VIBRATION REDUCTION AND CONTROL FOR TRAFFIC CAMERAS: ELECTRICAL DEVICE USER MANUAL

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USER MANUAL FOR
ELECTRICAL DEVICE
0-5251-P2

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ELECTRONIC IMAGE STABILIZATION PROGRAM

USER MANUAL

The image stabilization program is a MatLab program that can stabilize an input video sequence and display the resulting video. The input video can be selected to be from a live camera or it may be read from a video file. All the following files must be copied into the Matlab working directory:

- blank.png

- block_diagram.png

- calculate_lucas_kanade_feature.m

- find_max_similarity_index.m

- image_stabilization_figure.fig

- image_stabilization_figure.m

- live_image_stabilization.m

- mean_sum_of_abs_diff.m

- sub_images_boundaries.ini

- vfm.dll

- vfm.m

To start the program, type "image_stabilization_figure" in the Matlab command window.

Explanation of the Menus

The following section explains the options and menus in the "Image Stabilization" program:

"Input Selection" Menu

This menu allows the user to select between two possible inputs:

- Capture from camera:

  If this option is selected, the input sequence will be captured from a live camera. (A USB camera must be connected to the computer.)

- Input from a movie file:

  This option allows the user to read a movie file by clicking on the "Read" button. The user can also select the number of frames that will be read from the input file.

This menu also allows the user to select an area of the input image to be masked (blanked out). This option is especially useful for those input sequences that have added text or sub-titles at a particular section of the image. The boundaries of the masked area can be defined by the user in normalized coordinates.

Image Stabilization

Main Menu

Input Selection
Target Selection
Target Tracking
Motion Estimation
Motion Compensation

Display Options
Movie Options

Run
Quit

Input Selection

Input: **From movie file**

Read | 100 | **Frames from a movie file**

☑ **Mask an area of the input image**

Mask rectangle: xmin: **0.0**   xmax: **0.5**
Normalized   ymin: **0.7**   ymax: **1**
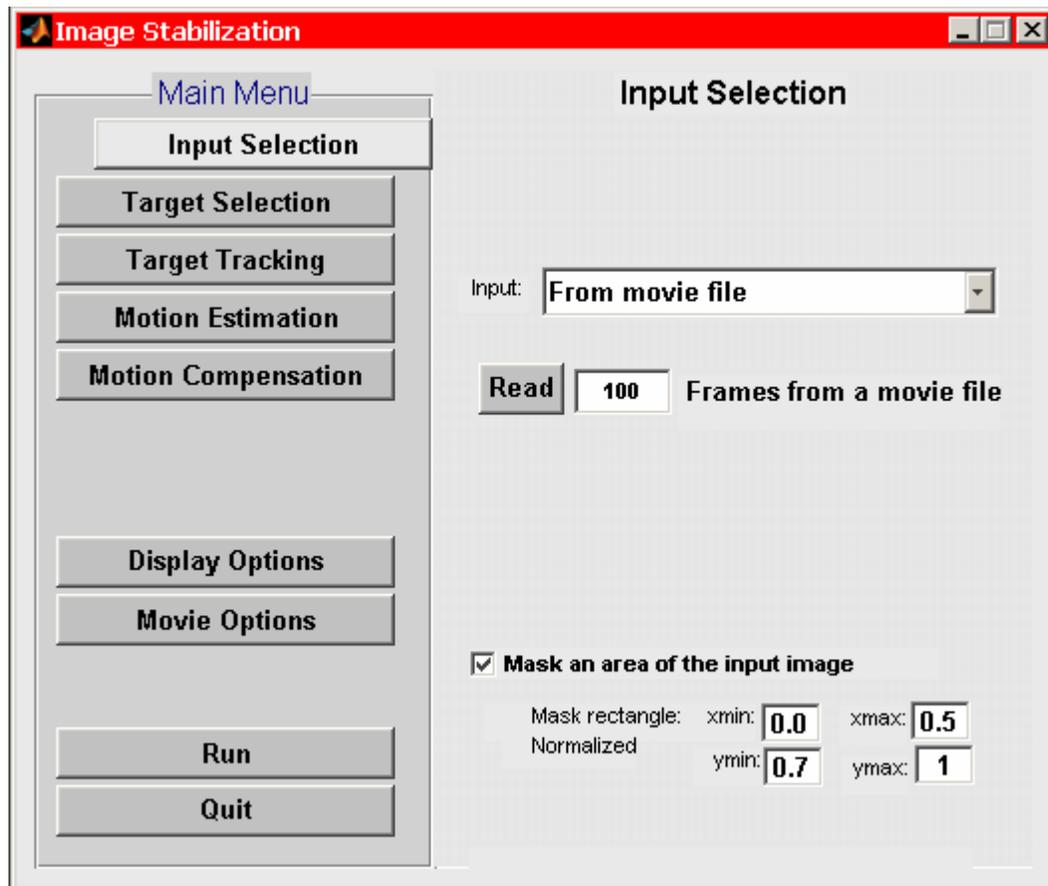
"Target Selection" Menu

This menu allows the user to select the method for initial target selection. There are five possible methods to select from:

- Largest possible target in the center

- Target in the center

- Edge Detect; Max. STD

- Max. Entropy

- Lucas Kanade feature selection

For a detailed explanation of the target selection methods please refer to the "Image Stabilization in Traffic Cameras" document.

This menu also allows the user to select the horizontal and vertical target size in pixels. Notice that for the first choice of the menu (i.e., "Largest possible target in the center") the target size will be calculated automatically.
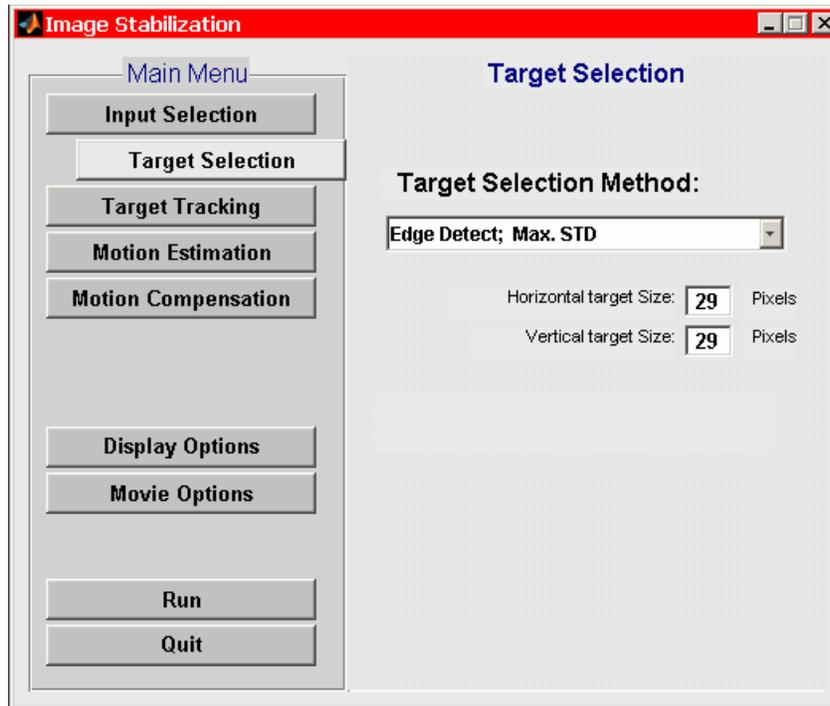
Notes:

The number of selected targets is equal to the number of sub-images (blocks) in the image.

The number of sub-images and the boundaries of each sub-image are specified in the file "***sub_images_boundaries.ini***" in the Matlab working directory. Each line in this file specifies the boundaries of one sub-image. The format of this file must be:

xmin,ymin,xmax,ymax

xmin,ymin,xmax,ymax

…..

where xmin and ymin specify the normalized coordinates of the upper left corner of the sub-image and xmax and ymax specify the normalized coordinates of the lower right corner of the sub-image.

"Target Tracking" Menu

This menu allows the user to set the horizontal and vertical boundaries around the target

to be searched for finding the best match for the target in the next frame.
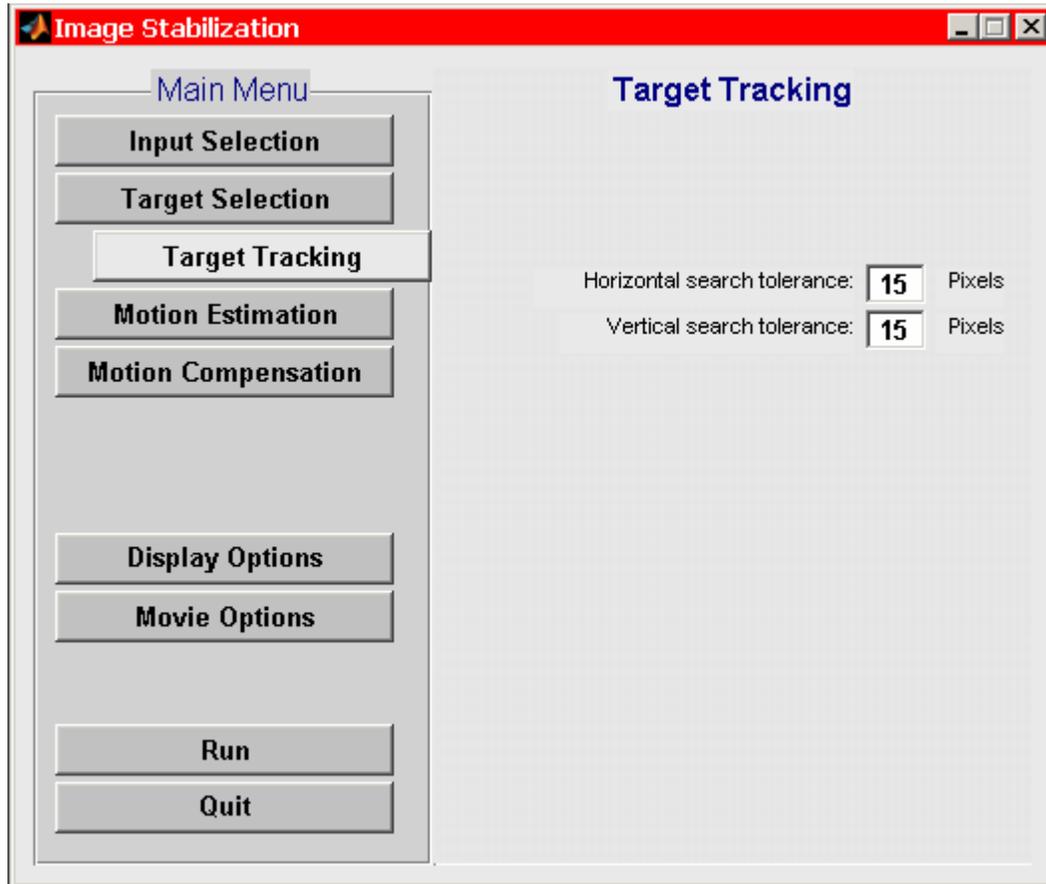
"Motion Estimation" Menu

This menu allows the user to select among four possible choices for estimating global

motion from local motion vectors:

- Select minimum local motion vector

- Select average of local motion vectors

- Select median mag. of local motion vectors

- Use Least Square fit (reject outliers)

For details about each of the possible methods please refer to the "Image Stabilization

in Traffic Cameras" document.
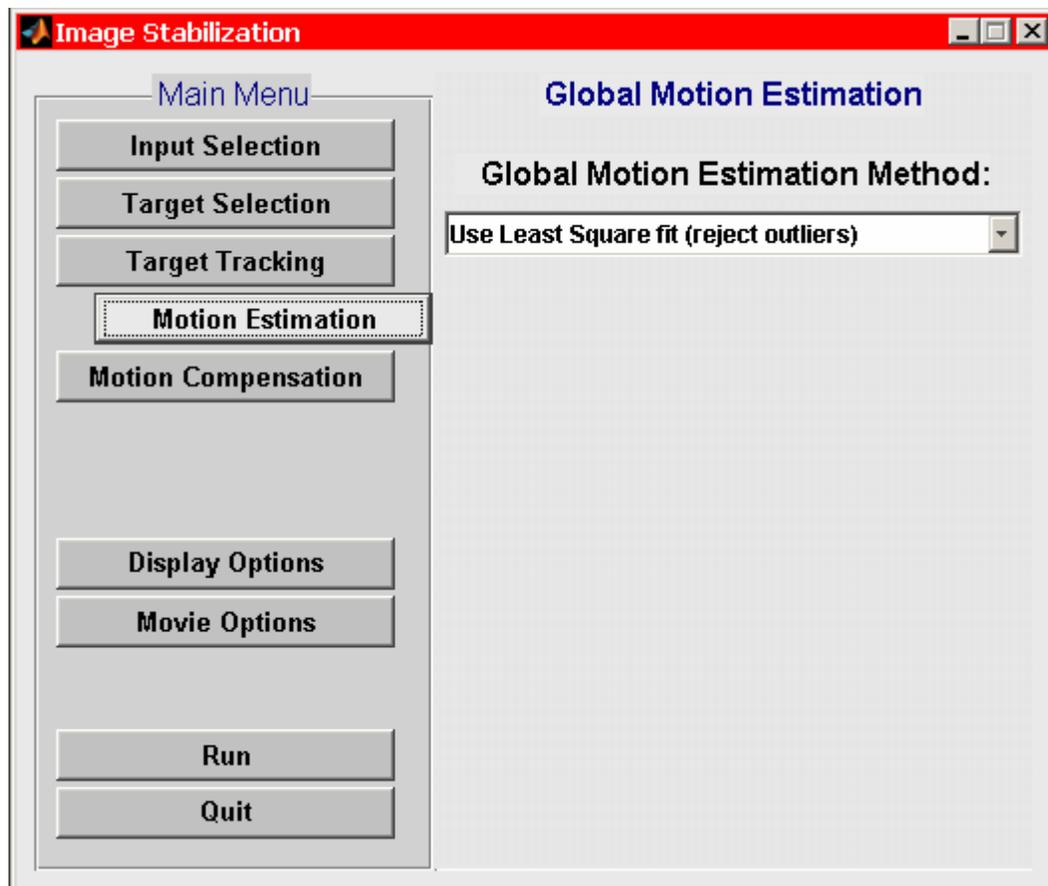
**"Motion Compensation" Menu**

With this menu the user can set the maximum allowed horizontal and vertical displacement of the original image to compensate for the camera motion. Notice that these settings will affect the width and height of the bands which will be cut from the sides of the original image in order to display the stabilized video.

The user can also set the minimum threshold for ignoring the motion between the successive frames. For example, if "ignore motion less than" is set to 3 pixels, then any target displacement that is less than 3 pixels from the previous frame will be ignored.
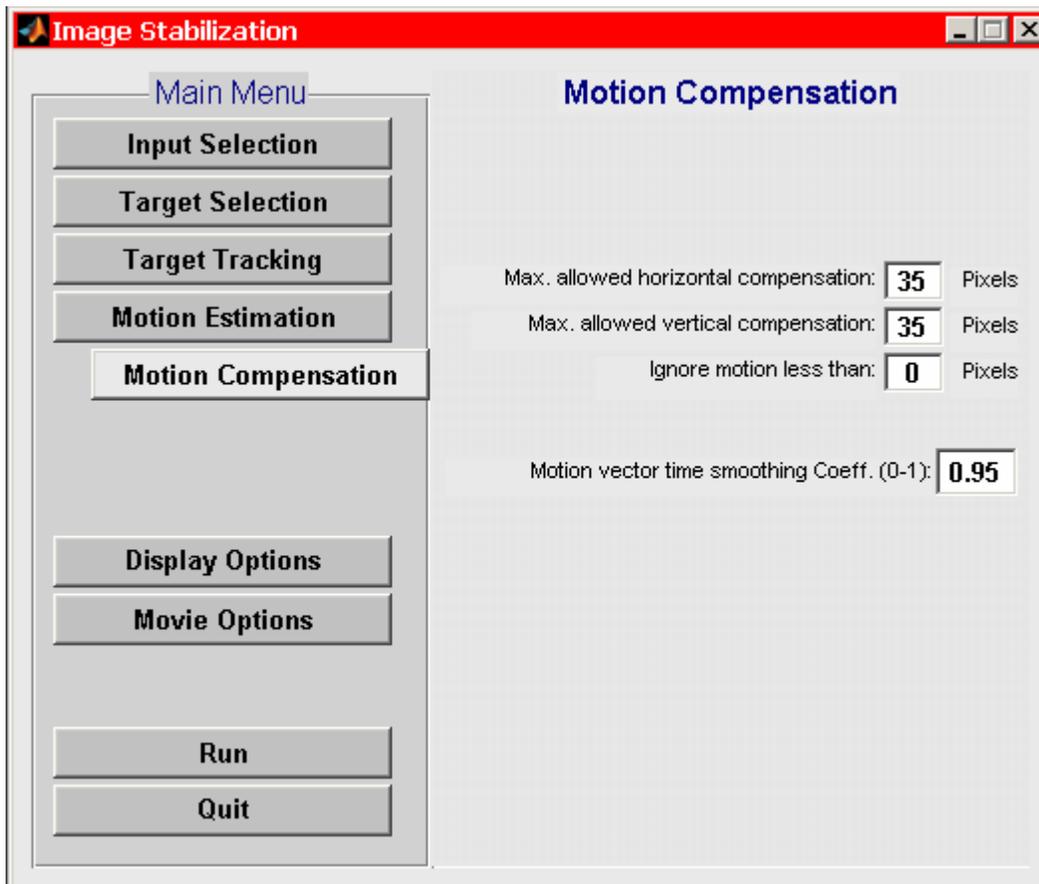
"Display Options" Menu

This menu allows the user to change the display options for the system.
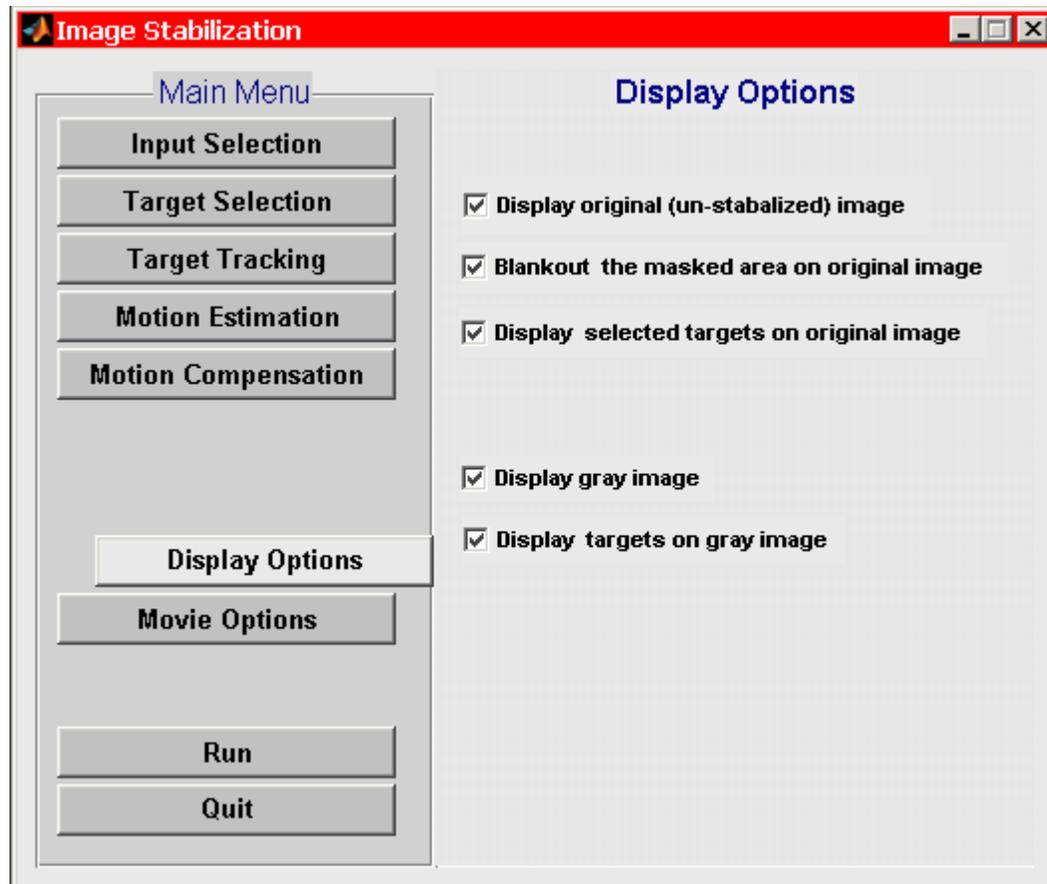
Notes:

Sub-images, targets, and search regions are displayed in different colors for clarity.

- Yellow rectangles represent the boundaries of sub-images.

- White rectangles represent the boundaries of search regions around each target.

- Blue rectangles represent the boundaries of a newly acquired target (targets which are selected in the current frame and are not being tracked yet).

- Red rectangles represent the boundaries of targets which are being tracked but are not participating in the calculation of the global motion vector.

- Green rectangles represent the boundaries of targets which are being tracked and are participating in the calculation of the global motion vector.

"Movie Options" Menu

This menu allows the user to record the system window (including the original un-stabilized frames and the stabilized frames) as a movie. The movie will be created as an avi file in the Matlab working directory named "temp_movie.avi." Windows Media Player can be used to play this file at a later time. The user can save this file under a different name by clicking on the "Save Movie" button.