VIDEO STABILIZATION

Contents

Abstract

Home videos are notorious for camera jitter as most are taken with hand-held camcorders. Given an un-stabilized video sequence, the objective of this project is to synthesize a new sequence as seen from a stabilized camera trajectory.Over the years there have been many different video stabilization techniques developed to solve this problem. However the removal of the unwanted video perturbations due to undesirable camera motions has proved difficult. This report looks at the previous method used and presents a method based on feature tracking using a corner detector to find features and template matching to validate these features. Mosaicking was used in order to rebuild undefined areas that result from motion compensation applied to each video frame. The project successfully generates a stable sequence given an unstable video sequence. The present solution to the problem removes unwanted affine translations. Although not implemented, due to time constraints,a technique for removing affine rotation is offered which could be used to increase the stabilization. The mosaicking effect would also be improved as a result.

Chapter 1

INTRODUCTION

Video sequences captured from hand-held camcorders can often have unwanted motion due to various reasons, such as vibrations in a moving vehicle or an unsteady hand. With todays modern cameras this unwanted motion is also amplified by high-power.The main aim of these stabilization algorithms is to remove the unwanted motion but to keep intact the desired motion. As it is impossible to know exactly the intended camera motion therefore the camera motion has to be calculated and an interpolation of the desired motion made. With a decision on the desired camera motion made, the jitter can be calculated and hence removed.r zoom lenses. As a result of these motions, there have been different video stabilization techniques developed.

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Chapter 2

MOTIVATION

Removal of the jitter in a hand held camcorder can only really have one purpose and that is to increase the aesthetic appearance of the footage. However, when considering other utilizations of a stabilizer there are more benefits than the obvious professional look.

Detection and Tracking independently moving objects from moving platforms can be greatly simplified by removing all motion from the camera output, so that the scene background looks stationary. Important in both robot navigation and scene modeling.

A steady video can greatly increase the clarity of the picture. For good high quality security video footage, sharp details are necessary.

Increased compression. Modern digital compressors use a lot of bits to encode moving features of a video. If the whole image shakes, it is all moving. This wastes an enormous number of bits. As a result stabilized video has a much better compression rate.

Human fatigue. Unstable footage can be strenuous to watch and having to examine it for hours on end can lead to difficulties. Ensuring operators are alert is a major challenge in real-life security CCTV. Stable footage can greatly help in this situation

Chapter 3

TASKS

3.1 TASK1

3.1.1 Algorithm:

Input:Load an image
Output: Rotate the image in a specified angle.

- Step1: Start
- Step2: Give an image as input
- Step3: Read the image
- Step4: Make the image into a matrix format
- Step5: Create Rotation matrix
- Step6: Use maths function to rotate to specified angle
- Step7: Rotation matrix is applied to image
- Step8: Rotated image is displayed
- Step9: Stop

3.2 TASK2

3.2.1 Algorithm:

Input:Load a video
Output: Rotate the video in a specified angle and convert it the original format.

- Step1 : Start
- Step2 : Give a video as input
- Step3 : Read the video
- Step4 : Make the video into a matrix format
- Step5 : Create Rotation matrix
- Step6 : Use maths function to rotate to specified angle
- Step7 : Rotation matrix is applied to video
- Step8 : Rotated video is displayed
- Step9 : Rotated video is coverted into the original format
- Step10: Stop

Chapter 4

CONCLUSION

Handheld camcorders can suffer from image jitter, as a result of an unsteady hand, moving vibrations and more. And with modern high powered zoom cameras this can be greatly amplified. This unwanted motion (jitter) affects the aesthetic look and feel of home videos and could be greatly improved by stabilizing the video sequence. As a result there is a need for image stabilization. This project has successfully managed to remove the unwanted motions that were caused by translational instability.

In order to stabilize a video sequence the camera motion first had to be calculated. This was achieved with the use of feature tracking. From the first frame of a video sequence features were found, they were then tracked through the remaining sequence. After dropping invalid features the location information of remaining features was used to estimate the average movement of the camera.

The unwanted motion or jitter was determined by subtracting the calculated camera motion from an interpolated version of the desired camera motion. This interpolation was achieved using a linear translation between the first and last frame. Alternative methods for the interpolation could have been used but for the purpose of panning it was desired that the first and last frame remain in the same location as the original.

Chapter 5

REFERENCE

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