**Deep Learning Lab**

**Computer Vision Track  
Assignment 3 Report**

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Objective

Training Encoder-Decoder network with 4 different configurations of the decoder network. We were tasked with training an encoder-decoder network for semantic segmentation. The main aim of the task is to analyse the impact of the number of upsamples performed on the performance of the network and we implemented four configurations.

1. Single Upsample -16x.

2. Two Upsamples -2x -> 8x.

3. Three Upsamples -2x -> 2x -> 4x.

4. Four Upsamples -2x -> 2x -> 2x -> 2x.

# Network Architecture

## **Configuration 1**

There is no refinement block and we directly upsample the feature map from the encoder to the size of the image. This configuration is better described in table 1.

Table 1- Configuration 1

|  |  |  |  |
| --- | --- | --- | --- |
| Layer number | Output feature maps | Upsampling rate | Kernel size |
| Upsample 1 | 120 | 16 | 3x3 |
| Conv | Number of classes | 1 | 1x1 |

## **Configuration 2**

There is one refinement block with one skip connection. This configuration is better described in table 2, and in figure 1.

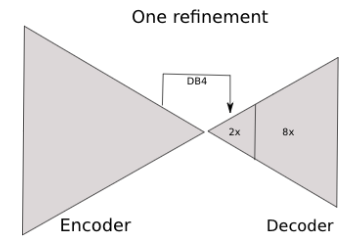


Figure 1- Configuration 2

Table 2- Configuration 2

|  |  |  |  |
| --- | --- | --- | --- |
| Layer number | Output feature maps | Upsampling rate | Kernel size |
| Upsample 1 | 256 | 2 | 3x3 |
| Conv 1 | 256 | 1 | 1x1 |
| Upsample 2 | 120 | 8 | 3x3 |
| Conv 2 | Number of classes | 1 | 1x1 |

## **Configuration 3**

There is two refinement blocks with two skip connections. This configuration is better described in table 3, and in figure 2.

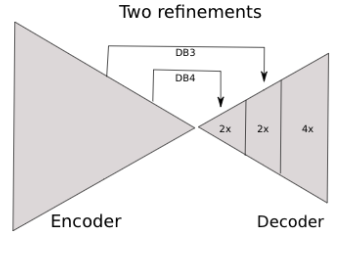


Figure 2- Configuration 3

Table 3- Configuration 3

|  |  |  |  |
| --- | --- | --- | --- |
| Layer number | Output feature maps | Upsampling rate | Kernel size |
| Upsample 1 | 256 | 2 | 3x3 |
| Conv 1 | 256 | 1 | 1x1 |
| Upsample 2 | 160 | 2 | 3x3 |
| Conv 2 | 160 | 1 | 1x1 |
| Upsample 3 | 120 | 4 | 3x3 |
| Conv 3 | Number of classes | 1 | 1x1 |

## **Configuration 4**

There is two refinement blocks with two skip connections. This configuration is better described in table 4, and in figure 3.

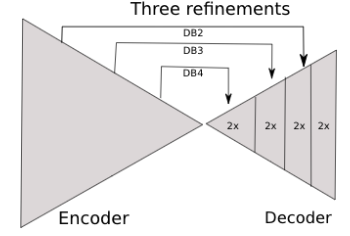


Figure 3- Configuration 4

Table 4- Configuration 4

|  |  |  |  |
| --- | --- | --- | --- |
| Layer number | Output feature maps | Upsampling rate | Kernel size |
| Upsample 1 | 256 | 2 | 3x3 |
| Conv 1 | 256 | 1 | 1x1 |
| Upsample 2 | 160 | 2 | 3x3 |
| Conv 2 | 160 | 1 | 1x1 |
| Upsample 3 | 96 | 2 | 3x3 |
| Conv 3 | 96 | 1 | 1x1 |
| Upsample 4 | 120 | 2 | 3x3 |
| Conv 4 | Number of classes | 1 | 1x1 |