International Refereed Journal of Engineering and Science (IRJES)
ISSN (Online) 2319-183X, (Print) 2319-1821
Volume 5, Issue 11 (November 2016), PP.28-30

Tracking Cars in Video Sequence at Sulaimany City

Sara Noori Mohammad Ali
Assistant Lecture, Department of Statistics. Administration and Economic School, University of Sulaimany.

Abstract: This paper includes a practic study of α-β-filters in Video Sequence at Sulaimany City. The purpose of this project is to research and experiment on the application of video image of traffic scene taken by stationary camera specifically to detect abnormal (velocity) traffic situations. The abnormal velocities do you to various case .in this paper I use α-β-filter with various value of α-β.

I. INTRODUCTION

All days is not good at every time or place may be do any thing like sudden lane change, vehicle going off the road and possibly vehicle accidents and weather may be include a bright sunny day, on a foggy day, on a rainy day and even during different times of day such as morning time, afternoon time, and evening time and during dusk.

Video cameras are widely used in Traffic Management Centers and the numbers are steadily increasing. Cloud also makes use of a large number of cameras for traffic management. At the last years in sulaimany city traffic management office used mor camera for different time at some street after that frome staff at traffic office sulaimanyah split video to select the car number have abnormal velocity from this person taken some mony (that mony dependent on velocity of car and velocity of street) if have more velocity the mony is more. That is do few car acident.

Object tracking has been a hot topic in the area of computer vision, A lot of research has been undergoing ranging from applications to noble algorithms, However, most works are focused on a specific application, such as tracking human, car, or pre-learned objects.[8]

II. Filter

The name filter is one of importan subject now, also filter dependent multiple subject like statistics, time series analysis, quality control, engener,… The new application of name filter meaning difference observation for two things: one of them is signal that is very important for us and another one is noise that is emergence case out control.

For many applications, the model statistic noise levels are given before the filtering process and will maintain unchanged during the whole recursive process. Commonly, this a priori statistical information is Determined by test analysis and certain knowledge about the observation type beforehand. [3]

Noisy images due to noisy signals of cameras and noise inference in leaky cables. For tracking we need reliable features. As an initial analysis has shown the most reliable features are the lights of the vehicles. Moreover, we can exploit a lot of background knowledge in the detection stage, e.g., driving direction, where a car is to be expected in the image, etc. This knowledge can be used to increase the speed and the reliability of the detection stage. The lights of vehicles are distinct from the background, and in addition the always (expect for motor-cycles and cars with broken lights) they appear in pairs with a strong geometrical relation. [6]

III. α- β Filter

The α-β filter is one of famouse filters for smoothing and filter for time series and signal. α - β filter have multiple application the more use and famouse of it is use at radar. α-β filter is a popular algorithm for target tracking which has found its application in several fields, The α-β filter is a one step ahead position predictor that uses the current error, called innovation, to predict the next position, The innovation is weighted by the smooth parameters α and β,. These parameters influence the behavior of the system in terms of stability and ability to track the target [1]. The α-β filters come in many different varieties. Some are designed to provide the best transient following capability for a constant velocity object, while simultaneously providing the best minimum variance estimate of position and velocity [7]. Also, it will be very desirable for such filters to have the capability of tuning itself to the sensor (radar) and moving object characteristics. The thing to note about this is that the transient behavior is the opposite of noise behavior; small α values produces more noise reduction but increasing transient response, while large α values produces less noise reduction but improving transient response [5].

Typically, values of α and β are adjusted experimentally. In general large α and β gains tend to produce faster response for tracking transient changing, while small α and β gains reduce level of the noise in the state

estimations. However, in spite of the recent advances in sensor technology, there are no devices that can detect the manned maneuvers of a tracked target in the surveillance and guidance systems. This sudden maneuver of a target implies to a tracking system that it is accelerating unexpectedly and that acceleration may be time-varying and following an unknown profile. Even a short-term acceleration can cause a bias in the measurement sequence and will result divergence [4].

we have three equation to difenition α-β filter as follow:
$X_f(t)=X_p(t)+\alpha[X_0(t)-X_p(t)]$
$D_f(t)=D_f(t-1)+\beta[X_0(t)-X_p(t)]$
$X_p(t+1)=X_f(t)+D_f(t)$
Where:
$X_0(t)$: is observed value at time (t)
$X_f(t)$: filtered value at time (t)
α : position smoothing parameter
β : velocity smoothing parameter
$D_f(t)$: value of error between observation and expectation at time (t)
Also expectation equation is cascading, it's mean need initial value .calculate the initial value by taking expectation value equal to observation value directy. Researchers have different opinion about value of α,β .
Bellow we show some opinion about value of α,β :[1]
0<α<1, 0<β<2 , and
0<4-2α-β
Also another opinion is: [2]
$\propto = 1 - e^{-2\varepsilon\omega 0T}$ and $\beta = 1 + e^{-2\varepsilon\omega 0T} - 2e^{-\varepsilon\omega 0T}cos\omega dT$
The inverse relations are:

$$\ln(1/\sqrt{(1-\alpha)})$$

$$\varepsilon = \frac{}{\sqrt{[\ln(1\sqrt{1-\alpha})]2} + \left[cos^{-1}\left(\frac{(2-\alpha-\beta)}{2\sqrt{}1-\alpha}\right)\right]2}$$

$$\omega d = \frac{1}{T}cos^{-1}\frac{(2-\alpha-\beta)}{2\sqrt{1-\alpha}}$$

And

$$\omega 0 = \omega d/\sqrt{1-\delta^2}$$

Where:
$\boldsymbol{\delta, \omega d \text{ and } \omega 0}$ are the clasic damping coefficients, damped natural fequency, and Natural frequency of a second-order system.

IV. Application

Data Collection for Analysis at different time and place. For example, on a straight highway, on a urved road, on a Crossroad, on a cloverleaf, in a tunnel, and so on. Video images can be used to keep a watch on traffic in the various roads of a town or on a highway. Several video cameras are installed on the roads on which the traffic needs to be checked. The data collection phase of the project consists of several stages. The fist stage is to decide when and where the traffic videos should be recorded.[8] For this application I collected data at traffic office at sulaimany city , the data conatain video of different place and time in sulaimany city roads and with different type of cars and different vilocity, but in this research I choose only abnormal vilocity of car . By using α-β filter for collected data with different value of α and β (tested some different value) dependent of research some researchers, in here I can't show all application only I show application of α-β filter whene α=0.1 and β=0.1 only for ten abnormal velocity car. We can see : For different observed value at different time

$X_0(t)$	$D_f(t-1)$	$X_p(t)$	$D_f(t)$	$_p(t+1)$
20	28	30	27	56
30	27	56	24.4	77.8
80	24.4	77.8	24.6200	102.6400
80	24.4	102.6200	22.3580	122.7160
90	22.3580	122.7160	19.0864	138.5308
90	19.0864	138.5308	15.0109	148.6886
90	15.0109	148.6886	9.1420	151.9618
90	9.1420	151.9618	2.9458	148.7114
90	2.9458	148.7114	2.9253-	139.9149
100	2.9253-	139.9149	6.9373-	128.9861

V. RESULTS & CONCLUSIONS

At this application with different value of α and β ,with various opinion of some researchers and using value of observation at different time and place for abnormal velocity of various car in sulaimany city we can say that: The value of velocity of car show at video is not real value of velocity of car is different may be few till more is different not real velocity or exact velocity becase at this time have some case for example weather, capasity of camera and …have effect to make noise show. Must be choose value of α-β cearfully, we use most different value of it but we can not say which one is very good or have better of it for ifferent value of observation .

VI. SOURCES

[1]. Ali Hussein Hasan, Aleksandr N. Grachev , " Adaptive α-β-filter for Target Tracking Using Real Time Genetic Algorithm", Journal of Electrical and Control Engineering, JECE Vol. 3 No. 4, 2013 PP. 32-3

[2]. Ben H. Cantrell, Naval Research Laboratory,Washington, D.C., "Description Of An Alpha-Beta Filter In Cartesian COORDINATES", 21 March 1973.

3]. Congwei Hu1,2, Wu Chen1,Yongqi Chen1 and Dajie Liu2, Adaptive Kalman Filtering for Vehicle Navigation,Journal of Global Positioning Systems (2003), Vol. 2, No. 1 : 42-47

[4]. Fun-Bin Duh, Chin-Teng, "Tracking a maneuvering target using neural fuzzy network", IEEE Trans on Systems, MAN, and Cybernetics—part B: Cybernetics, vol. 34, No. 1, February 2004.

[5]. John E. Gray, "What a long strange trip it has been: My twenty-five year affair with the alpha-beta filter", ttp://engineering.jameskbeard.com.

[6]. Roman Pflugfelder and Horst Bischof," Car tracking in tunnels", Czech Pattern Recognition Workshop 2000, Tom´aˇs Svoboda (Ed.) Perˇsl´ak, Czech Republic, February 2–4, 2000

[7]. T.R. Benedict, G.W. Bordner, "Synthesis of optimal set of radar track-while-scan smoothing equations", Institute of Radio Engineers (IRE), Trans. on Automatic Control (AC), vol. 7, pp. 27-32, 1962.

[8]. Young Min Kim, " Object Tracking in a Video Sequence" CS 229 Final Project Report. ymkim@stanford.edu