the images of

RANSAC, VORONOI, VORLAG are provided the result with them comparison.

RANSAC algorithm is an iterative method to estimate parameters of a mathematical model from a set of observed data which contains outliers. The outliers can come, e.g., from extreme values of the noise or from erroneous measurements or incorrect hypotheses about the interpretation of data. Merging two images using ransac algorithm the image has taken from different time and different angles with slight location difference.

VI. FUTURE ENHANCEMENT

In future, user can create many applications based on this thesis. The thesis can use in google maps, panoramic and some image processing concepts.

Based on this concept user can develop many scopes in future,

- To find the approximate scale difference between two images or find the approximate area of overlap between two images.
- In future by use of databases more efficient retrieval can be achieved.
- The TIFF image format also used in this algorithm.

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