Smart Space Utilisation using Smart Phones

Minal Zope[1], Rajas Bhalerao[2], Mohammad Mulla[3], Zeeshan Ali Shaikh[4], Ajay Solanke [5]
Department of Computer Engineering
[1, 2, 3, 4, 5]AISSMS IOIT , Pune, India

Abstract-*In this project, we implementing a novel technique to scan and verify the measurement of an user defined space from a distance.By using a sets of image processing algorithm we are going to measure the dimension of a user defined space with its calculated dimension with an real life products (e.g. furniture products, electronic products, etc) which are been data mined from e-commerce website. With the help of mobile camera the image will be captured from which the user will select the desired space with endpoints. This desired space with be then used as the input data to our application. The project when implemented will not only reduce human efforts but also provide the user a easy way to access the objects (which are been data mined from our website).The whole process has been provided by a interactive UI both on the app and the website. Also this project will overlap multiple image which the user has selected from the website on the user defined space.*

Keywords-Area Measurement using Mobile camera, Distance Measurement, Camera Calibration, Personalised Recommendation, Android E-Commerce.

I. INTRODUCTION

To develop an Android-platform based image processing application that is able to calculates the dimensions of user selected area from android mobile camera and shows the recommended objects on the user selected area of captured image virtually on the mobile screen.The use of E-Commerce websites is booming than the conventional methods. After buying the products from E-Commerce websites, customer face problems of products been too large or too small for the allocated area. This problem motivate us to create an application which gives the predefined knowledge to the user of products.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

Existing system consist of hardware of high end cameras or lasers by which distance is being measured. Our proposed system will generate measurements using low end cameras (i.e. Mobile phone cameras). Existing system lacks the user interface and connectivity to the wide range of E-Commerce websites. Our proposed system will create user friendly interface and connect the portal to E-Commerce websites for wide range of options to choose from. The cost expected for the existing system is much more than our proposed system, due to the use of high end cameras and lasers.

III. DISADVANTAGES OF EXISTING SYSTEM

Existing system can only used to calculate the distance between the camera and object. Accuracy of the image processing and distance calibration is low. Few of the existing systems are only applicable for small area. Existing system may require multiple images to calculate the distance between two objects. Existing system lack the accuracy and may take more time to calculate the average measurement. Existing system requires to capture image from a specific angle for proper measurements.

IV. PROPOSED SYSTEM

In this project, we implementing a novel technique to scan and verify the measurement of an user defined space from a distance. By using a sets of image processing algorithm we are going to measure the dimension of a user defined space with its calculated dimension with an real life products (e.g. furniture products, electronic products, etc) which are been data mined from e-commerce website. With the help of mobile camera the image will be captured from which the user will select the desired space with endpoints. This desired space with be then used as the input data to our application. The project when implemented will not only reduce human efforts but also provide the user a easy way to access the objects (which are been data mined from our website).The whole process has been provided by a interactive UI both on the app and the website. Also this project will overlap multiple image which the user has selected from the website on the user defined space.

V. METHODOLOGY

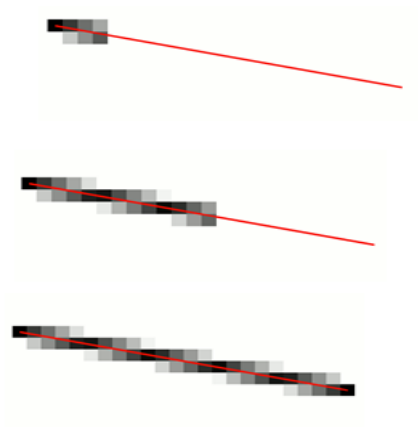
Computer stereo vision is used in robotic navigation to check depth of any object, but it needs two cameras. In the base paper, use of a single camera is applied instead of two different cameras. As the distance between camera and object is unknown, the measurement is done with the help of phone's inertial sensors. In diagram, the difference in image location is

called as Disparity. The distance between two cameras is known as Base-Line. Based on disparity Base line, distance is been calculated. Recording the same image from 2 different location using only one camera can create the same disparity also known as Single-Camera Stereo Vision. In single camera approach camera's translational rotational movements are required to calculate position, which in turn can be achieved by inertial sensors. This disparity is calculated and recorded for a 3D scene. This is difficult to calculate and this is known as correspondence problem.

5.1 Bresenham's line algorithm

1. Bresenham's line algorithm is an algorithm that determines the points of an n-dimensional raster that should be selected in order to form a close approximation to a straight line between two points.
2. It is commonly used to draw line primitives in a bitmap image (e.g. on a computer screen), as it uses only integer addition, subtraction and bit shifting, all of which are very cheap operations in standard computer architectures.
3. It is an incremental error algorithm. It is one of the earliest algorithms developed in the field of computer graphics. An extension to the original algorithm may be used for drawing circles.
4. While algorithms such as Wu's algorithm are also frequently used in modern computer graphics because they can support antialiasing, the speed and simplicity of Bresenham's line algorithm means that it is still important.
5. The algorithm is used in hardware such as plotters and in the graphics chips of modern graphics cards. It can also be found in many software graphics libraries.
6. Because the algorithm is very simple, it is often implemented in either the firmware or the graphics hardware of modern graphics cards.
7. Method:

   - Bresenham's algorithm chooses the integer y corresponding to the pixel center that is closest to the ideal (fractional) y for the same x; on successive columns y can remain the same or increase by 1. The general equation of the line through the endpoints is given by:



8. The Bresenham algorithm can be interpreted as slightly modified digital differential analyzer (using 0.5 as error threshold instead of 0, which is required for non-overlapping polygon rasterizing).
9. An extension to the algorithm that handles thick lines was created by Alan Murphy at IBM.

5.2 Xiaolin Wu's line algorithm

1. Bresenham's algorithm draws lines extremely quickly, but it does not perform anti-aliasing.
2. In addition, it cannot handle any cases where the line endpoints do not lie exactly on integer points of the pixel grid. A naive approach to anti-aliasing the line would take an extremely long time.
3. Wu's algorithm is comparatively fast, but is still slower than Bresenham's algorithm. The algorithm consists of drawing pairs of pixels straddling the line, each coloured according to its distance from the line.
4. Pixels at the line ends are handled separately. Lines less than one pixel long are handled as a special case.
5. An extension to the algorithm for circle drawing was presented by Xiaolin Wu in the book Graphics Gems II.
6. Just like the line drawing algorithm is a replacement for Bresenham's line drawing algorithm, the circle drawing algorithm is a replacement for Bresenham's circle drawing algorithm.

5.3 Computer stereo vision algorithm.

Stereo Triangulation is a technique to calculate distance between the optical axes of cameras must be parallel. Difference of objects positioning images due to changed in sight, which must be matched from 2 images at a time that are projections of the same points in 3D.

VI. THE ADVANTAGES OF PROPOSED TECHNIQUE CAN BE SUMMARIZED AS FOLLOWS

The proposed system give a visual view of the object selected in the environment in which it will be placed. With the use of E-Commerce websites, automatic suggestions for the smart space will be suggested. Due to this utilization of the space will be effectively done. Proposed system can be used for both indoor and outdoor objects, but the system will be more effective for indoor decors.

VII. CONCLUSION

First the object category is selected then the user clicks and defines a space. Dimension of user selected area is displayed on the mobile screen, and after selecting the object category by the user, the virtual model of selected object will displayed.As we have come to know that E-commerce websites have N number of products but the user cannot view the product virtually in his desired place which leads to the consumer returning or replacing the product many times. Our application helps the consumer to virtually visualize the product which the user selects in the required area and select the products wisely.

FUTURE SCOPE

Future scope of our application will be to merge the application with Augmented Reality, this will help the consumer to view the product in more efficient way in high resolution. Multiple objects can be viewed at same time in a single frame giving the perfect matching sense to the user.

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