Schematic Control Flow Diagram of Application of 2-D Fourier Transform on an Image:
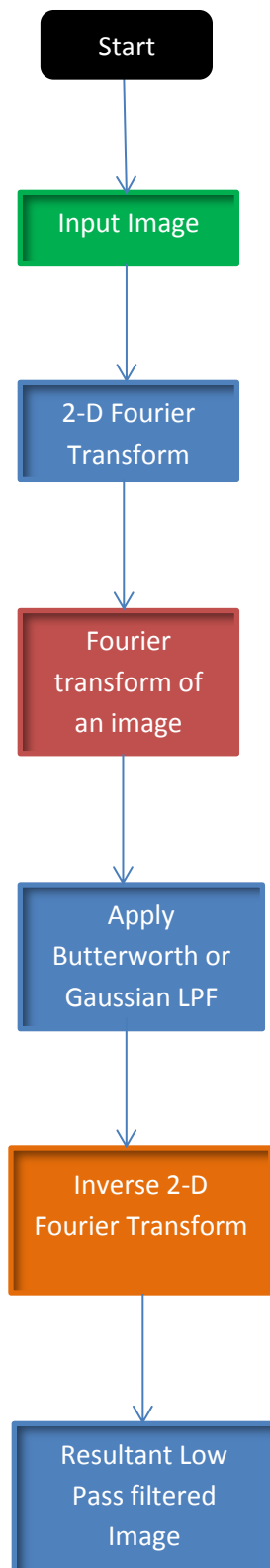
```
                Start
                  │
                  ▼
             Input Image
                  │
                  ▼
            2-D Fourier
             Transform
                  │
                  ▼
             Fourier
           transform of
            an image
                  │
                  ▼
              Apply
          Butterworth or
          Gaussian LPF
                  │
                  ▼
            Inverse 2-D
         Fourier Transform
                  │
                  ▼
           Resultant Low
           Pass filtered
               Image
```

Algorithmic Steps:

1. Input Image.
2. Compute **2-Dimensional Fourier Transform** of the input image.(*Fast Fourier Transform* Algorithm has been used)
3. Generate Fourier Magnitude Spectrum.
4. Shift the zero frequency components to the origin.
5. Applying contrast enhancement to the above for visualization ease (Logarithmic Stretch).
6. Choose among Butterworth Low Pass Filter and Gaussian Low Pass Filter.

   6.1. For Butterworth Filter:

   6.1.1. Enter the value of N and the Cut off frequency.
   6.1.2. Generate the Filter response plot.
   6.1.3. Apply the filter to generate a Low pass filtered spectrum.
   6.1.4. Apply 2-D Inverse Fourier Transform to obtain the Low Pass filtered image.

   6.2 For Gaussian Filter:

   6.2.1.   Enter the value of Cut off Frequency.
   6.2.2.   Generate the Filter response plot
   6.2.3.   Apply the filter to generate a Low pass filtered spectrum.
   6.2.4.   Apply 2-D Inverse Fourier Transform to obtain Low Pass filtered image.

Algorithmic Complexity Discussion:

2-Dimensional Discrete Fourier Transform has time complexity of the order of $O(n^4)$, which is a major performance bottle-neck. In order to optimize our code, we have used Fast Fourier Transform (**FFT**) Algorithm which reduces the time complexity to $O(n^2 \log n)$ [n = no. of inputs].