

HMotion: An Algorithm for Human Motion Detection

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ABSTRACT

Computer memory is expensive and the recording of data captured by a webcam needs memory. In order to minimize the memory usage in recording data from human motion as recorded from the webcam, this algorithm will use motion detection as applied to a process to measure the change in speed or vector of an object in the field of view. This application only works if there is a motion detected and it will automatically save the captured image in its designated folder.

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Algorithm, motion detection, computer application, webcam application

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INTRODUCTION

Human body tracking from monocular video sequences is a challenging task. The main task is to retrieve the pose of a person starting from a video taken with a camera (Fossati, 2009).

At the heart of our study is the fact that human motions contain significant postures that are easily detected. All of the approaches for motion detection in a continuous video stream are based on comparing of the current video frame with one from the previous frames. One of the most common approaches is to compare the current frame with the previous one which the researches adopted in this study. For this purpose the researchers used "difference and threshold filters".

On this step an image was saved with white pixels on the place where the current frame is different from the previous frame on the specified threshold value. The pixels were counted and if the amount will be greater than the predefined an alarm level can signal about a motion event.

Most cameras produce a noisy image so the researchers got motion in such places where there is no motion at all. To remove random noisy pixels, researchers used an Erosion filter. If the object is moving smoothly small changes from frame to frame will be received. When the object is moving so slowly the algorithm will not give any result at all. The most efficient algorithms are based on building the so-called background of the scene and comparing each current frame with the background. There are many approaches to build the scene, but most of them are too complex. The researchers' approach is to move the background frame to the current frame on the specified amount.

Scope and Limitations

The study will determine the difference of two pictures. The implementation of the program directed by these challenges were discussed and analyzed. However, every study has its own limitation. This study covers the goal of capturing a motion from webcam and saving it in the designated folder. This study does not cover recording video.

Research Literature

Zhang (2002) in his research stated that video tracking is a technique that is used to detect and track objects based on some typical features of the objects, and monitor their activities by image sequences taken by video cameras. Video tracking can be used in many areas especially in security-related areas such as airports, embassies, and battlefields. Much research has been done with various hardware environments most based on fixed position still cameras.

Motion detection, according to Lee (2008) was a system that uses a more advanced mechanisms stressed that there is no need for the supervisor of a security monitoring system to pay attention to it constantly. In current days, when a security camera is installed, a human being has to be on alert all the time while the camera is on since any little movement can require attention of the supervisor. But most of small objects do not need the supervisor's attention since they could be birds, cats or dogs. In this new system the system only reports the unusual change to the supervisor by calculating the motion and size of objects in the screen. Thus the supervisor can be liberated from the 24-hour concentration duty. Instead he can be only be alerted when the real security threat such as a big moving object like a human intruder appears.

Roza in her 2009 study entitled "Motion detection and Real time Tracking" motion detection can be broken down into two main subsystems, motion detection and tracking. Motion detection is the process of determining the movement of an object from two or more successive images. Once the movement detection occurs, calculations are made from two images to determine the type of movement made. The information from the calculations is then used in the tracking of the objects. Tracking involves the prediction of the future position of an object and the movement of the cameras to follow the objects.

Motion detection according to Bradshaw (2008) is one of the most useful features of the modern video security control system. With this technology, each image received by the camera is processed by software and compared to the previous image. If the system detects change that exceeds the threshold (a parameter set by the user), the system implements the predefined action. The action could be simply that the video is saved, and/or a cell-phone text message or email is sent, or a relay is activated to turn on lights on the alarm.

Fossati (2005) developed human body tracking from monocular sequences. The main task is to retrieve the pose of a person from a video sequence taken with a single camera.

Theoretical Framework

The researchers following the following ina making a motion detection test using a webcam:



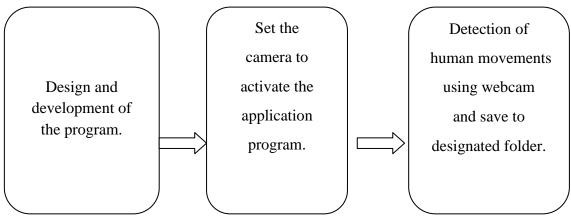


Figure 1 Theoretical Framework

Codes for the algorithm

//FORM (Code)

Private Declare Function capCreateCaptureWindow Lib "avicap32.dll" Alias "capCreateCaptureWindowA" (ByVal lpszWindowName As String, ByVal dwStyle As Long, ByVal X As Long, ByVal Y As Long, ByVal nWidth As Long, ByVal nHeight As Long, ByVal hwndParent As Long, ByVal nID As Long) As Long

Private Sub Command1_Click()

Picture2.Picture = Picture1.Picture

End Sub

Private Sub Command2_Click()

STARTCAM

Load Progress

Progress.Show

Progress.start

Unload Progress

Command2.Enabled = False

Command3.Enabled = True

Picture1.AutoRedraw = True

Picture2.AutoRedraw = True

Timer1.Enabled = True

Timer2.Enabled = True

End Sub

Private Sub Command3_Click()

STOPCAM

ProgressBar1.Value = 0

Command3.Enabled = False

Command2.Enabled = True

Picture1.Picture = LoadPicture("nosignal.bmp")

Picture2.Picture = LoadPicture("nosignal.bmp")

Label1.Caption = "0%"

End Sub

Private Sub Command4_Click()



```
List1.Clear
```

End Sub

Private Sub Form_Load()

Picture1.Width = 320 * Screen.TwipsPerPixelX

Picture1.Height = 240 * Screen.TwipsPerPixelY

Picture2.Width = 320 * Screen.TwipsPerPixelX

Picture2.Height = 240 * Screen.TwipsPerPixelY

Picture1.Picture = LoadPicture("nosignal.bmp")

Picture2.Picture = LoadPicture("nosignal.bmp")

End Sub

Private Function Different(ByVal a As Long, ByVal b As Long) As Boolean

'Checks different of two colors

ar = a Mod 256: a = a \ 256

ag = a Mod 256: a = a \ 256

ab = a Mod 256: a = a \ 256

br = b Mod 256: b = b \ 256

bg = b Mod 256: b = b \ 256

bb = b Mod 256: b = b \ 256

sense = 255 - Slider1. Value * 5

Different = (Sqr((ar - br) * (ar - br) + (ag - bg) * (ag - bg) + (ab - bb) * (ab - bb)) > sense) 'formula for counting different

End Function

Private Sub Form_Unload(Cancel As Integer)

STOPCAM

SaveSetting "MotionDetect", "Param", "s1", Str(Slider1.Value)

SaveSetting "MotionDetect", "Param", "s2", Str(Slider2.Value)

End Sub

Private Sub Timer1_Timer()

'getting picture from camera

SendMessage mCapHwnd, GET_FRAME, 0, 0

SendMessage mCapHwnd, COPY, 0, 0

Picture 1. Picture = Clipboard. GetData: Clipboard. Clear

stepp = 3 'Grid dense

Dim qan, qann As Long

qan = 0

qann = 0

For i = 1 To Picture1.Width / Screen.TwipsPerPixeIX Step stepp

For j = 1 To Picture1.Height / Screen.TwipsPerPixelY Step stepp

 $If \ Different(Picture 1.Point (i * stepp * Screen. Twips Per Pixel X, j * stepp * Screen. Twips Per Pixel Y), Picture 2.Point (Screen. Twips Per Pixel X * i * stepp, j * stepp * Screen. Twips Per Pixel Y)) Then$

Picture1.Circle (i * stepp * Screen.TwipsPerPixeIX, Screen.TwipsPerPixeIY * j * stepp), 1, RGB(255, 0, 0)

qann = qann + 1

End If

Next



Next

Label1.Caption = Int(qann * 100 / 910) & "%" 'Counting motion in pracentes

ProgressBar1.Value = Int(qann * 100 / 910)

End Sub

Sub STOPCAM()

DoEvents: SendMessage mCapHwnd, DISCONNECT, 0, 0

Timer1.Enabled = False

Timer2.Enabled = False

End Sub

Sub STARTCAM()

'Getting handle of camera window

mCapHwnd = capCreateCaptureWindow("WebcamCapture", 0, 0, 0, 320, 240, Me.hwnd, 0)

DoEvents

SendMessage mCapHwnd, CONNECT, 0, 0 'connecting to camera

SendMessage mCapHwnd, WM_CAP_DLG_VIDEOFORMAT, 0, 0 'Calling video format dialog

DoEvents

Slider1.Value = GetSetting("MotionDetect", "Param", "s1", "0")

Slider2.Value = GetSetting("MotionDetect", "Param", "s2", "0")

End Sub

Private Sub Timer2_Timer()

If ProgressBar1.Value > 1 - Slider2.Value * 2 Then

Beep

SavePicture Picture1.Picture, App.Path + "\Detected\" + Format(Date, "ddmmyyyy") + "__" + Format(Time, "hhmmss") + ".bmp"

List1.AddItem "Saved in " + Str(Time) + " " + Str(ProgressBar1.Value) + "% --> " + Format(Date, "ddmmyyyy") + "__" + Format(Time, "hhmmss") + ".bmp"

End If

End Sub

//PROGRESS CODE

Public Sub start()

For i = 1 To 15

DoEvents

SendMessage mCapHwnd, GET_FRAME, 0, 0

SendMessage mCapHwnd, COPY, 0, 0

Form1.Picture2.Picture = Clipboard.GetData: Clipboard.Clear

DoEvents

ProgressBar1.Value = ProgressBar1.Value + 1

Next

End Sub

Private Sub Form_Load()

ProgressBar1.Value = 0

End Sub



Results

The method developed was used to identify and discriminate the body motion at the same time. If there is a detected motion it will save to the designated folder and if there is no motion it will do nothing. Motion was detected through color sensitivity. It was found out that there is motion if color sensitivity is 50% and above, which was saved upon detection.

Findings

The researchers found out that motion detection of human using webcam can be automatically detected using color sensitivy. Motion detection works on the basis of frame differencing - meaning comparing how pixels (usually <u>blobs</u>) change location after each frame. There are two ways motion can be detected: 1.) looking for a bulk change in the image, and 2.) motion of the middle mass.

The problem with these motion detection methods is that neither detects very slow moving objects, determined by the sensitivity of the threshold. But if the threshold is too sensitive, it will detect things like shadows and save there in designated folder.

Motion Detection is applied to a process to measure the change in speed or vector of an object in the field of view. The study entitled "Motion Detection of Human using webcam" This application only works if there is a motion detected and it will automatically save the captured image in its designated folder and if there is no motion captured it will not saved.

Conclusions

The authors conclude that using a webcam can easily detect the motion of a human. It has been made toward the goal of automatically detecting, identifying and tracking of captured image.

The system used the Difference and Threshold filters algorithm to compare and detect the difference of the two pictures.



She is a graduate of Bachelor of Science in Statistics at the University of the Philippines in 1986, Master in Computer Science at De la Salle University, Manila in 2000 and is doing her dissertation in Phd in Education major in Mathematics and a member of IACSIT since last year.

She had been in the teaching profession in more than 25 years and is the Dean of the College of Computer Studies of Lyceum of the Philippines University in Batangas for 12 years. She had presented research papers locally and internationally, one of which is Philippine government funded at San Diego California last March 2010. She had visited 9 countries in a period of 11 years during study tours and benchmarking visits. She had been the President of PSITE IV-

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