4. RESEARCH METHODOLOGY
4 RESEARCH METHODOLOGY

The research methodology involves three major stages namely
- Developments of tools
- Data Flow Diagrams
- Testing with sample data

4.1 DEVELOPMENT OF TOOLS

The set of tools developed in the present work are broadly classified into two categories, namely
- Standard tools
- Application specified tools

Standard Tools: these are common in any application software that includes to access inputs, viewing them in convenient sizes with panning saving into required formats and print facilities.

Fig 4.1: a few Standard tools created in the application
The following tools are developed in the application to process the image files to enhance the digital images in different ways. Using visual C++ basic programming develops the tools.

**Initial:**  
- Read  
- Select  
- Reset

**Image Processing**

**Applying Colors:**

![Applying Colors](image)

Fig 4.2 Applying Colors

**Filters:**

- SE_Diagonal Filter  
- NE_Diagonal Filter  
- Right Diagonal Filter  
- Horizontal Filter  
- Horizontal_Q Filter  
- Vertical_filter,

![Different Filters](image)

Fig 4.3: Different Filters
Emboss:
Emboss-NW
Emboss-East

Engrave:
Engrave-NW
Engrave-East

Special Functions:
Sweeping
Smoothening
Sharp
Gray Scale
Lightening
Blurring

**DFig 4.4 Some Special Functions**

**Description of Application tools**
The Image Processing Software filters fall into 8 general categories. In addition, third-party filters appear at the bottom of the Filter menu.
SE_Diagonal Filter
NE_Diagonal Filter
Right Diagonal Filter
Horizontal Filter
Horizontal_Q Filter
Vertical_filter
Mask_filter
Invert_All

**Sharpen**
Sharpen tool improves the clarity of the image. Find the areas in the image where significant color changes occur and sharpen them. The Sharpen Edges filter sharpens only edges while preserving the overall smoothness of the image. Use this filter to sharpen edges without specifying an amount.

**Gray Scale Image:**
Here we convert color of image to gray scale images. We do this by reading an image into a pixel array, then by converting each of those pixels to gray.

**Lightening Image:**
Some times we require to lighten the dark image. Here we can lighten images by adding the same positive number to each color value(red, green, and blue).
The Lighting Effects filter lets one produce myriad lighting effects on RGB images by varying 17 light styles, 3 light types, and 4 sets of light properties. One can also use textures from grayscale files (called bump maps) to produce 3-D-like effects and save ones own styles for use in other images. The Lighting Effects filter works only on RGB images.
**Embossed Image:**
We will create a striking visual effect by embossing an image which makes to appear to be raised in 3D.

**Engraved Images:**
We create embossed images by taking the differences between a pixel and the pixel to the upper-left of it and adding 128 to the result to create gray scale image. We can crate engraved images by taking the difference between a pixel and the pixel to its lower right and adding 128 to the result.

**Sweeping Images**
In Sweeping of images we only wanted to plot the difference between adjacent pixels that is the difference between two pixels only to create embossed or engraved images.

**Blurring Images**
We can Blur images by averaging of pixels.

**Applying Filters**
To use a filter, choose the appropriate submenu command from the Filter menu. These guidelines can help one in choosing filters:
- The last filter chosen appears at the top of the menu.
- Filters are applied to the active, visible layer.
- Filters cannot be applied to Bitmap-mode, indexed-color, or 16-bit per channel images.
- Some filters only work on RGB images.
- Some filters are processed entirely in RAM.
Applying filters—especially to large images—can be time-consuming. Previewing effects can save time and prevent unintended results. Depending on the filter, one may have a preview window or the option to preview effects on the entire layer.

One can apply a filter to an individual channel, apply a different effect to each color channel, or apply the same filter but with different settings.

Grayscale image converted to RGB, and with Graphic Pen filter applied to green and blue channels

**Improving Performance with filters**

Some filter effects can be memory intensive, especially when applied to a high-resolution image. One can use these techniques to improve performance:

- One can try out the filters and settings on a small portion of an image.
- Applying the effect to individual channels—for example, to each RGB channel—if the image is large and one is having problems with insufficient memory. (With some filters, effects vary if applied to the individual channel rather than the composite channel, especially if the filter randomly modifies pixels.)
- One can Experiment on a low-resolution copy of one file and it has to be noted the filters and settings used. Then apply the filters and setting to the high-resolution original.
• One can free up memory before running the filter by using the Purge command. For more information, see correcting mistakes.
• Allocate more RAM to Photoshop. If necessary, exit from other applications to make more memory available to Photoshop.
• Try changing settings to improve the speed of memory-intensive filters, such as Lighting Effects, Cutout, Stained Glass, Chrome, Ripple, Spatter, Sprayed Strokes, and Glass filters. (For example, with the Stained Glass filter, increase cell size. With the Cutout filter, increase Edge Simplicity, or decrease Edge Fidelity, or both.)
• If one plan to print to a grayscale printer, convert a copy of the image to grayscale before applying filters. However, applying a filter to a color image and then converting to grayscale may not have the same effect as applying the filter to a grayscale version of the image.
4.2 Data Flow Diagrams

LEVEL 0 DFD

SATellite Data Image Processing

Data/Control

Users

Output/Communication
LEVEL 2 DFD FOR APPLYING COLORS

LEVEL 2 DFD FOR APPLYING COLORS

APPLYING COLORS

RED

BLUE

GREEN

RED-BLUE

RED-GREEN

BLUE-GREEN

IMAGE

IMAGE

IMAGE

IMAGE

IMAGE
LEVEL 2 DFD FOR FILTERS

FILTERS

- SE-DIAGONAL FILTER
- NE-DIAGONAL FILTER
- HORIZONTAL FILTER
- HORIZONTAL-Q FILTER
- VERTICAL FILTER

IMAGE

IMAGE

IMAGE

IMAGE
LEVEL 2 DFD FOR EMBOSS

EMBOSS

EMBOSS-NW  EMBOSS-EAST

IMAGE  IMAGE
LEVEL 2 DFD FOR ENGRAVE

ENGRAVE

ENGRAVE-NW

ENGRAVE-EAST

IMAGE

IMAGE
LEVEL 2 DFD FOR SPECIAL FUNCTIONS

SPECIAL FUNCTIONS

SWEEP-ING

SMOOTH-ING

SHARPE-ING

GRAY-SCALE

LIGHTEN-ING

BLURING

IMAGE

IMAGE

IMAGE

IMAGE