**YOLOv3-SPP의 layer와 input&output 크기**

Sequential 단위로 layer index 취급하겠음. 초기 img\_size = 416 설정함.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **idx** | **Layer** | **Input (C, H, W)** | **Output (C, H, W)** | **동작 방식** |
| 0 | Conv-BN-LeakyReLU | (3, 416, 416) | (32, 416, 416) |  |
| 1 | Conv-BN-LeakyReLU | (32, 416, 416) | (64, 208, 208) |  |
| 2 | Conv-BN-LeakyReLU | (64, 208, 208) | (32, 208, 208) |  |
| 3 | Conv-BN-LeakyReLU | (32, 208, 208) | (64, 208, 208) |  |
| 4 | weightedFeatureFusion | (64, 208, 208) | (64, 208, 208) | Layer4 input + Layer1 output |
| 5 | Conv-BN-LeakyReLU | (64, 208, 208) | (128, 104, 104) |  |
| 6 | Conv-BN-LeakyReLU | (128, 104, 104) | (64, 104, 104) |  |
| 7 | Conv-BN-LeakyReLU | (64, 104, 104) | (128, 104, 104) |  |
| 8 | weightedFeatureFusion | (128, 104, 104) | (128, 104, 104) | Layer8 input + Layer5 output |
| 9 | Conv-BN-LeakyReLU | (128, 104, 104) | (128, 104, 104) |  |
| 10 | Conv-BN-LeakyReLU | (128, 104, 104) | (128, 104, 104) |  |
| 11 | weightedFeatureFusion | (128, 104, 104) | (128, 104, 104) | Layer11 input + Layer8 output |
| 12 | Conv-BN-LeakyReLU | (128, 104, 104) | (256, 52, 52), |  |
| 13 | Conv-BN-LeakyReLU | (256, 52, 52) | (128, 52, 52) |  |
| 14 | Conv-BN-LeakyReLU | (128, 52, 52) | (256, 52, 52) |  |
| 15 | weightedFeatureFusion | (256, 52, 52) | (256, 52, 52) |  |
| 16 | Conv-BN-LeakyReLU | (256, 52, 52) | (128, 52, 52) |  |
| 17 | Conv-BN-LeakyReLU | (128, 52, 52) | (256, 52, 52) |  |
| 18 | weightedFeatureFusion | (256, 52, 52) | (256, 52, 52) |  |
| 19 | Conv-BN-LeakyReLU | (256, 52, 52) | (128, 52, 52) |  |
| 20 | Conv-BN-LeakyReLU | (128, 52, 52) | (256, 52, 52) |  |
| 21 | weightedFeatureFusion | (256, 52, 52) | (256, 52, 52) |  |
| 22 | Conv-BN-LeakyReLU | (256, 52, 52) | (128, 52, 52) |  |
| 23 | Conv-BN-LeakyReLU | (128, 52, 52) | (256, 52, 52) |  |
| 24 | weightedFeatureFusion | (256, 52, 52) | (256, 52, 52) |  |
| 25 | Conv-BN-LeakyReLU | (256, 52, 52) | (128, 52, 52) |  |
| 26 | Conv-BN-LeakyReLU | (128, 52, 52) | (256, 52, 52) |  |
| 27 | weightedFeatureFusion | (256, 52, 52) | (256, 52, 52) |  |
| 28 | Conv-BN-LeakyReLU | (256, 52, 52) | (128, 52, 52) |  |
| 29 | Conv-BN-LeakyReLU | (128, 52, 52) | (256, 52, 52) |  |
| 30 | weightedFeatureFusion | (256, 52, 52) | (256, 52, 52) |  |
| 31 | Conv-BN-LeakyReLU | (256, 52, 52) | (128, 52, 52) |  |
| 32 | Conv-BN-LeakyReLU | (128, 52, 52) | (256, 52, 52) |  |
| 33 | weightedFeatureFusion | (256, 52, 52) | (256, 52, 52) |  |
| 34 | Conv-BN-LeakyReLU | (256, 52, 52) | (128, 52, 52) |  |
| 35 | Conv-BN-LeakyReLU | (128, 52, 52) | (256, 52, 52) |  |
| 36 | weightedFeatureFusion | (256, 52, 52) | (256, 52, 52) |  |
| 37 | Conv-BN-LeakyReLU | (256, 52, 52) | (512, 26, 26) |  |
| 38 | Conv-BN-LeakyReLU | (512, 26, 26) | (256, 26, 26) |  |
| 39 | Conv-BN-LeakyReLU | (256, 26, 26) | (512, 26, 26) |  |
| 40 | weightedFeatureFusion | (512, 26, 26) | (512, 26, 26) |  |
| 41 | Conv-BN-LeakyReLU | (512, 26, 26) | (256, 26, 26) |  |
| 42 | Conv-BN-LeakyReLU | (256, 26, 26) | (512, 26, 26) |  |
| 43 | weightedFeatureFusion | (512, 26, 26) | (512, 26, 26) |  |
| 44 | Conv-BN-LeakyReLU | (512, 26, 26) | (256, 26, 26) |  |
| 45 | Conv-BN-LeakyReLU | (256, 26, 26) | (512, 26, 26) |  |
| 46 | weightedFeatureFusion | (512, 26, 26) | (512, 26, 26) |  |
| 47 | Conv-BN-LeakyReLU | (512, 26, 26) | (256, 26, 26) |  |
| 48 | Conv-BN-LeakyReLU | (256, 26, 26) | (512, 26, 26) |  |
| 49 | weightedFeatureFusion | (512, 26, 26) | (512, 26, 26) |  |
| 50 | Conv-BN-LeakyReLU | (512, 26, 26) | (256, 26, 26) |  |
| 51 | Conv-BN-LeakyReLU | (256, 26, 26) | (512, 26, 26) |  |
| 52 | weightedFeatureFusion | (512, 26, 26) | (512, 26, 26) |  |
| 53 | Conv-BN-LeakyReLU | (512, 26, 26) | (256, 26, 26) |  |
| 54 | Conv-BN-LeakyReLU | (256, 26, 26) | (512, 26, 26) |  |
| 55 | weightedFeatureFusion | (512, 26, 26) | (512, 26, 26) |  |
| 56 | Conv-BN-LeakyReLU | (512, 26, 26) | (256, 26, 26) |  |
| 57 | Conv-BN-LeakyReLU | (256, 26, 26) | (512, 26, 26) |  |
| 58 | weightedFeatureFusion | (512, 26, 26) | (512, 26, 26) |  |
| 59 | Conv-BN-LeakyReLU | (512, 26, 26) | (256, 26, 26) |  |
| 60 | Conv-BN-LeakyReLU | (256, 26, 26) | (512, 26, 26) |  |
| 61 | weightedFeatureFusion | (512, 26, 26) | (512, 26, 26) |  |
| 62 | Conv-BN-LeakyReLU | (512, 26, 26) | (1024, 13, 13) |  |
| 63 | Conv-BN-LeakyReLU | (1024, 13, 13) | (512, 13, 13) |  |
| 64 | Conv-BN-LeakyReLU | (512, 13, 13) | (1024, 13, 13) |  |
| 65 | weightedFeatureFusion | (1024, 13, 13) | (1024, 13, 13) |  |
| 66 | Conv-BN-LeakyReLU | (1024, 13, 13) | (512, 13, 13) |  |
| 67 | Conv-BN-LeakyReLU | (512, 13, 13) | (1024, 13, 13) |  |
| 68 | weightedFeatureFusion | (1024, 13, 13) | (1024, 13, 13) |  |
| 69 | Conv-BN-LeakyReLU | (1024, 13, 13) | (512, 13, 13) |  |
| 70 | Conv-BN-LeakyReLU | (512, 13, 13) | (1024, 13, 13) |  |
| 71 | weightedFeatureFusion | (1024, 13, 13) | (1024, 13, 13) |  |
| 72 | Conv-BN-LeakyReLU | (1024, 13, 13) | (512, 13, 13) |  |
| 73 | Conv-BN-LeakyReLU | (512, 13, 13) | (1024, 13, 13) |  |
| 74 | weightedFeatureFusion | (1024, 13, 13) | (1024, 13, 13) |  |
| 75 | Conv-BN-LeakyReLU | (1024, 13, 13) | (512, 13, 13) |  |
| 76 | Conv-BN-LeakyReLU | (512, 13, 13) | (1024, 13, 13) |  |
| 77 | Conv-BN-LeakyReLU | (1024, 13, 13) | (512, 13, 13) |  |
| 78 | MaxPool | (512, 13, 13) | (512, 13, 13) | Ceil\_mode=false: output크기 내림dilation=1:stride제어하는 param  예) |
| 79 | Route |  | (512, 13, 13) | ‘layers’:[-2] 🡪 x = out[77] |
| 80 | MaxPool | (512, 13, 13) | (512, 13, 13) |  |
| 81 | Route |  | (512, 13, 13) | ‘layers’:[-4] 🡪 x = out[77] |
| 82 | MaxPool | (512, 13, 13) | (512, 13, 13) |  |
| 83 | Route |  | (2048, 13, 13) | ‘layers’:[-1, -3, -5, -6] 🡪 x.concat(out[82]+out[80]+out[78]+out[77]) |
| 84 | Conv-BN-LeakyReLU | (2048, 13, 13) | (512, 13, 13) |  |
| 85 | Conv-BN-LeakyReLU | (512, 13, 13) | (512, 13, 13) |  |
| 86 | Conv-BN-LeakyReLU | (512, 13, 13) | (512, 13, 13) |  |
| 87 | Conv-BN-LeakyReLU | (512, 13, 13) | (1024, 13, 13) |  |
| 88 | Conv | (1024, 13, 13) | (255, 13, 13) |  |
| 89 | YOLO Layer | (255, 13, 13) | (3, 13, 13, 85) | Mask: [116, 90] , [156, 198] , [373, 326]  Output: [bs, 3, 13, 13, 85] |
| 90 | Route |  | (512, 13, 13) | ‘layers’:[-4] 🡪 x = out[86] |
| 91 | Conv-BN-LeakyReLU | (512, 13, 13) | (256, 13, 13) |  |
| 92 | Upsample | (256, 13, 13) | (256, 26, 26) |  |
| 93 | Route |  | (768, 26, 26) | ‘layers’:[-1, 61] 🡪 x.concat(out[92]+out[61]) = (768,26,26) |
| 94 | Conv-BN-LeakyReLU | (768, 26, 26) | (256, 26, 26) |  |
| 95 | Conv-BN-LeakyReLU | (256, 26, 26) | (512, 26, 26) |  |
| 96 | Conv-BN-LeakyReLU | (512, 26, 26) | (256, 26, 26) |  |
| 97 | Conv-BN-LeakyReLU | (256, 26, 26) | (512, 26, 26) |  |
| 98 | Conv-BN-LeakyReLU | (512, 26, 26) | (256, 26, 26) |  |
| 99 | Conv-BN-LeakyReLU | (256, 26, 26) | (512, 26, 26) |  |
| 100 | Conv | (512, 26, 26) | (255, 26, 26) |  |
| 101 | YOLO Layer | (255, 26, 26) | (3, 26, 26, 85) | Mask: [30, 61], [62, 45], [59, 119]  Output: [bs, 3, 26, 26, 85] |
| 102 | Route |  | (256, 26, 26) | ‘layers’:[-4] 🡪 x = out[98] |
| 103 | Conv-BN-LeakyReLU | (256, 26, 26) | (128, 26, 26) |  |
| 104 | Upsample | (128, 26, 26) | (128, 52, 52) |  |
| 105 | Route |  | (384, 52, 52) | ‘layers’:[-1, 36] 🡪 x.concat(out[104]+out[36]) = (384,52,52) |
| 106 | Conv-BN-LeakyReLU | (384, 52, 52) | (128, 52, 52) |  |
| 107 | Conv-BN-LeakyReLU | (128, 52, 52) | (256, 52, 52) |  |
| 108 | Conv-BN-LeakyReLU | (256, 52, 52) | (128, 52, 52) |  |
| 109 | Conv-BN-LeakyReLU | (128, 52, 52) | (256, 52, 52) |  |
| 110 | Conv-BN-LeakyReLU | (256, 52, 52) | (128, 52, 52) |  |
| 111 | Conv-BN-LeakyReLU | (128, 52, 52) | (256, 52, 52) |  |
| 112 | Conv | (256, 52, 52) | (255, 52, 52) |  |
| 113 | YOLO Layer | (255, 52, 52) |  | Mask: [10, 13], [16, 30], [33, 23] Output: [bs, 3, 52, 52, 85] |

총 114개 layer