Object Tracking

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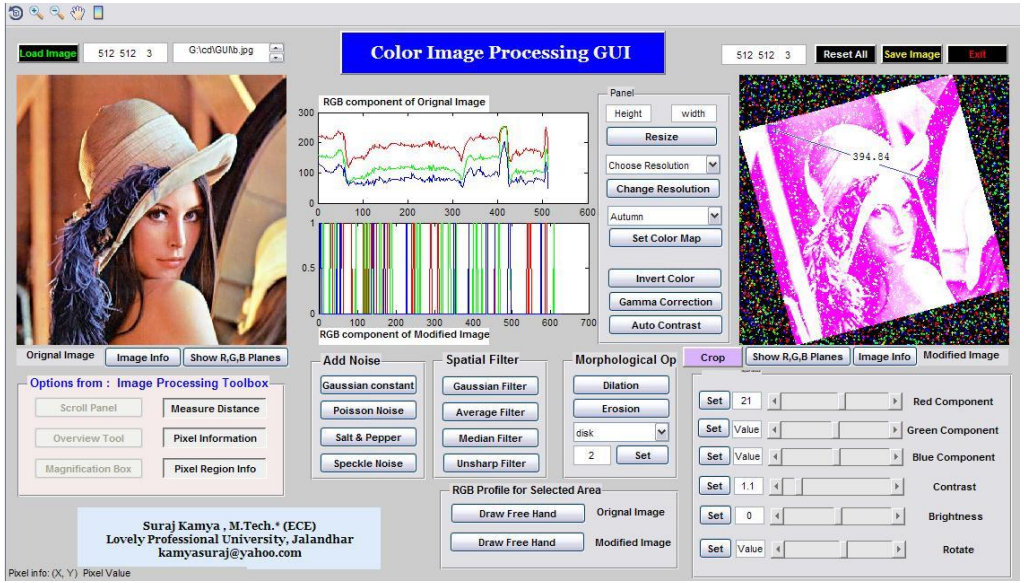
Abstract

Visual target tracking is one of the major fields in computer vision system. Object tracking has many practical applications such as automated surveillance system, military guidance, traffic management system, fault detection system, artificial intelligence and robot vision system. But it is difficult to track objects with image sensor. Our algorithm uses the Kalman filter as many as the number of moving objects in the image frame. If many moving objects exist in the image, however, we obtain multiple measurements. Therefore, precise data association is necessary in order to track multiple objects correctly. Another problem of multiple objects tracking is occlusion that causes merge and split. For solving these problems, this paper defines the cost function using some factors. Experiments using Matlab show that the performance of the proposed algorithm is appropriate for multiple objects tracking in real-time. The other one is Red colour tracking and showing the threshold value of the colour, useful in determining colours in the real time environment and also helps in pointing out difference between the objects.

IMAGE PROCESSING

What is Image Processing ?



PROBLEMS

Traditional Inconvenient Human-Computer Interaction

Camouflage in Defence System

Counting Several Similar looking Objects

Security Issues

Difficulty in Tracking far Objects (Accident Prone)

SOLUTIONS

Hand Gesture Recognition

Motion Object Tracking

RGB Colour Tracking

Single Object Tracking

REQUIREMENT

Software Requirement:

Matlab

(Or)

Open CV

(Or)

Visual Studios

Hardware Requirement:

Laptop

Object Detection and Tracking

In a video sequence an Object is said to be in motion , if it is changing its location with respect to its background

The motion tracking is actually the process of keeping tracks of that movng object in video sequence i.e position of moving object at certain time etc.

SINGLE OBJECT TRACKING

A method following an object through successive image frames to determine its relative movement with respect to other objects.

FEATURE SELECTION FOR TRACKING

The common visual features are as follows:

- **Color:** The apparent color of an object is influenced by two factors i.e. spectral power distribution of illuminant and surface reflectance properties.

- **Edges:** Object boundaries generate strong changes in the image intensities. Edge detection is used to identify these changes

DRAWBACKS

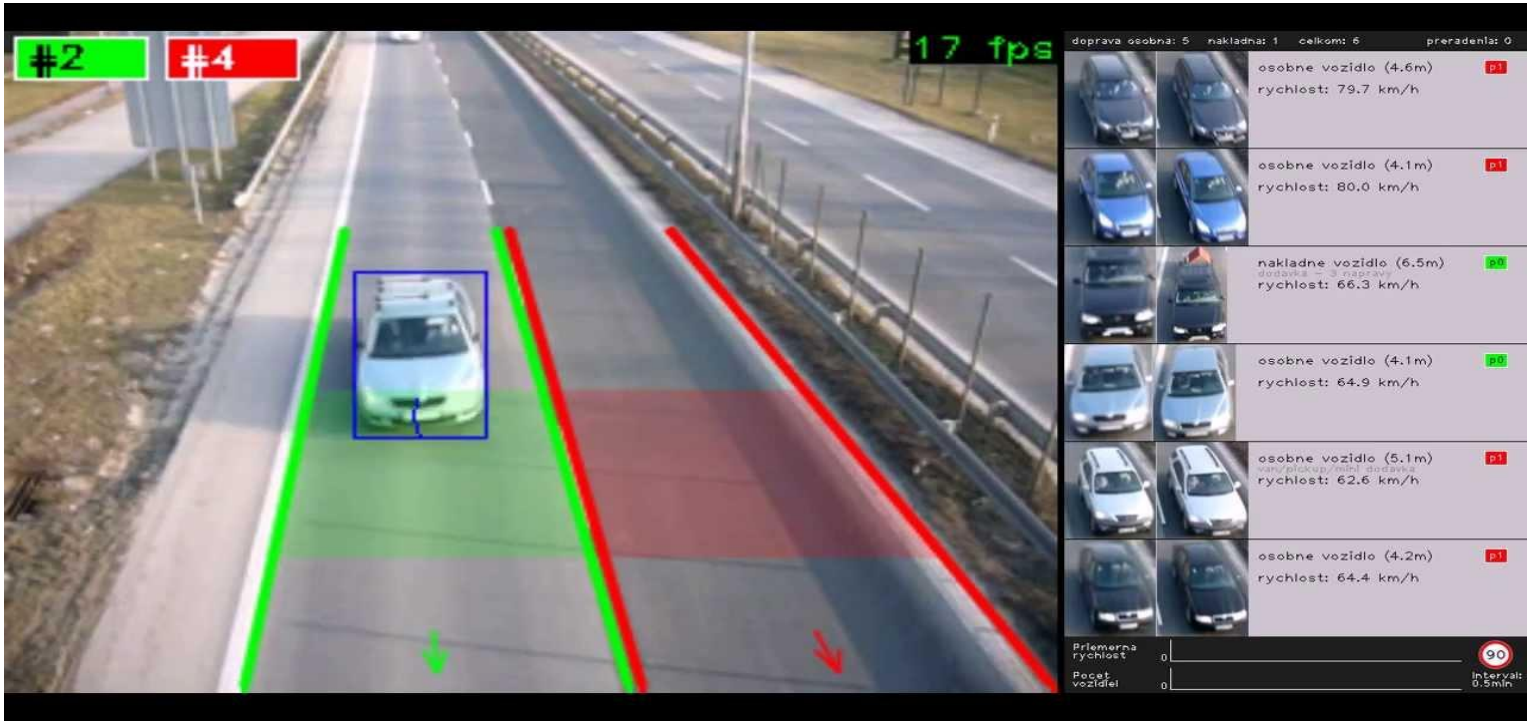
Temporal variation/dynamic environment

Abrupt object or camera motion

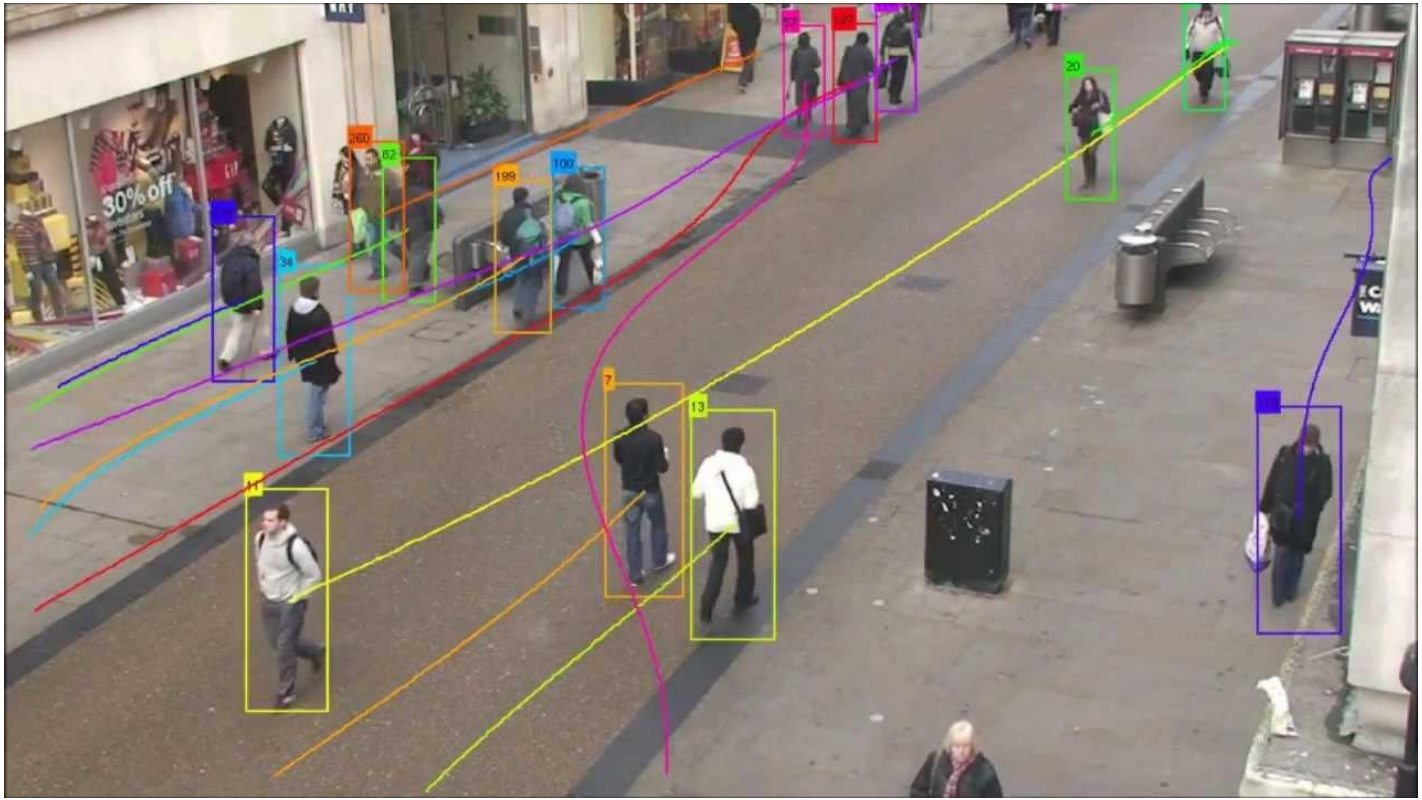
Multi-camera ? Multi-objects?

Computational expenses

Application: Traffic Information

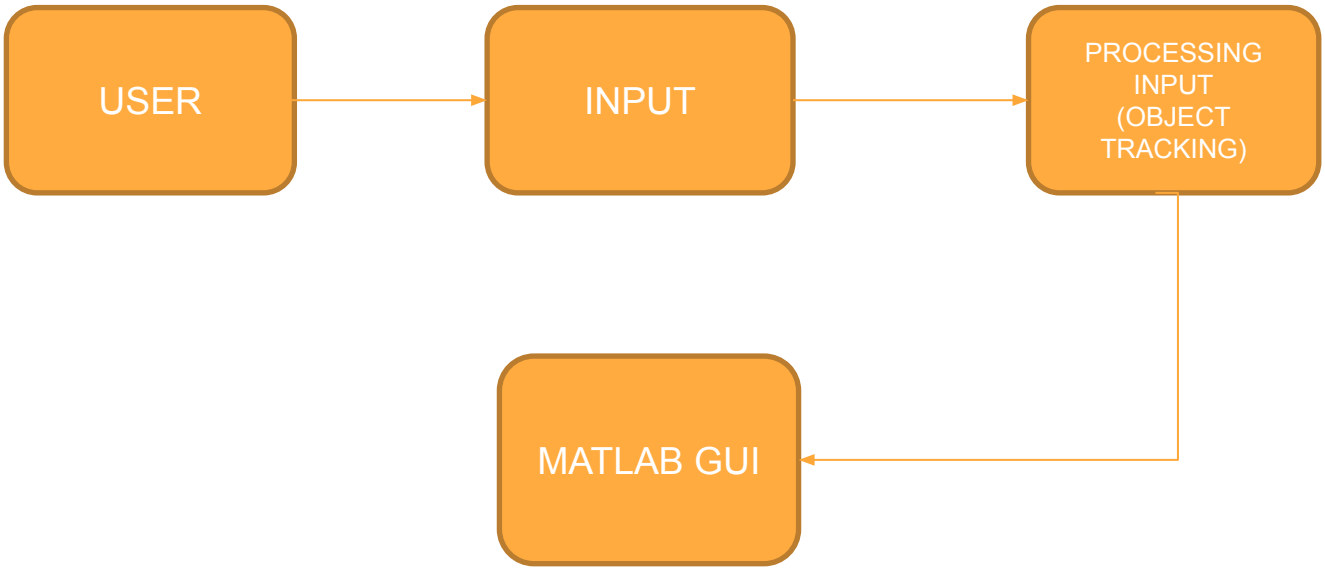


Application: Surveillance



Application : Colour Tracking

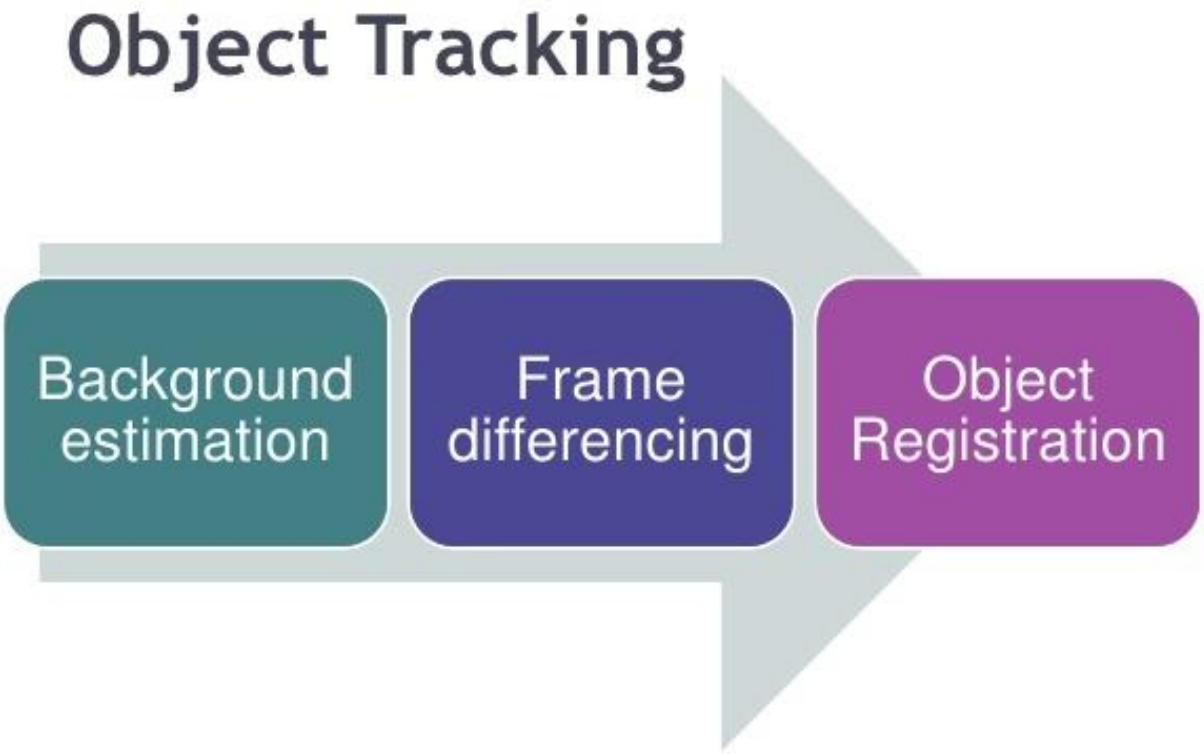
System Architecture



System Architecture

- The end USER runs the application for his purpose to be served .
- An appropriate INPUT is given by the user to get the desired output i.e tracking the object
- OBJECT TRACKING is done using background estimation ,frame differencing and object registration using Kalman Algorithm
- The output is shown to the user with the help of built-in Matlab GUI

Modules


Object Tracking
Background estimation
Frame differencing
Object Registration

Morphology Based Object Tracking

Background Estimation

- Image Differencing
- Thresholding

Object Registration

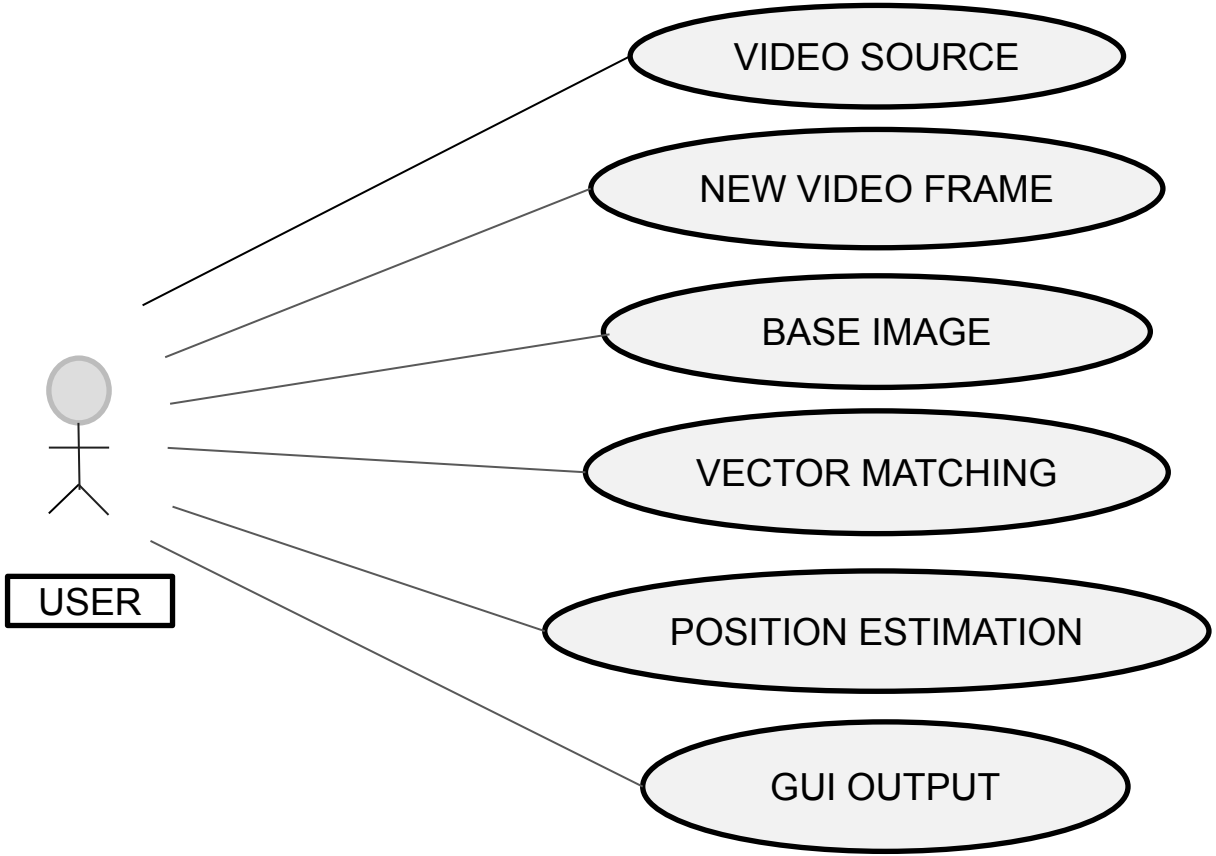
- Contours are registered
- Width, height and histogram are recorded for each contour

Feature Vector

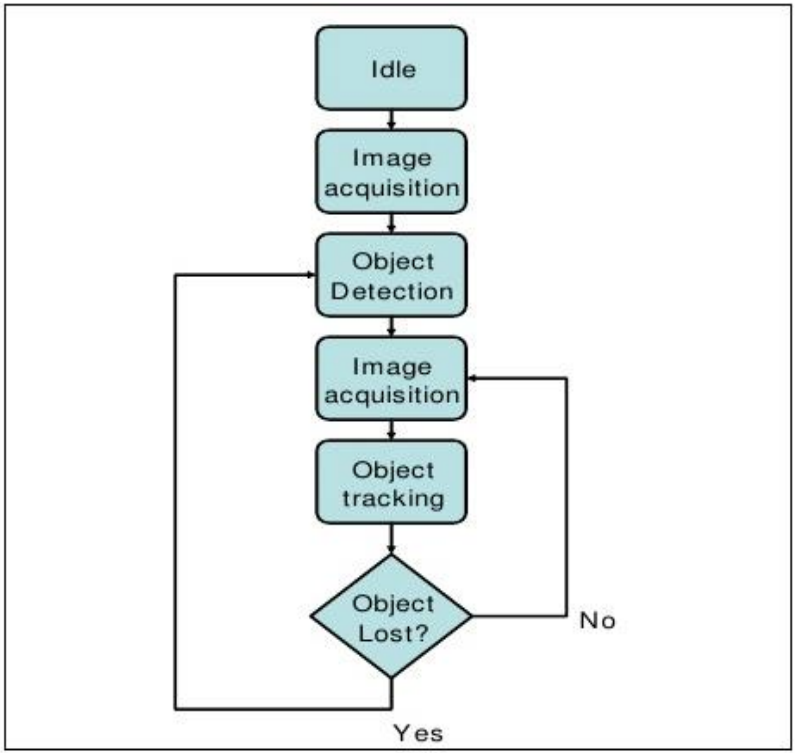
- Each object represented by a feature vector (the length, width, area and histogram of the object)

Thresholding

Use Case Diagram



Flow Diagram



Kalman filter algorithm

- The Kalman filter estimates a process by using a form of feedback control: the filter estimates the process state at some time and then obtains feedback in the form of (noisy) measurements.

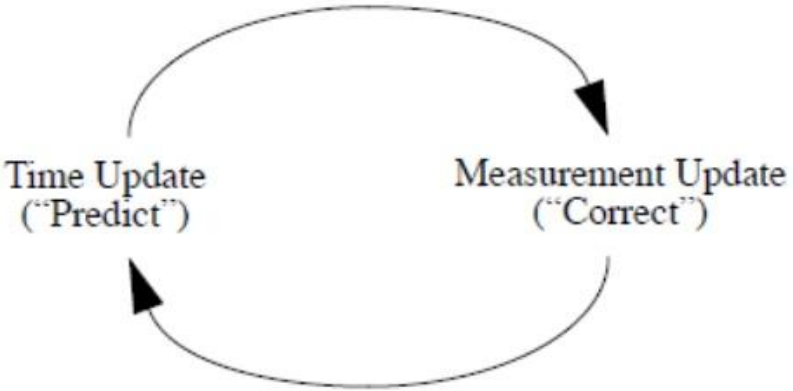
- As such, the equations for the Kalman filter fall into two groups: *time update* equations and m*easurement update* equations.

- The time update equations are responsible for projecting forward (in time) the current state and error covariance estimates to obtain the *a priori* estimates for the next time step.

- The measurement update equations are responsible for the feedback—i.e. for incorporating a new measurement into the *a priori* estimate to obtain an improved *a posteriori* estimate.

- The time update equations can also be thought of as *predictor* equations, while the measurement update equations can be thought of as *corrector* equations.

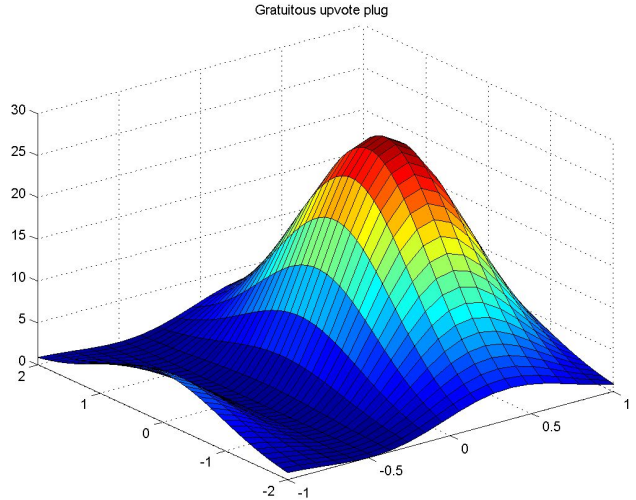
- The final estimation algorithm resembles that of a *predictor-corrector* algorithm.



The ongoing discrete Kalman filter cycle.

The *time update* projects the current state estimate ahead in time. The *measurement update* adjusts the projected estimate by an actual measurement at that time.

Why Matlab ?


Gratuitous upvote plug
30
25
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-1
-2
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0
0.5
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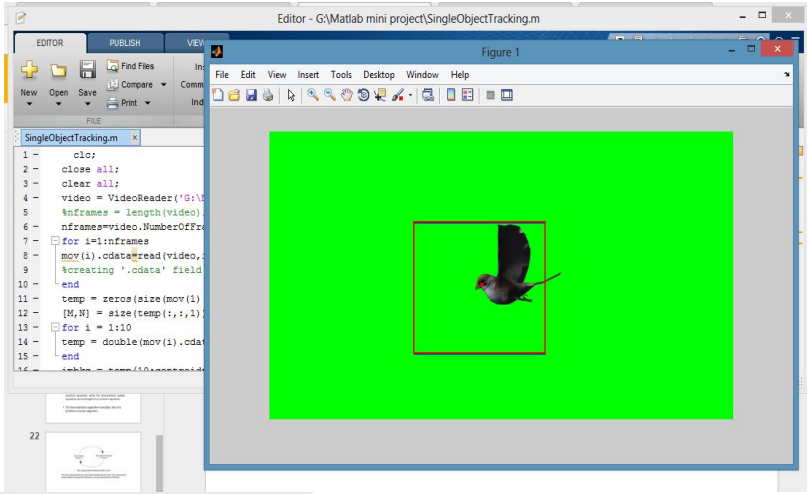
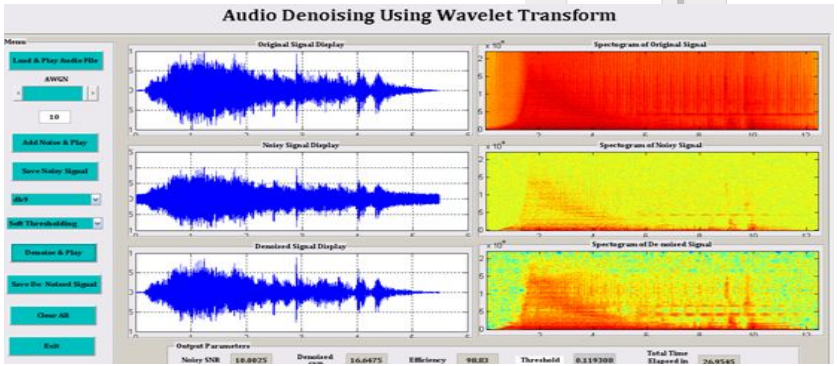

Editor - G:\Matlab mini project\SingleObjectTracking.m
EDITOR
PUBLISH
VIEW
New
Open
Save
Find Files
Compare
Print
SingleObjectTracking.m
clc;
close all;
clear all;
video = VideoReader('G:\
%nframes = length(video)
nframes=video.NumberOfFr
for i=1:nframes
mov(i).cdata=read(video,
%creating '.cdata' field
end
temp = zeros(size(mov(1)
[M,N] = size(temp(:,:,1)
for i = 1:10
temp = double(mov(i).cda
end
22
Figure 1
File
Edit
View
Insert
Tools
Desktop
Window
Help


Audio Denoising Using Wavelet Transform
Menu
Load & Play Audio File
AWGN
10
Add Noise & Play
Save Noisy Signal
db9
Soft Thresholding
Denoise & Play
Save De- Noised Signal
Clear All
Exit
Original Signal Display
Spectrogram of Original Signal
Noisy Signal Display
Spectrogram of Noisy Signal
Denoised Signal Display
Spectrogram of De-noised Signal
Output Parameters
Noisy SNR
10.0025
Denoised
16.6475
Efficiency
98.83
Threshold
0.119308
Total Time
Elapsed in
26.9545

References

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- Natasha Devroye.Estimation:parts of chapters 12-13.Wiener & Kalman Filtering
- R. E. KALMAN. A New Approach to LInear Filtering & Prediction Problems
- www.tutorialspoint.com/matlab/

THANK YOU