**REPORT 3**

In this report, the filter that uses in application such as Prewitt, Sobel, Laplacian and other diagonal filters are examined by comparing each other.

**PREWITT OPERATOR**

It detects two types of edges: horizontal edges and vertical edges.

F = {-1 0 1 ; -1 0 1 ; -1 0 1}, for vertical edges.

F = {-1 -1 -1 ; 0 0 0 ; 1 1 1}, for horizontal edges.

By using Prewitt operator, horizontal and vertical edges in the image can be detected properly.

**SOBEL OPERATOR**

Sobel operator is similar to the Prewitt operator. Only difference of Sobel operator is that Sobel operator coefficients are not fixed and they can be adjusted according to the requirements. For example;

F = {-1 0 1 ; -2 0 2 ; -1 0 1}, for vertical edges.

F = {-1 -2 -1 ; 0 0 0 ; 1 2 1}, for horizontal edges.

When comparing Prewitt and Sobel operator’s results, you can find that Sobel operator finds more edges than Prewitt operator. This is because Sobel operator have more weight to pixel intensities around the edges.

**DIAGONAL OPERATOR**

Diagonal operators like Robinson Compass and Kirsch Compass masks take into consideration diagonal edges from image. These operators provide more edges information about image.

**LAPLACIAN OPERATOR**

Laplacian operator is one of the most effective derivative masks to find edges in an image. The main difference between Laplacian operator and other operators that are mentioned above is that all operators are first order derivative masks but Laplacian is second order derivate mask. Also, Laplacian operator is an isotropic mask. It takes into account outward and inward edges instead of directional ones.

A simple example of Laplacian mask is:

L = {0 1 0 ; 1 -4 1 ; 0 1 0}, positive Laplacian mask.

L = {0 -1 0 ; -1 4 -1 ; 0 -1 0}, negative Laplacian mask.