



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.

Indexing terms/Keywords

Algorithm, motion detection, computer application, webcam application

Academic Discipline And Sub-Disciplines

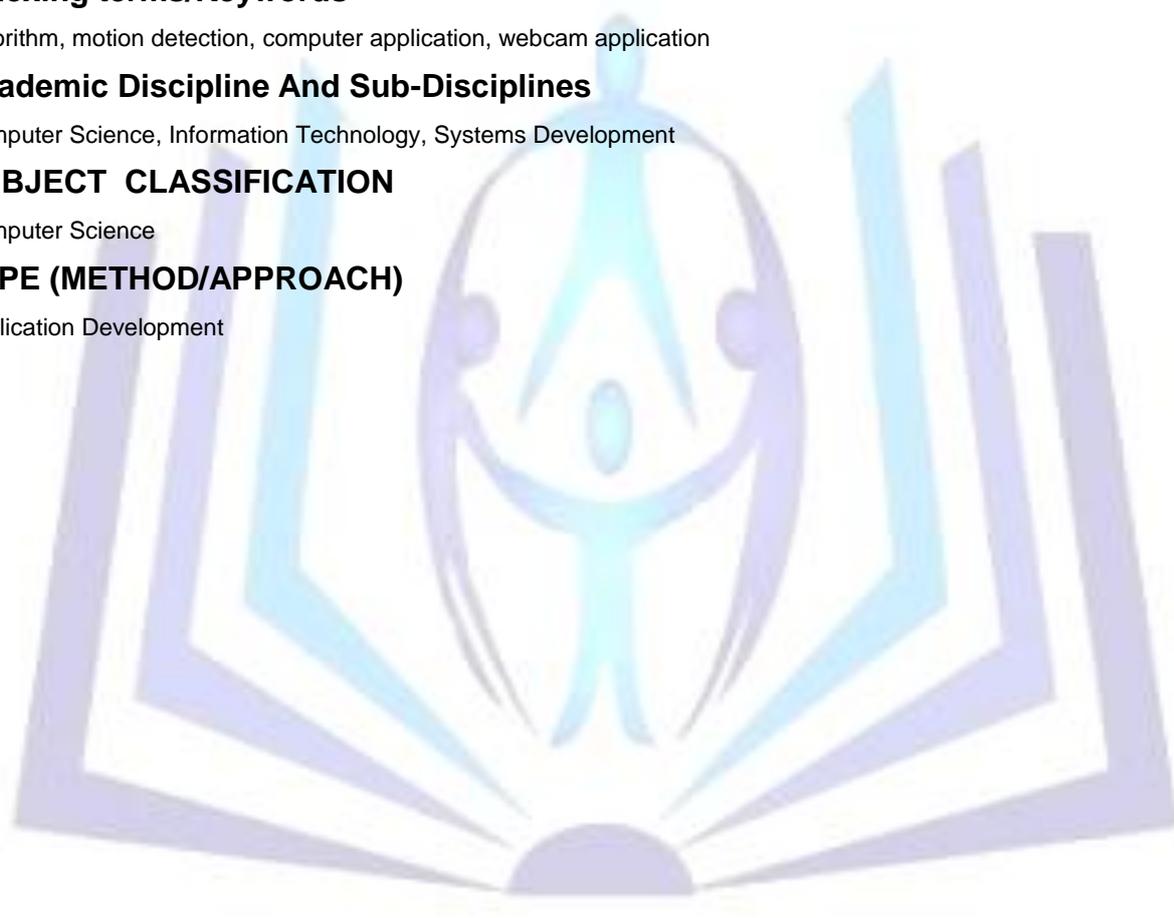
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INTRODUCTION

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 in making a motion detection test using a webcam :

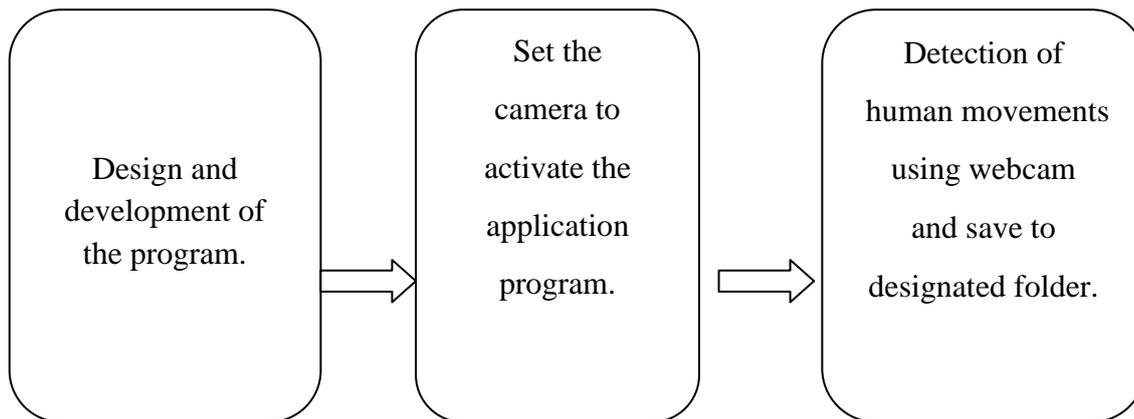


Figure 1 Theoretical Framework

Codes for the algorithm

//FORM (Code)

```
Private Declare Function capCreateCaptureWindow Lib "avicap32.dll" Alias "capCreateCaptureWindowA" (ByVal  
IpszWindowName 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
Picture1.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.TwipsPerPixelX Step stepp
For j = 1 To Picture1.Height / Screen.TwipsPerPixelY Step stepp
If Different(Picture1.Point(i * stepp * Screen.TwipsPerPixelX, j * stepp * Screen.TwipsPerPixelY),
Picture2.Point(Screen.TwipsPerPixelX * i * stepp, j * stepp * Screen.TwipsPerPixelY)) Then
Picture1.Circle (i * stepp * Screen.TwipsPerPixelX, Screen.TwipsPerPixelY * j * stepp), 1, RGB(255, 0, 0)
qann = qann + 1
End If
Next
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_VIDEIFORMAT, 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 sensitivity. Motion detection works on the basis of frame differencing - meaning comparing how pixels (usually blobs) 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-Philippine Society of IT Education for 3 years and had been the PSITE National Secretary for another 3 years and is currently the National Treasurer this year.