## **ZFNet**

Let’s now look at the entire AlexNet

1. ZFNet is another 8-layer CNN architecture. Let’s understand it better with a side-by-side comparison with AlexNet.
2. ZFNet is largely similar to AlexNet, with the exception of a few of the layers. Let us highlight those differences.
3. **Convolutional Layer 1**: Input is 227x227x3
   1. Filter Size (**F**) = 7 (7x7x3)
   2. No. of Filters (**K**) = 96
   3. Stride (**S**) = 4
   4. Padding (**P**) = 0
   5. **Parameters** = (7x7x3) x 96 = 14,112
   6. **W1** = 55
   7. **H1** = 55
   8. **D1** = K = 96
   9. **ReLU** Non-linearity function is applied to every 2D area in the output volume.
4. **Convolutional Layer 3**: input is 11x11x256
   1. Filter Size (**F**) = 3 (3x3x256)
   2. No. of Filters (**K**) = 512
   3. Stride (**S**) = 1
   4. Padding (**P**) = 0
   5. **Parameters** = (3x3x256) x 512 = 1,179,648
   6. **W3** = 9
   7. **H3** = 9
   8. **D3** = K = 512
   9. **ReLU** Non-linearity function is applied.
5. **Convolutional Layer 4**: input is 9x9x512
   1. Filter Size (**F**) = 3 (3x3x512)
   2. No. of Filters (**K**) = 1024
   3. Stride (**S**) = 1
   4. Padding (**P**) = 0
   5. **Parameters** = (3x3x512) x 1024 = 4,718,592
   6. **W4** = 7
   7. **H4** = 7
   8. **D4** = K = 1024
   9. **ReLU** Non-linearity function is applied.
6. **Convolutional Layer 5**: input is 7x7x1024
   1. Filter Size (**F**) = 3 (3x3x1024)
   2. No. of Filters (**K**) = 512
   3. Stride (**S**) = 1
   4. Padding (**P**) = 0
   5. **Parameters** = (3x3x1024) x 512 = 4,718,592
   6. **W4** = 5
   7. **H4** = 5
   8. **D4** = K = 512
   9. **ReLU** Non-linearity function is applied.
7. **Max-Pooling Layer 3**: input is 5x5x512
   1. Filter Size (**F**) = 3 (3x3x512)
   2. Stride (**S**) = 2
   3. **Parameters** = 0
   4. **W2m** = 2
   5. **H2m** = 2
   6. **D1m** = 512
8. **Fully Connected Layer 1**: input is 2x2x512 = 2048
   1. Number of Neurons = 4096
   2. Parameters = (2x2x512) x 4096 = 8,388,608
9. The **total difference in the number of parameters** ZFNet - AlexNet = 1.45 Million
10. There are other variants of ZFNet where we use a stride of 2 in the first convolutional layer, thereby changing the subsequent layer dimensions.