

**Image Compression and Packet Video**  
**October 18, 1999**  
**Laboratory Assignment #8**  
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Purpose:

Block matching is a critical algorithm used in video compression. The full search block match is used as part of other predictive search algorithms such as hierarchical Block Match and logarithmic searches. This lab will study the size parameters role in the success of the block search algorithm.

Problem:

Several sequences of images have been provided for your research. The most active images are from a football sequence (obtained from ftp.ipl.rpi.edu). These images have been subsampled by 2 to make them manageable with MATLAB. The block matching algorithm has two parameters that directly effect its performance. The size of the macroblock, and the search region (see Figure 1). For this lab, we will study the change in displacement vector statistics when the macroblock dimensions are 8 and 16. The search region for these runs will be tied to the macroblock dimension (i.e. when dimension is 8, the search region will also be 8).

Three m-files have been provided motion.m (the main routine), blkmatch.m (the block match routine), and mae3.m (the routine that calculates the MAD parameter). In addition, during the writing of the lab, I discovered that there was an error in the MATLAB version 4.2 routine xyzchk.m, which is used by the quiver.m routine. Both routines have been provided for your use. Mathworks has confirmed that the xyzchk.m routine is in error (but they have not endorsed my corrections). These corrections are not needed in the version 5.2 software. Delete them if you are not using version 4.2. Make sure these routines are in the directory that you are executing out of. You may have to copy xyzchk.m to your MATLAB directory (on my system: c:\matlab\toolbox\matlab\polyfun\xyzchk.m)

Modify the routine blkmatch.m to collect the magnitude of the displacement vector. The vectors are stored in the arrays (vectorx and vectory). Examine the code to see how this vector is used. Compute the magnitude of the vector, and collect a histogram of the magnitudes. After the program has completed its subplots, reset the plot for single plot (subplot(1,1,1)) and plot the histogram.

Collect these statistics for the following images:

foot1.tif versus foot0.tif  
foot1.tif versus foot2.tif

Note that the results will reflect forward and backward prediction.

## Reference Picture

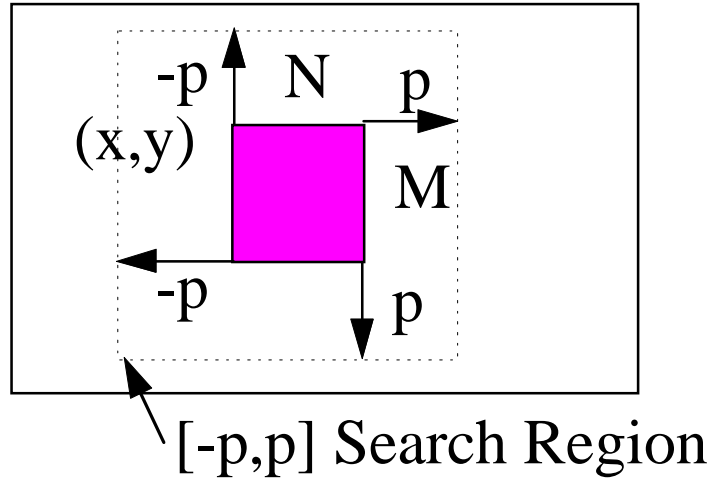


Figure 1 - Definition of Program Parameters

Extra Credit:

Using the displacement vector produced by the program, generate a output image that is based on the prediction. For example, using Foot1.tif as the reference image, and Foot2.tif as the predicted image, take the blocks defined in foot1.tif, and create an image that reflects the displacement. (Figure 2).

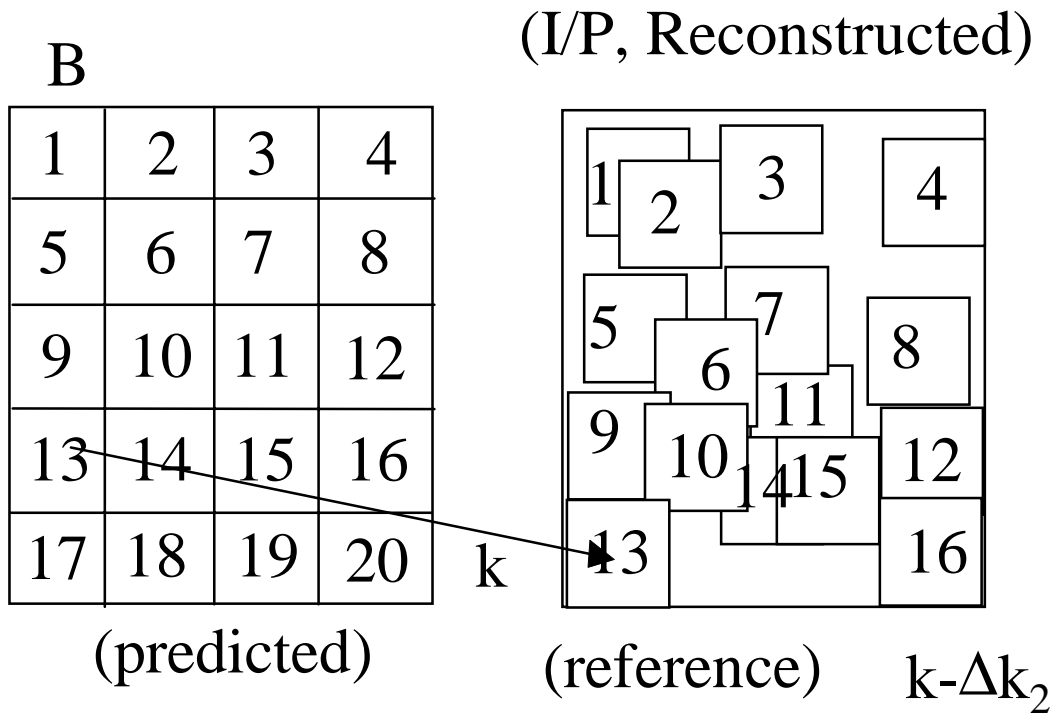


Figure 2 - Predicted frame Results

Frame 0 Image

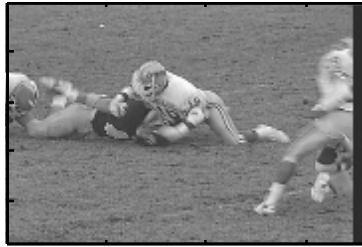


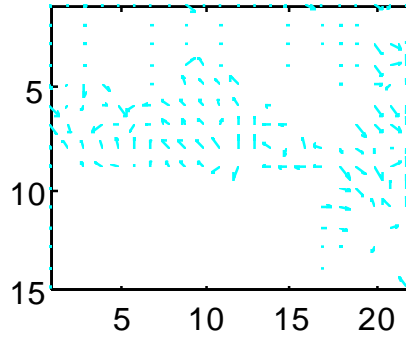
Image Size 243 x 360

Frame 1 Image



Image Size 243 x 360

Motion Vectors



Motion Vectors

