Source Code for Motion Vector Outlier Rejection Cascade for Global Motion Estimation

This file describes the source codes for the **Motion Vector Outlier Rejection Cascade for Global Motion Estimation** developed in the following paper:

Yue-Meng Chen and Ivan V. Bajić, "Motion vector outlier rejection cascade for global motion estimation," Accepted for publication in *IEEE Signal Processing Letters*, Nov. 2009.

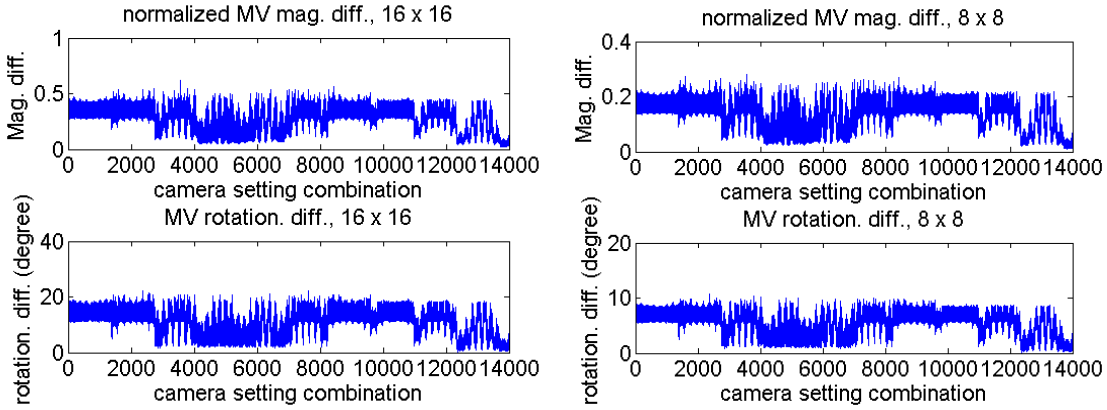
The package includes the following code:

1. Matlab code for the calculation of the 90-th percentile of magnitude and phase difference in Table I.
2. Matlab code to perform analysis of global motion estimation with MV field corrupted by zero-mean Gaussian noise (Fig. 3 and Table IV of the paper).
3. Matlab code to perform analysis of global motion estimation with MV field corrupted by zero-mean Gaussian noise and outliers (Fig. 4 and Table V of the paper).
4. Matlab code to reproduce the global motion compensation performance (Y-PSNR) in the Table-VII of the paper.
5. Matlab code for the motion estimation using exhaustive search, and generated MVs for seven sequences.

1. Calculation of the 90-th percentile of magnitude and phase difference in Table I

The main function to generate the 90-th percentile of magnitude and phase difference in a motion vector (MV) field is **Table_I.m.** The result is used to determine the thresholds for the filters in the cascade.

The following figure is generated for the MV field with 16×16 and 8×8 blocks:



Note from this figure that, for 16×16 and 8×8 blocks, the 90-th percentiles for relative magnitude difference D_{mag} are about 0.4 and 0.2, respectively, and the 90-th percentiles for phase difference are about 19 degrees and 9 degrees, respectively.

2. Matlab code to perform analysis of global motion estimation with MV field corrupted by zero-mean Gaussian noise (Fig. 3 and Table IV of the paper)

To plot the GME performance (SNR vs. iteration) in Fig. 3 and Table IV in the paper, run the following Matlab function:

Fig3.m;
Table_IV.m;

Please note that the results are averaged over 50 runs for each value, and there might be slight difference in the SNR values shown in Table IV.

3. Matlab code to perform analysis of global motion estimation with MV field corrupted by zero-mean Gaussian noise and outliers (Fig. 4 and Table V of the paper)

To plot the GME performance (SNR vs. iteration) in Fig. 4 and Table V in the paper, run the following Matlab function:

Fig4.m;
Table_V.m;

Please note that the results are averaged over 50 runs for each value, and there might be slight difference in the SNR values shown in Table V.

4. Matlab code to reproduce the global motion compensation performance (Y-PSNR) in the Table-VII of the paper

To generate the Y-PSNR reported in Table-VII, please run the following Matlab function:

Table_VII.m ;

Please note for each sequence, you need both raw video sequence (in YUV 4:1:1 format) and motion vectors for each frame. We provide MVs generated by motion estimation using exhaustive search, but reader may require obtaining original video sequence in order to reproduce the results reported in Table-VII.

5. Matlab code for the motion estimation using exhaustive search

To generate the MV field for a input sequence, please run the following Matlab code:

meMain.m ;

You may need to change the path to the YUV sequences used for motion estimation.

We also provide all MVs (for all 7 sequences used in the paper) to reproduce the results reported in Table-VII. They are stored in the corresponding directories named "city", "coastguard", etc., under the generic file name "matlab_mv_%d.txt" where %d stands for the frame number. To understand the structure of these files, please refer to **meMain.m** and functions therein.