Computer Vision

Assignment-3

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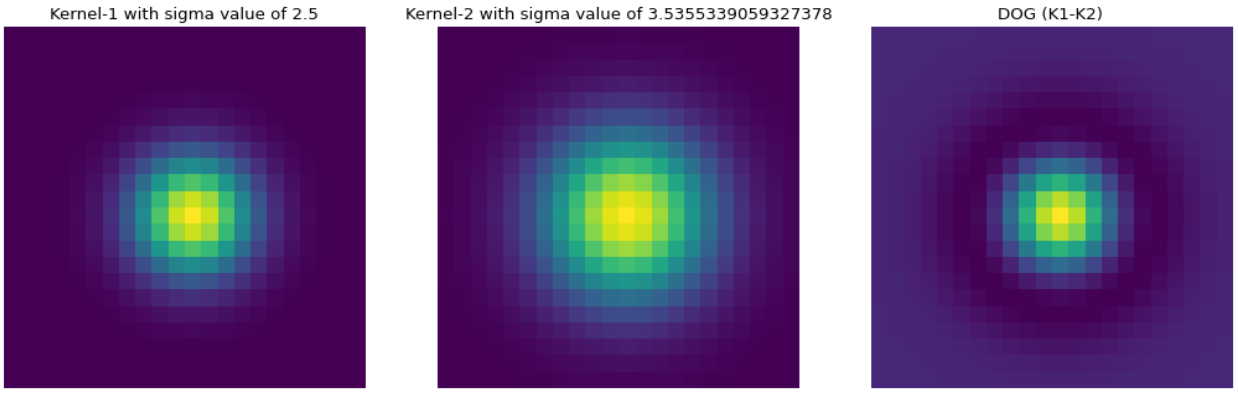
Task-a:

- Based on the given data difference of kernels is performed.The respective kernels are as shown in below



- The given kernel is 2D with the shape of 22 by 22 as shown in figure
- Here sigma1 is taken as 2.5 and sigma2 is root of 2 times sigma1 i.e 3.535
- Size of kernel is (6*sigma2 , 6*sigma2) so it becomes (22 , 22)

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Kernel-1 shape is : (22, 22)
Kernel-2 shape is :  (22, 22)
DOG shape is : (22, 22)
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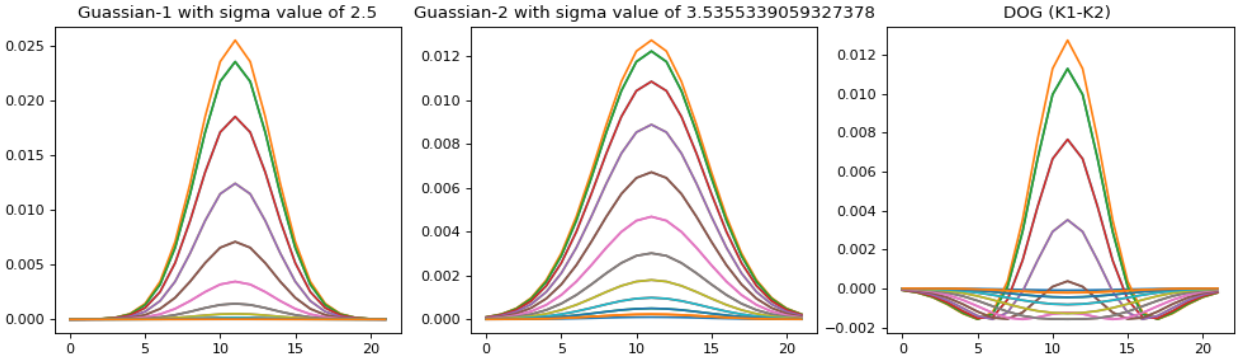
- The respective gaussian distributions of the kernels are as shown below



- By the **kernel matrix** it is clear that majority intensities are at the center with some radius R. and out of that there is no intensity values so its a **bandpass structure**

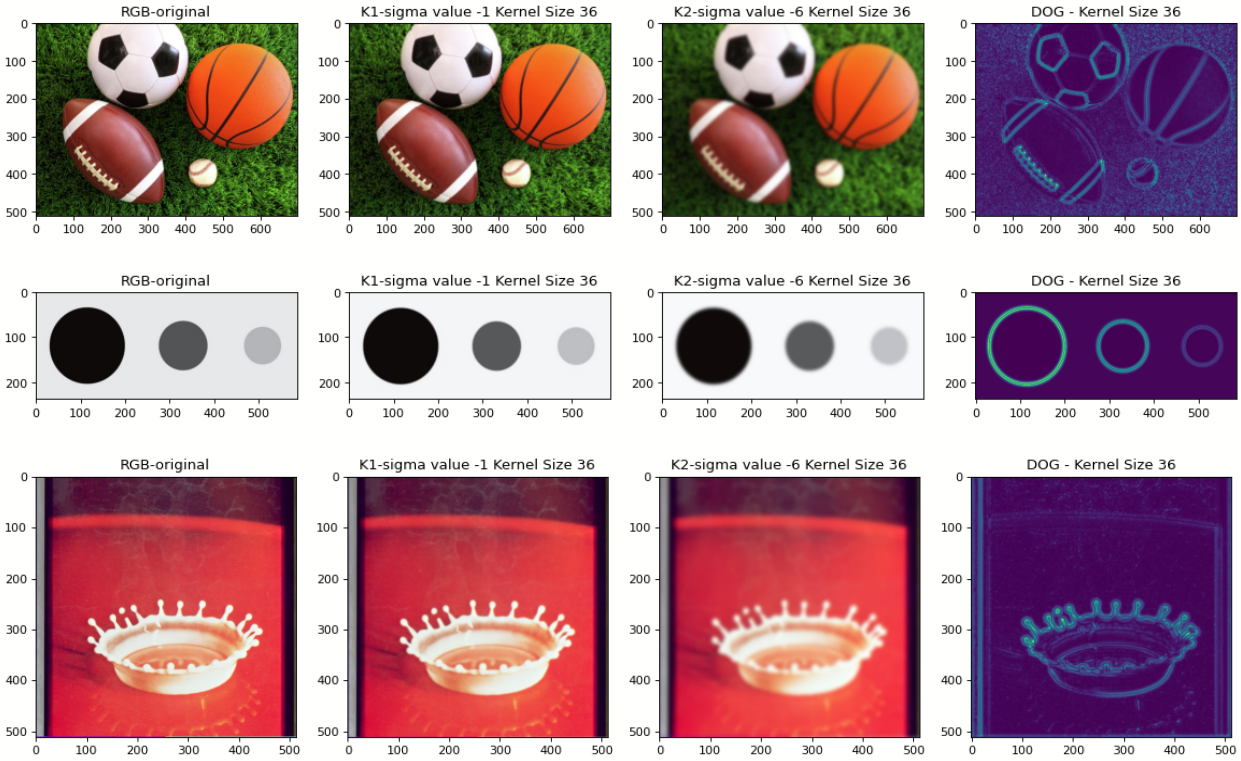
Task-b:

Case1: sigma1 << sigma2

signa1=1

signal2=6

Here the results are shown below

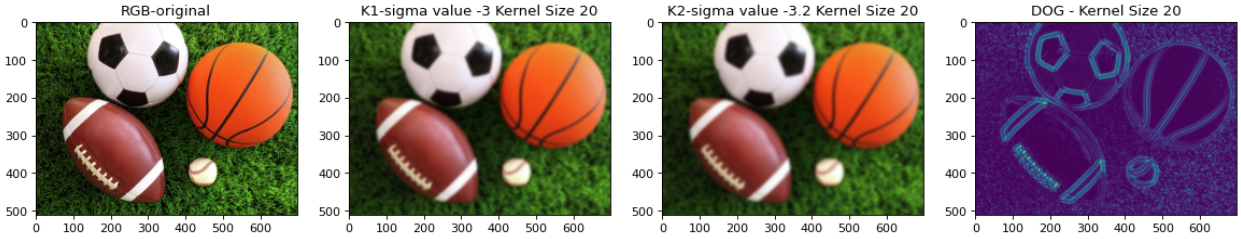


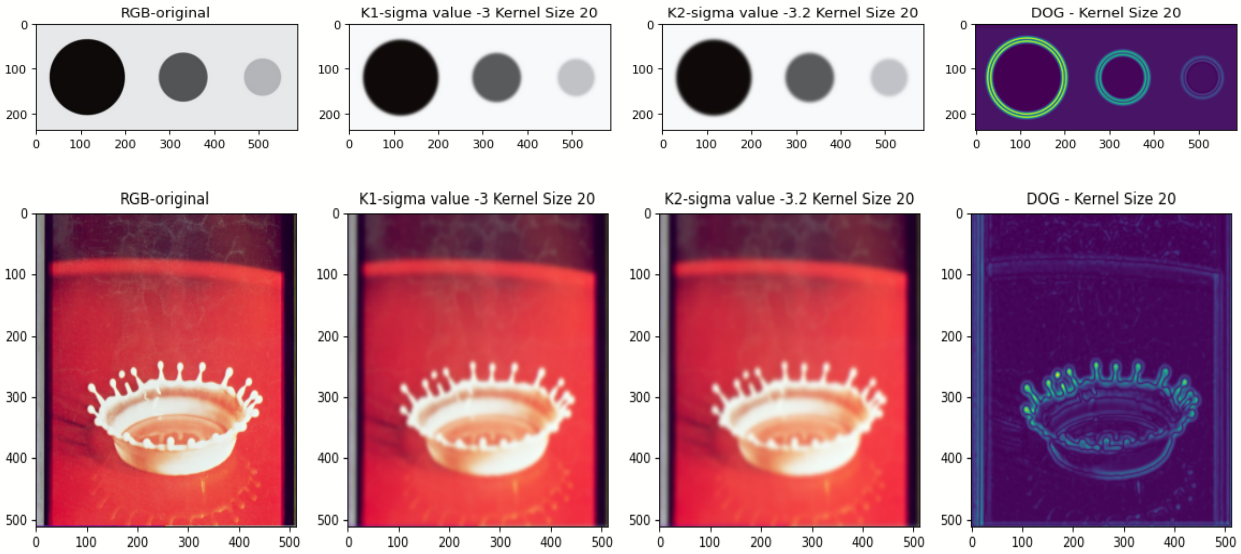
Case2: sigma1 = sigma2 (Nearly) and small

signa1=3

signal2=3.2

Here the results are shown below



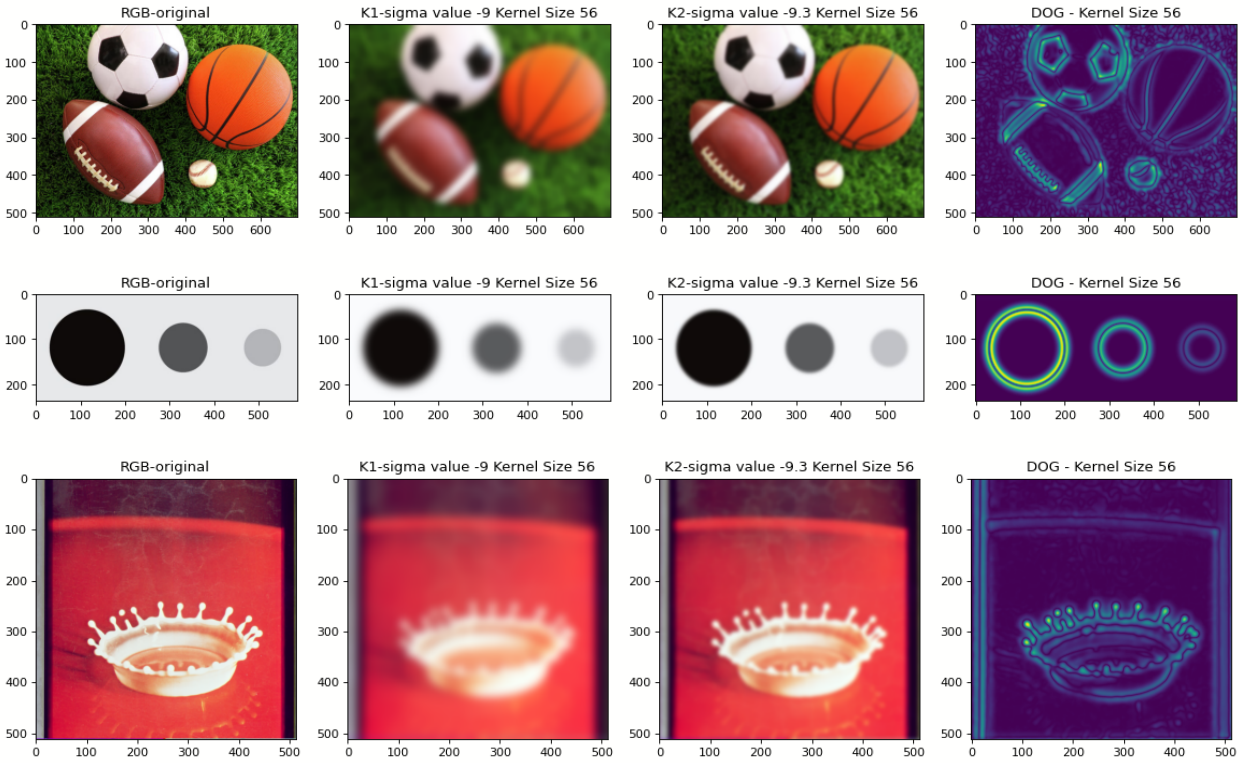


Case3: sigma1 = sigma2 (Nearly) and Large

signal1=9

signal2=9.3

Here the results are shown below



Comments:

- **Blob detection:**
  1. In case-1 the detection of blob is perfect whereas in case-2 and case-3 the blob's outer radius is broden.
  2. So sigma1<<sigma2 is better at blob detection
- **Edge detection:**
  1. If you compare case1,case2,case3 results(specially Drop,Ball images) the edges are clearly improved as sigma is increasing
  2. That is at case3 (sigma1 and sigma2 are nearly equal and large) is good for edge detection
  3. But for the circular shapes like bobs image the edges are getting wider
- **Edge localization:**
  1. If we observe the Ball image in all three cases the inner details are(edges) are sharper in case 3
  2. If we observe the Drop image in all three cases the edge details are very clear at case 3
  3. So for Edge localization case-3 is good, i.e (sigma1 and sigma2 are nearly equal and large).