www.revistageintec.net
ISSN: 2237-0722
revista GEINTEC Gestão, Inovação e Tecnologias

Speeded Up Robust Features Registration based Efficient Multi Row Panorama Generation

S. Srujana[1]; K. Sripal Reddy[2]; D. Praveen Kumar[3]

[1]PG Scholar, Department of ECE, Vardhaman College of Engineering, Shamshabad, Hyderabad, India.
[1]srujanasamireddy480@gmail.com

[2]Assistant Professor, Department of ECE, Vardhaman College of Engineering, Shamshabad, Hyderabad, India.
[2]k.sripalreddy@gmail.com

[3]Assistant Professor, Department of ECE, Vardhaman College of Engineering, Shamshabad, Hyderabad, India.
[3]praveenkumar7.d@vardhaman.org

Abstract

Most of the current panorama generation tools need an input to be provided along a single axis, which means that only a small portion of the scene is recorded. To achieve a wide area of viewers, this paper suggests a multi-row panoramic technique (multi-panorama method). A pan/tilt camera allows the automatic or manual scanning to occur over large horizontal and vertical perspectives. Frame pictures in horizontal and vertical perspectives to adjust to their coordinates and projections will need separate projection marks. And the picture should be continually updated over long time periods but it should also coordinate with other pictures in the spatial region, so as to provide an almost seamless appearance. Before these challenges, the first and before those, the worse, the game creates an optimum scanning route that encompasses the majority of the display and utilizes the reference frame as a starting point to stitch all the remainder. Multi-row stitching has a method of ensuring a minor alignment fault is located in the first column, followed by a small miss in the second row. It should be noted that mrpg suggests a multi-point stitch to reduce seams and compensate for distortion, and so that the existing structure is not divided around the panoramic canvas in an inaccurate manner. A new panoramic image synthesis approach was introduced that produced results that indicate panoramic images are higher quality than other current state- of-of-the-the-the-art approaches, and- of pan or-the-art image techniques. Because of this, we used the surf feature instead of the sift algorithm, we got to results much more quickly and, we were able to achieve the targeted precision much faster.

Key-words: SIFT, Panorama, Reference Frame, Scanning Path, Surf Registration.

1. Introduction

There are a variety of panorama picture stitching technologies available today [1]–[7]. For example, we can easily create a panoramic picture with our cell phones or digital cameras, or we can use commercial applications like Auto-stitch [8], [9], Kolor Autopano,1 Microsoft ICE,2 Realviz3, and Microsoft Photosynth,4 to synthesize multiple images and create a panorama. These encounters offer us the impression that picture stitching is a well-established technology. Despite the widespread usage of panoramic picture stitching technology, the latest image stitching algorithms do have a number of flaws. The most noticeable issue is the viewing field's inadequate visibility. As far as we know, most cell phones, like The iphone can only create one-dimensional single-row panoramas, implying that the camera's scanning path only covers a straight line between the start and terminal points (shown in Fig.1) rather than a wide viewing range, resulting in only a narrow strip panorama (shown in Fig.2(a)). Other phones such as the Moto X, which uses five images to create a panorama in left, right, top, bottom and mid position, support the images in both the horizontal and vertical directions simultaneously. Despite the fact that the procedure broadens the viewing area, misalignment is a common occurrence (as seen in the red rectangle in Fig.2(b)).

Furthermore, some image stitching software, such as Auto stitch [8], may be used to create a panorama from multiple images (the created panorama is shown in Fig.2(c)). Bundle adjustment is typically used to refine the 3D coordinates that represent the scene geometry, and then panoramas are created. Bundle modification, on the other hand, necessitates the use of camera pose parameters, which comes at a high expense in terms of computing. Meanwhile, it continues to provide unsatisfactory effects, such as the misalignment shown in the red rectangle in Figure 2.(c). The picture blur and dislocation was caused by the misalignment in this case. As a result, the emphasis of this paper is on developing an effective multi-row panorama generation process that employs numerous images to create a panorama with a large viewing area. This paper first suggests an ideal scanning path to cover the whole viewing area between the specified start and terminal points for the given start and terminal points. The centre frame is used as the reference frame, and the coordinate of the reference frame is used as the baseline to generate the panorama's coordinates, according to the direction.

It aids in the prevention of strabismus as well as the reduction of accumulated errors. The stitching order is then organized in first-column and second-row to guarantee that there is just a minor alignment flaw. In addition, a system for sewing multi-block and multi-point joints is proposed. Projective transformation model for each picture block to address the problem of multiple projections

Neighbour-aid satisfying refers to points and aligned-aiding relative points that aid in adhering a multi-frame in all directions. Neighbor restricted

points are used to avoid visible seams and exact, and relative points are employed to avoid distances between adjacent blocks, which results in a seamless and precise broad panorama.

Fig. 1 - Limited Coverage Illustration in 1D Scanning. (a) The Horizontal Scanning. (b) The Oblique Scanning. (c) The Vertical Scanning

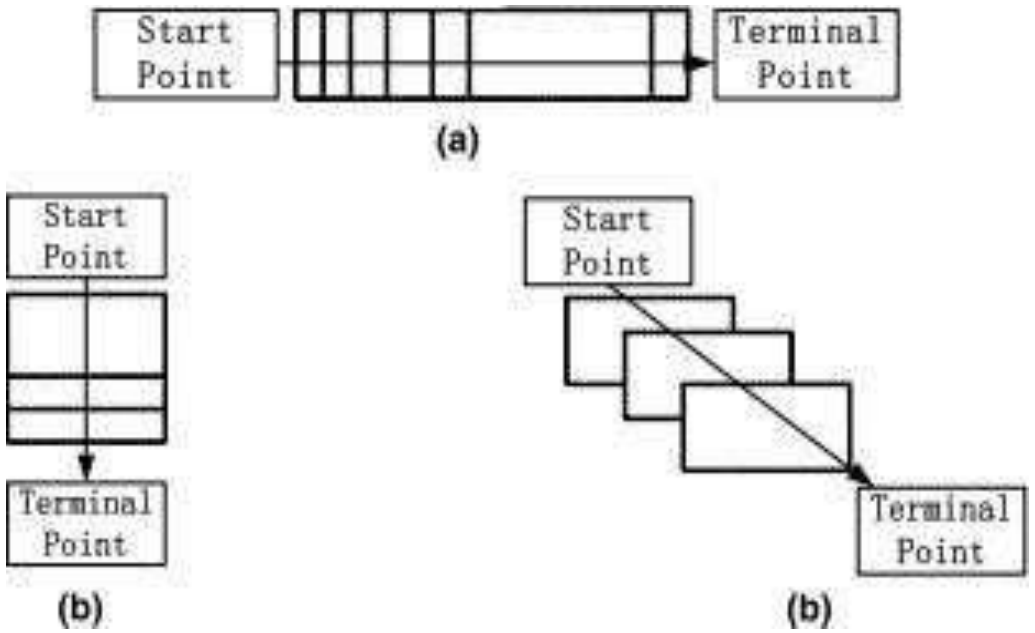
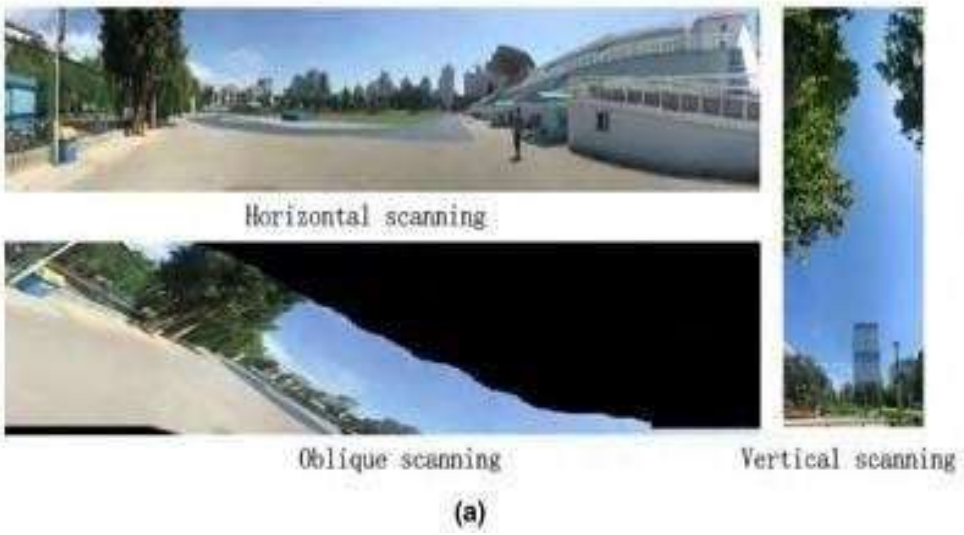
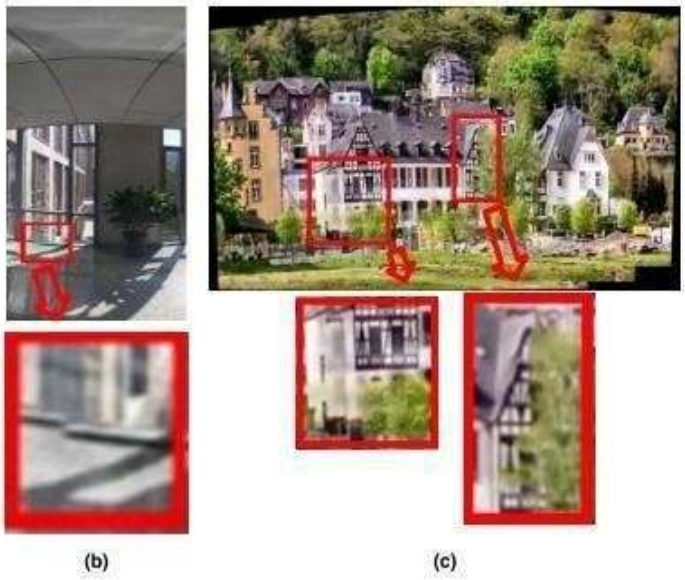


Figure 2 - Using Existing Image Stitching Software or Apps, The Panoramas Were Developed. (a) Panorama Produced with an iphone Using 1D Scanning. (b) Using the Moto X, Build a Five-Image Panorama. (c) Panorama Generated from Multiple Images Using Auto-stitch





2. System Analysis

Existing System

In today's world, there are a variety of panoramic picture stitching technologies available. For example, we can easily create a panoramic picture using our cell phones or digital cameras, or we can use commercial applications like Auto-stitch, kolor auto pano, Microsoft ICE, Realviz3, and Microsoft Photosynth to synthesize multiple images and create a panorama. These encounters offer us the impression that picture stitching is a well-established technology.

Disadvantages of Existing System

Despite the widespread usage of panoramic picture stitching technology, the latest image stitching algorithms do have a number of flaws. The most noticeable issue is the viewing field's inadequate visibility. The picture blurs and dislocates as a consequence of the misalignment.

Proposed System

The study presented in this paper focuses on an effective multi-row panorama generation process that employs several images to create a panorama with a large viewing area. This paper first suggests an ideal scanning path to cover the whole viewing area between the specified start and terminal points for the given start and terminal points. To get the panorama's horizontal and vertical,

the central frame is used as a reference, and the reference frame's horizontal and vertical baseline are produced in relation to it. It aids in the prevention of strabismus as well as the reduction of accumulated errors. The stitching order is then organized in first- column and second-row to guarantee that there is just a minor alignment flaw. In addition, a system for sewing multi-block and multi-point joints is proposed. The term "multi-block" relates to the process of calculating the projective transformation model for each picture block in order to solve the issue of multiple projections in broad panoramas.

Advantages of Proposed System

A multi-point flexible mounting attachment is useful for fitting an object to a multi-frame or fixing something to a multi-frame, but only relative to neighboring points. Neighbor restricted points are used to prevent creating seams in neighboring houses, while retaining accurate relationships between blocks of scenery; while relative points are used to stop breaking up the whole environments and maintain true room viewing panoramas, resulting in a smooth and precise landscaping.

3. Input Design & Output Design

Input Design

The input architecture serves as a bond between the consumer and the information system. It entails creating data planning specifications and protocols, as well as the measures required to convert transaction data into a format suitable for processing. This may be accomplished by checking the machine to interpret data from a recorded or printed record, or by making people key the data directly into the device. Controlling the amount of input needed, controlling mistakes, preventing delays, avoiding additional measures, and maintaining the method clear are all important considerations in input design. The input is created in such a way that it offers protection and convenience while maintaining privacy. The following factors were taken into account by Input Design:

- What types of data should be used in the input?
- What methods can be used to organize or code the information?
- The discussion that will aid the operational personnel in getting input.
- Methods for planning input validations, as well as what to do in the event of an error.

Objectives

1. The method of translating a user-oriented summary of the data into a computer-based framework is known as input design. This architecture is critical in preventing data entry mistakes and demonstrating to managers the proper steps to take in order to obtain accurate data from the computerized system.
2. It is accomplished by designing user-friendly data entry screens that can accommodate vast amounts of data. The aim of input design is to render data entry simpler and error-free. The data entry panel is set up in such a manner that you can do any of the data manipulations. It even allows you to look through your records.
3. It would verify the authenticity of the data until it is entered. Screens may be used to enter information. Appropriate notifications are sent as and when required, ensuring that the customer is never caught off guard. As a result, the aim of input design is to construct an easy-to-follow input interface.

Output Design

A quality performance is one that satisfies the end user's needs while still clearly presenting the content. The outputs of any device are used to relay the effects of processing to consumers and other systems. It is decided how the information would be displaced for immediate use, as well as the hard copy output, in the output design. It provides the consumer with the most relevant and clears facts. The interaction between the machine and the customer is improved with efficient and insightful performance design.

1. Computer output should be structured in an ordered, well-thought-out manner; the correct software must be created while ensuring that and output function is designed in such a way that users can find the device easy to use. They can identify the basic performance that is required to fulfil the requirements when analyzing and designing computer code.
2. Choose from a variety of methods for presenting content.
3. Create a text, article, or other format that contains the system's details.

One or all of the following goals should be achieved through an information system's production form.

- Disseminate details regarding previous events, economic situation, or future predictions.
- Important incidents, openings, challenges, or warnings should all be signaled.

- Activate a procedure.
- Ensure that a decision has been made.

Algorithm

Input

Take multiple images with same scenario.

Input Regularization

Find out the frames which have to be stitched based on the threshold of overlapping rate. The center frame located in the middle rows & columns is referred as reference frame.

Column Panorama Generation

Stitching will start from the reference frame. Two adjacent frames are stitched towards up & down.

Two Columns Panorama Generation

After wrapping the first column with center frame/ Reference frame starts stitch the corresponding frames present next to the first column.

Wide Panorama Generation

By wrapping all the frames by column wise to left and right wide panorama is generated.

Output

The generated panorama images can be output results.

4. Implementation

Module Description

1. Image Acquisition

In image processing, image retrieval is the process of extracting an image from a database, typically hardware- based source, so that it can be transferred through whatever processes are required afterward. In image processing, image acquisition is often the first phase in the workflow series since processing is impossible without an image. The picture that is obtained is totally unprocessed and is the product of whatever hardware was used to create it, which may be very useful in certain areas where having a stable baseline on which to operate is essential. A scenario picture is a collection of identical scenario photos obtained from a dataset. After that, the scene images were transformed to grayscale images in preparation for the next step.

2. Feature Extraction

For panorama generation, we used SURF (Speeded-Up Robust Feature) features in feature extraction. SURF uses box filters to estimate the dog. Instead of using Gaussian averaging to approximate the pixel, squares are used since the convolution with square is much faster than using the integral image. This can also be achieved in several scales at the same time. To locate the points of concern, the SURF employs a BLOB detector centred on the Hessian matrix. Wavelet responses in both horizontal and vertical directions are used for orientation assignment, with appropriate Gaussian weights applied in both directions. The wavelet responses are often used by SURF for function definition. A community around the main point is chosen and divided into sub regions, during which wavelet responses are taken and interpreted for each sub region to provide the SURF function descriptor. SURF was used to detect and localize key points in a variety of scene pictures.

3. Feature Matching

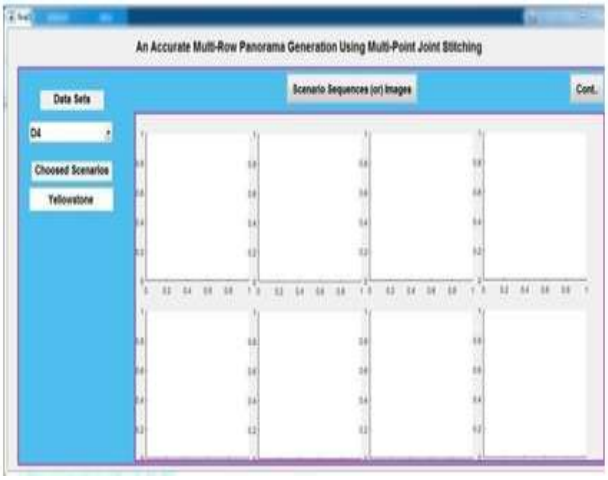
The observed main points or characteristics in multiple scene images are matched using the pair wise distance process. For comparing, the features of the first scene picture are contrasted to the features of two or more subsequent scene images. A matching threshold is used in this form of

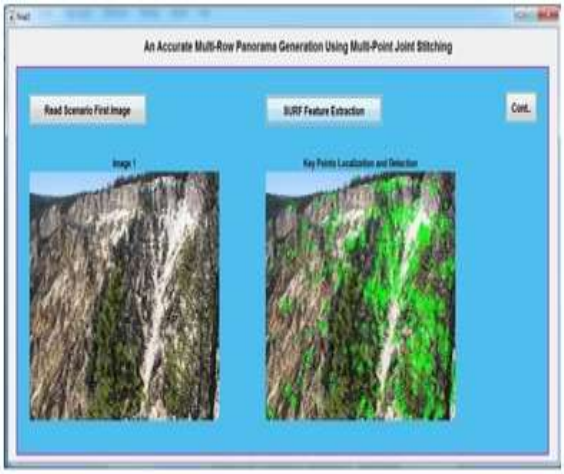
matching. When the difference between two features is less than the matching threshold, they are considered to be identical. In addition to using the matching threshold, it often prevents uncertain matches. Following that, a picture panorama is created using the matched features.

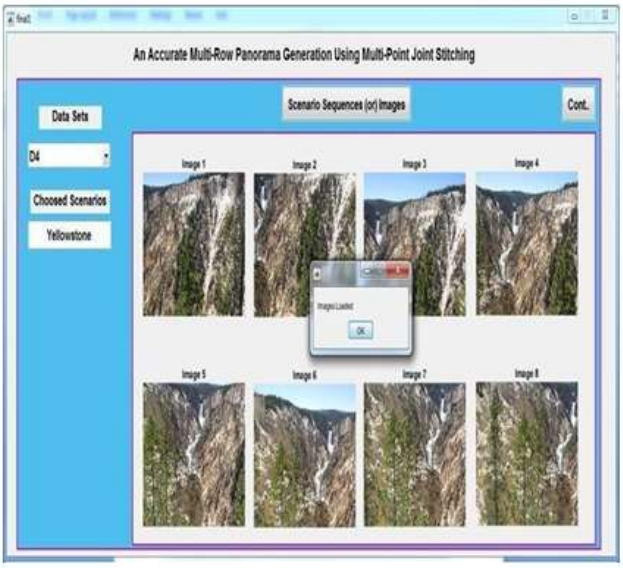
4. Panorama Generation

The photographs with the most feature matches are obtained during feature matching. Finally, the photographs are stitched together to create a panoramic picture. The features can align with every possible image since each image used for reconstruction overlaps with the others.

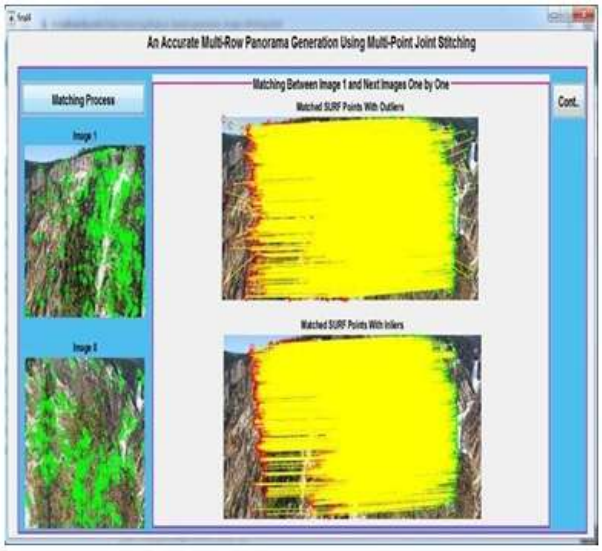
5. Results







Received: 15.03.2021 – Accepted: 15.04.2021



By using the SURF feature based algorithm multiple rows or multiple columns can be stitched at a time so that more accurate multirow panorama can be generated.

6. Conclusion

A multi-row panoramic picture stitching approach is proposed in this article. To begin stitching, it first creates an optimum scanning route to cover the vast viewing area, and then selects the centre frame. This method will occupy as much of the viewing area as possible while still avoiding strabismus and accumulative errors. The stitching method then employs first-column and second-row stitching rather than common stitching along the scanning route or synchronous use of the frame of reference in horizontal and vertical directions. The method of managing the correct alignment is the

first-column and second-row method. In addition, multi-point joint stitching is suggested to ensure correct matching in subtle regions, especially the stitching border and nonoverlapping area. The proposed system will provide a quicker and more precise panoramic picture than other state-of-the-art image stitching techniques, as well as a stronger visual effect in a wide view panorama, according to experimental findings.

References

Chen, Y.S., & Chuang, Y.Y. (2016). Natural image stitching with the global similarity prior. *In European conference on computer vision*, 186-201.

Lin, C.C., Pankanti, S.U., Natesan Ramamurthy, K., & Aravkin, A.Y. (2015). Adaptive as-natural-as-possible image stitching. In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*, 1155-1163.

Pravenaa, S., & Menaka, R. (2016). A methodical review on image stitching and video stitching techniques. *International Journal of Applied Engineering Research*, *11*(5), 3442-3448.

Li, J., Li, C., Yang, T., & Lu, Z. (2017). A novel visual-vocabulary-translator-based cross-domain image matching. *IEEE Access*, *5*, 23190-23203.

Nguyen, T.D., Shinya, A., Harada, T., & Thawonmas, R. (2017). Segmentation mask refinement using image transformations. *IEEE Access*, *5*, 26409-26418.

Jia, J., & Tang, C.K. (2005). Eliminating structure and intensity misalignment in image stitching. *In Tenth IEEE International Conference on Computer Vision (ICCV'05) Volume 1*, *2*, 1651-1658.

Jia, J., & Tang, C.K. (2008). Image stitching using structure deformation. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, *30*(4), 617-631.

Brown, M., & Lowe, D.G. (2007). Automatic panoramic image stitching using invariant features. *International journal of computer vision*, *74*(1), 59-73.

Hess, R. (2015). Opensift: An Open-Source SIFT Library. http://robwhess.github.io/opensift/

Zaragoza, J., Chin, T.J., Tran, Q.H., Brown, M.S., & Suter, D. (2014). As projective-as-possible image stitching with moving DLT. *IEEE Transaction Pattern Analysis Machine Intelligence*, *36*(7), 1285–1298.