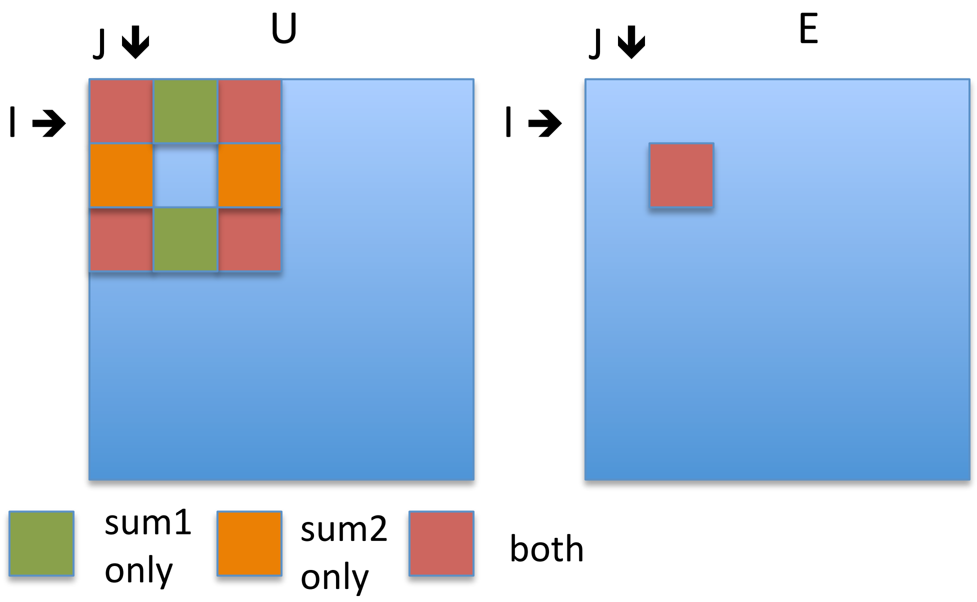
Assignment 2: Memory Hierarchy Optimization Due Fri day, February 8 at 5PM

Sobel edge detection:

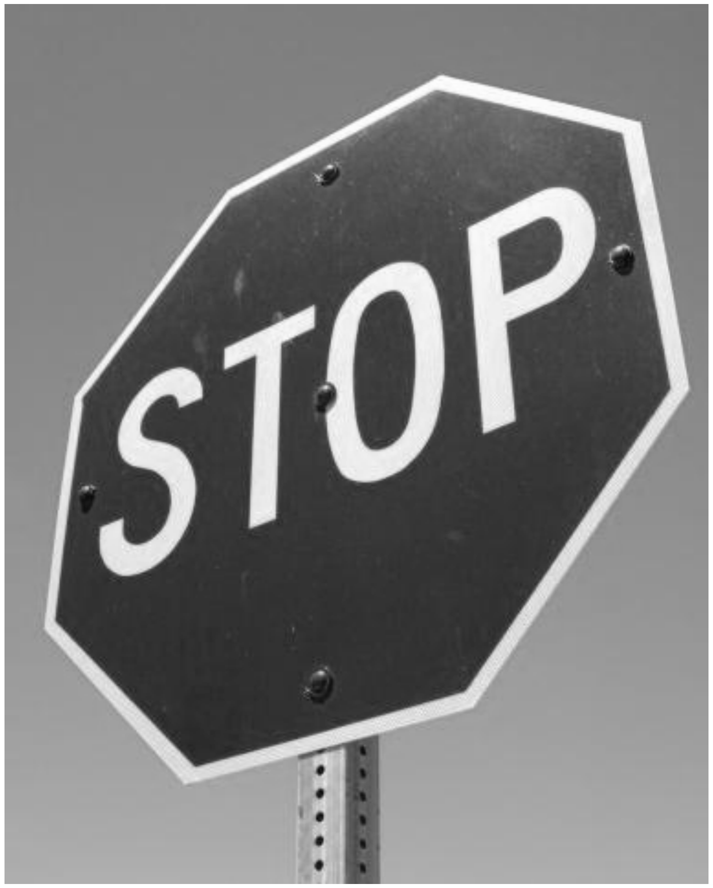
Find the boundaries of the image where there is significant difference as compared to neighboring "pixels" and replace values to find edges



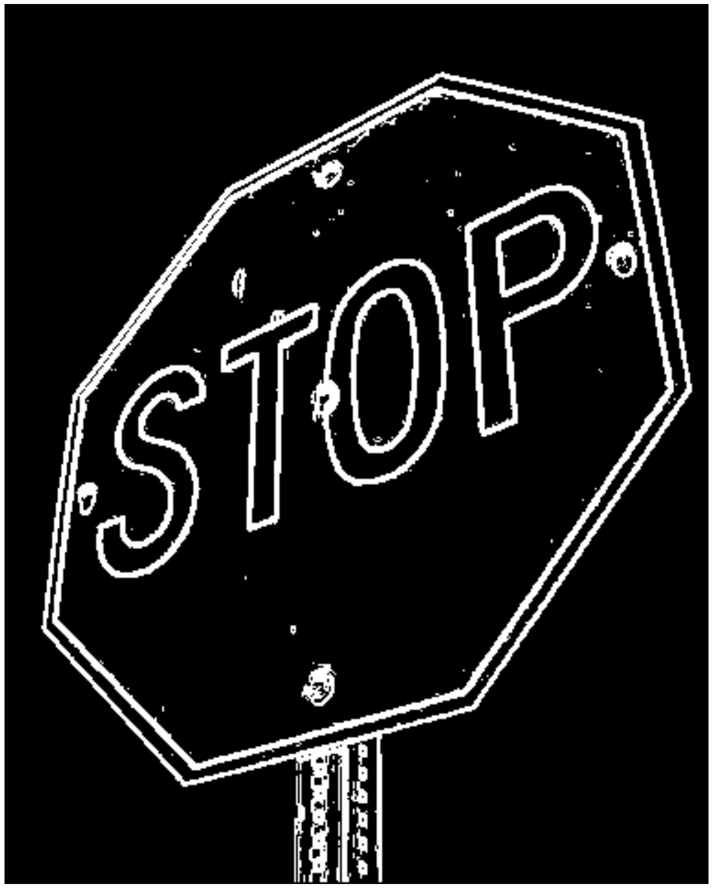
```
for (i = 1;  i < ImageNRows - 1; i++)
  for (j = 1; j < ImageNCols -1; j++)
   {
     sum1 = u[i-1][j+1] - u[i-1][j-1]
          + 2 * u[i][j+1] - 2 * u[i][j-1]
          + u[i+1][j+1] - u[i+1][j-1];
     sum2 = u[i-1][j-1] + 2 * u[i-1][j] + u[i-1][j+1]
          - u[i+1][j-1] - 2 * u[i+1][j] - u[i+1][j+1];

     magnitude =  sum1*sum1 + sum2*sum2;
     if (magnitude > THRESHOLD)
       e[i][j] = 255;
     else
       e[i][j] = 0;
   }
```

Example

Input



Output



General Approach

0. Provided
   a. Input file
   b. Sample output file
   c. CPU implementation

1. Structure
   a. Compare CPU version and GPU version output [compareInt]
   b. Time performance of two GPU versions (see 2 & 3 below) [EventRecord]

2. GPU version 1 (partial credit if correct)
   implementation using global memory

3. GPU version 2 (highest points to best performing versions)
   use memory hierarchy optimizations from previous, current lecture

4. Extra credit: Try two different block / thread decompositions. What happens if you use more threads versus more blocks? What if you do more work per thread? Explain your choices in a README file.

Handin using the following on CADE machines, where probfile includes all files

“handin cs6235 lab2 <probfile>”