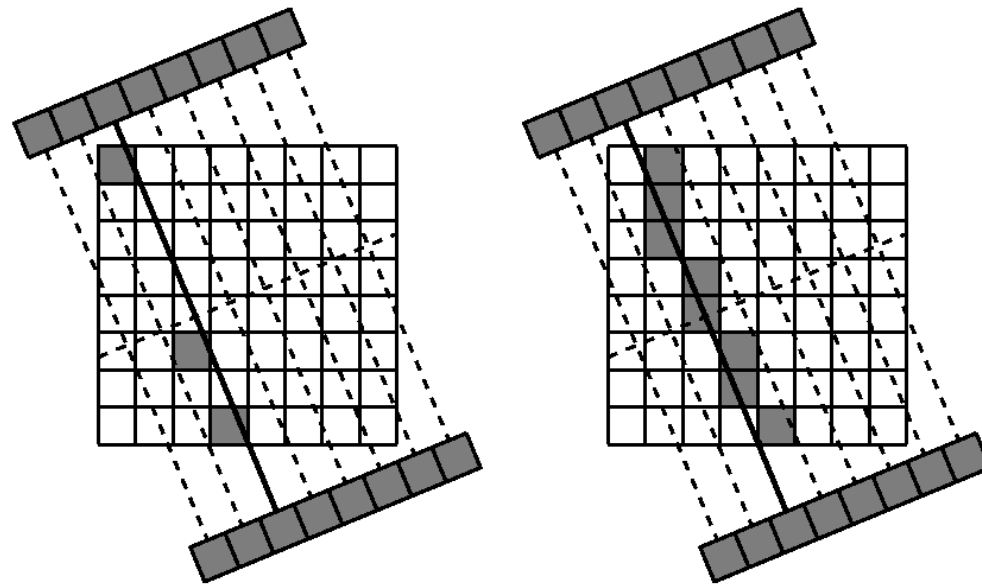


2.3 Implementation

Algorithm for the image rotation approach is implemented with backward strategy. That is, $\hat{g}(s, \theta)$ the discrete Radon transform for the line defined by pair (s, θ) , is the sum of the *source pixels* of the pixels in the corresponding column. Source pixels are determined according to the interpolation method.

The scanner rotation algorithm is somewhat more complicated. First we must determine the pixels cut by a coincidence line and additionally compute the weighting factors for those pixels. The pixels cut by a coincidence line are searched in two parts, first a horizontal search on x -axis and then a vertical search on y -axis. Figure at the below left show the pixels found in the horizontal search and on the right the pixels found in the vertical search.



The second step in the scanner rotation algorithm is implemented to work simultaneously with the first step. That is, when a pixel is found the weighting coefficient is computed right on spot. The pixels that are not hit by the coincidence line do not contribute to that line, thus the weighting coefficient is always zero for those pixels. We have implemented three schemes for the weighting coefficient for the hit pixels. First, all the hit pixels get weighting coefficient one. Second and third scheme take into consideration that some pixels are hit “more” than others, this is realised by computing the weighting coefficient from the *length of intersection* or from the *exact area of intersection*. In the exact area of intersection scheme we consider the coincidence line rather as a coincidence stripe. The width of the stripe is the distance between the lines and the corresponding coincidence line is the parallel bisector of the stripe.

A very helpful feature of the system model is that it is highly symmetrical. The image grid is always a square, the parallel lines are equidistant and the set of angular positions can be partitioned in four subsets of equal size. Use of symmetries facilitates the implementation and accelerate the computation as only one of the subsets must be calculated explicitly, rest can be determined via symmetries. The projection matrix containing the weighting coefficients can also be compressed in smaller space as only a part of the coefficients is enough to define the system. Next figure illustrates the symmetry group of a square which can be used in our system model. Idea is that one line in one subset of angular positions describes altogether eight lines on the image grid. In the figure $\rho_{P,\phi}$ is a rotation of angle ϕ about point P , and σ_x a reflection on point or line x .

