Block Matching Diagrams

A set of diagrams illustrating motion estimation with block matching

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Please credit Matt Foster (http://my-mili.eu)

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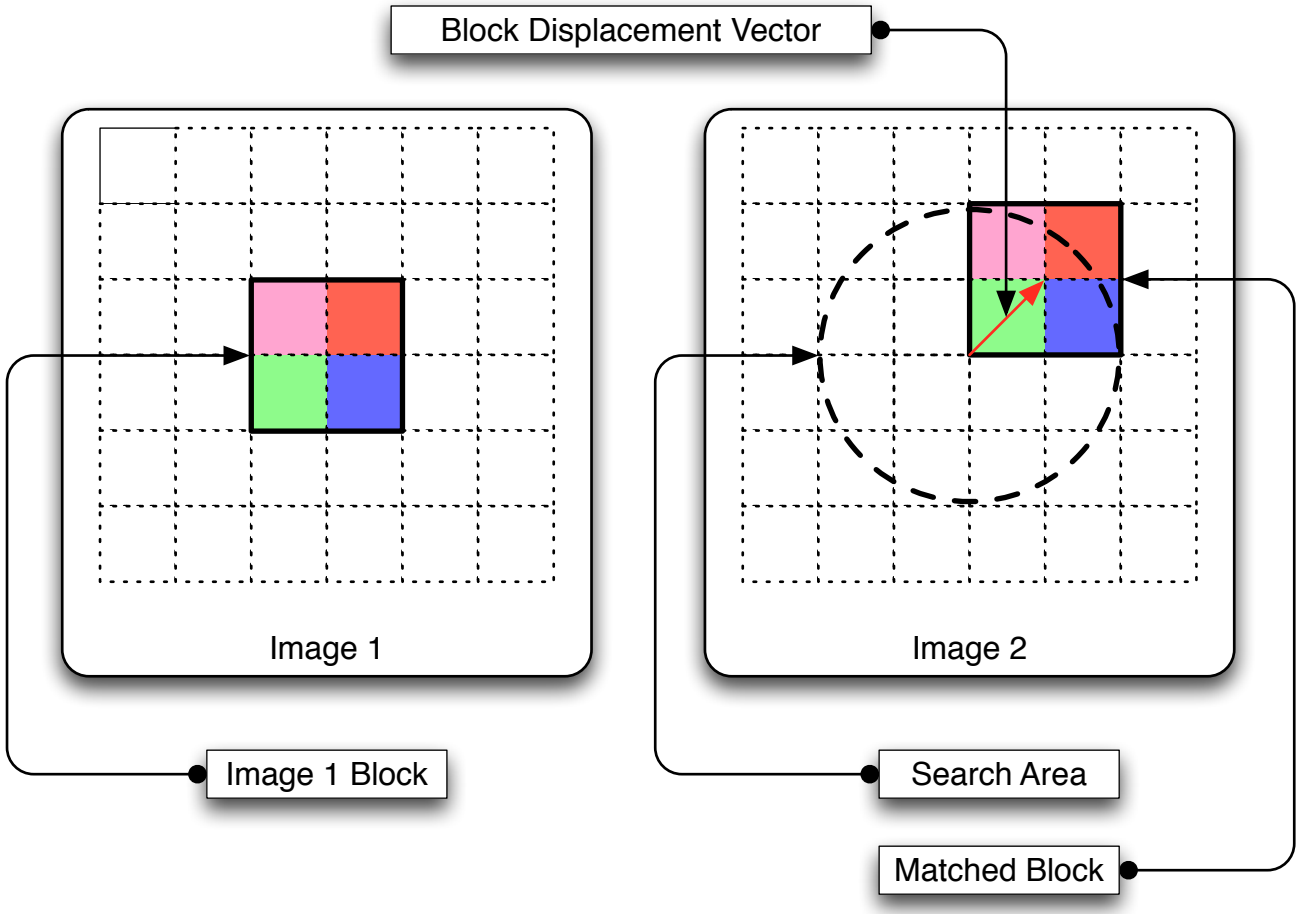
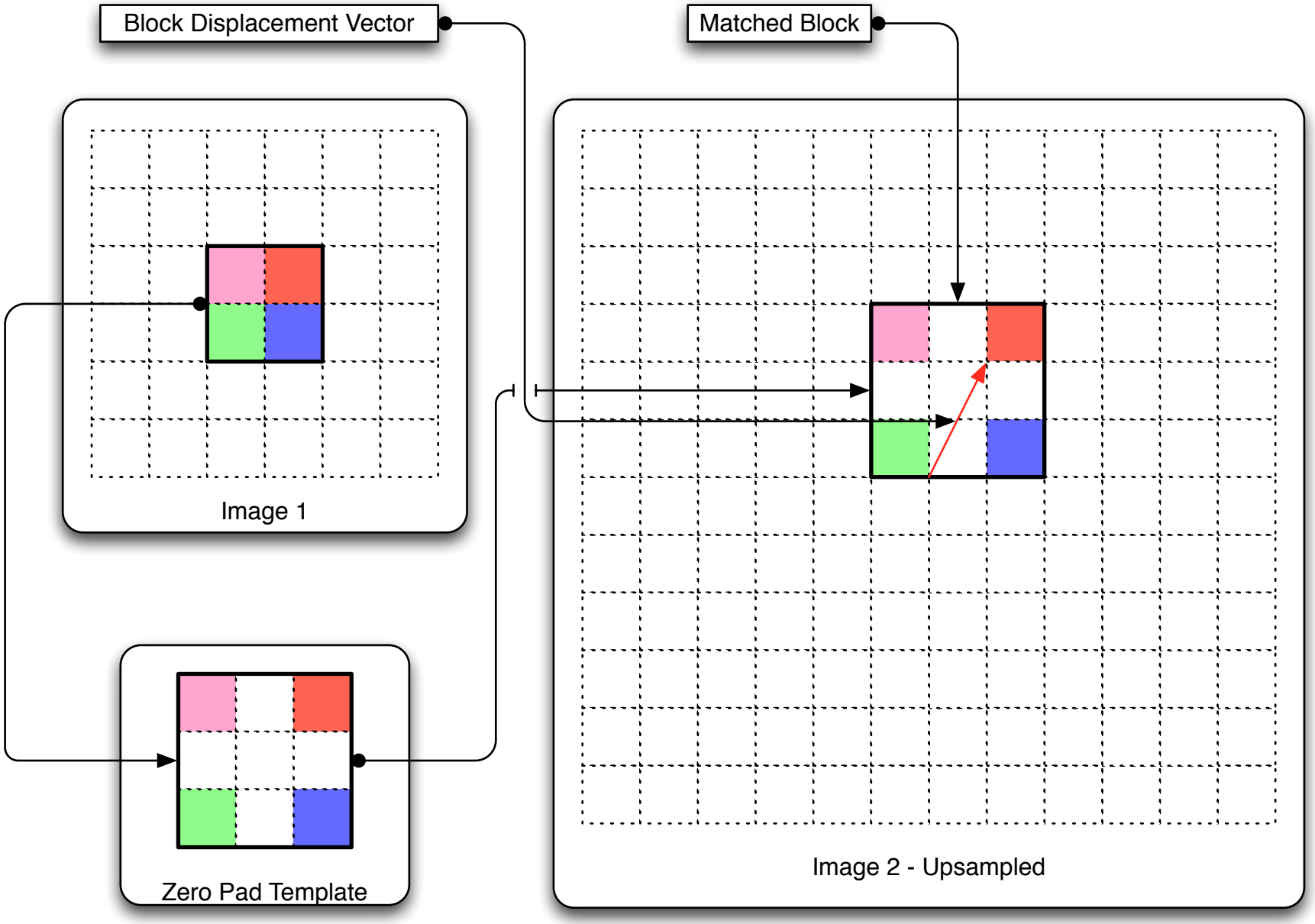
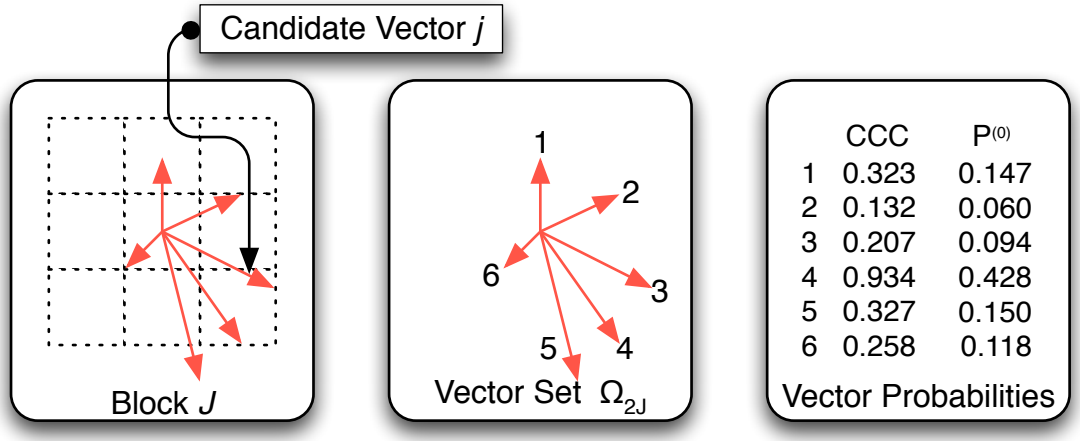


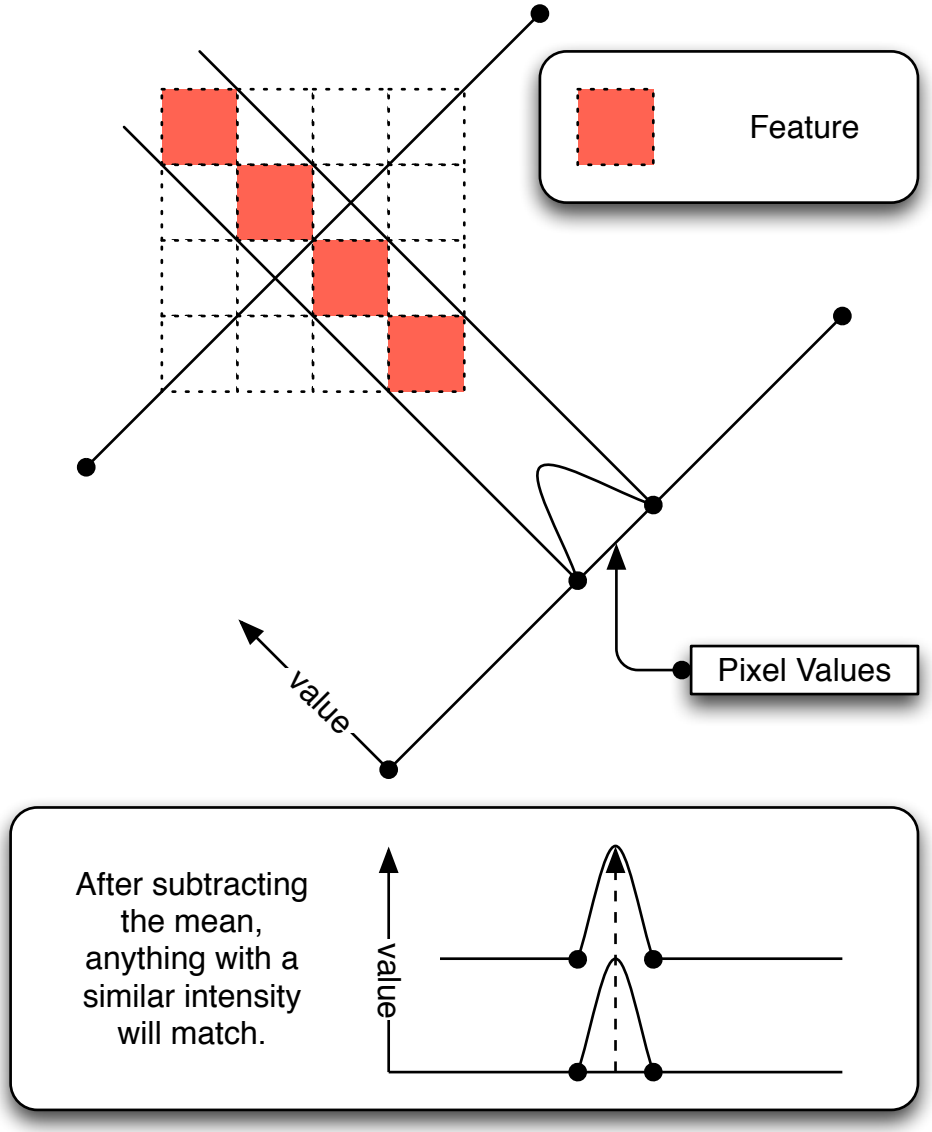
The block matching process works by sliding from a source image to different positions in a destination image, and comparing the two blocks. The direction of motion is then taken as the displacement of the block which results in the highest similarity.



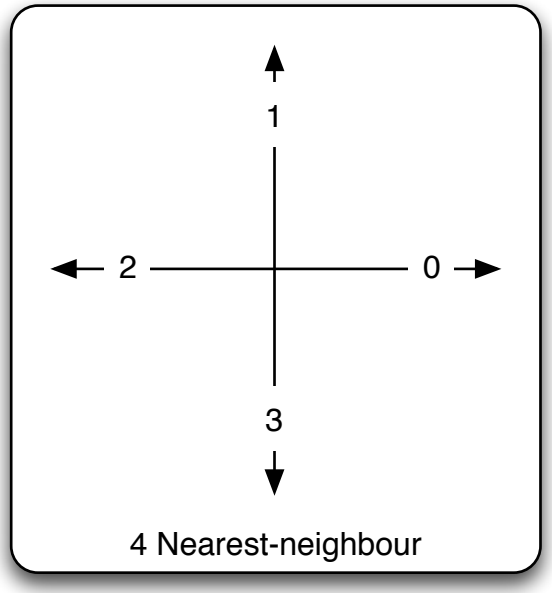
Sub-pixel block matching is an extension to block matching which up-samples the source block (by padding with zeros), and the destination (by interpolating), and then uses block matching as before. The result is a motion estimate which is accurate to within a fraction of a pixel. The fraction is determined by the level of up-sampling, i.e. up-sampling by 2 gives vectors with a ½ pixel resolution.



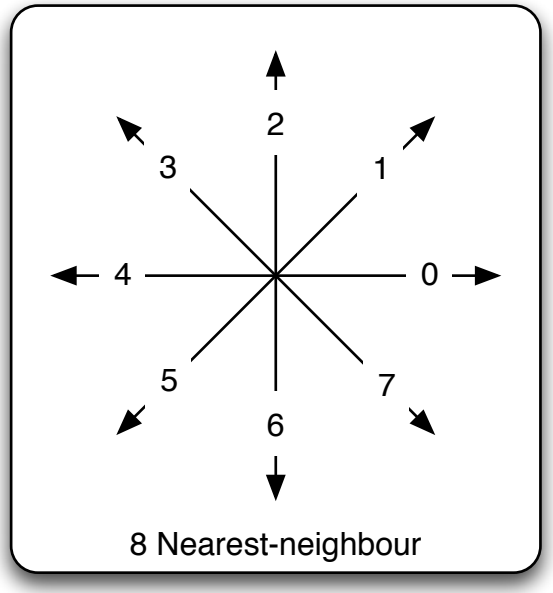
Relaxation labelling takes vectors from block matching, and uses a probabilistic labelling system to find the best vector. In this case, best means the vector which results in the smoothest field, whilst keeping the similarity measure as high as possible.



The 'correlation problem' is a problem which can occur when using small blocks for block matching, and using the cross-correlation to measure similarity. Because the mean is subtracted from the blocks being compared, small features can appear very similar, leading to false matches.



4 Nearest-neighbour



8 Nearest-neighbour

Boundary tracing is a simple method of converting a shape into a description of its boundary. Chain codes are a simple boundary description which works be describing the direction of the next boundary pixel relative to the current. These directions show a typical chain code numbering scheme.