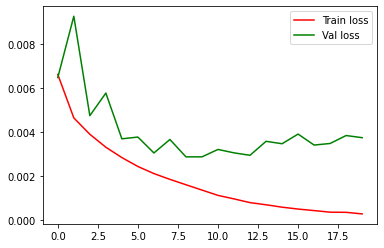
Question 1.a

Total number of parameters: 7682826

Validation accuracy is: 81.2 %

Shape, polygon

Description automatically generated

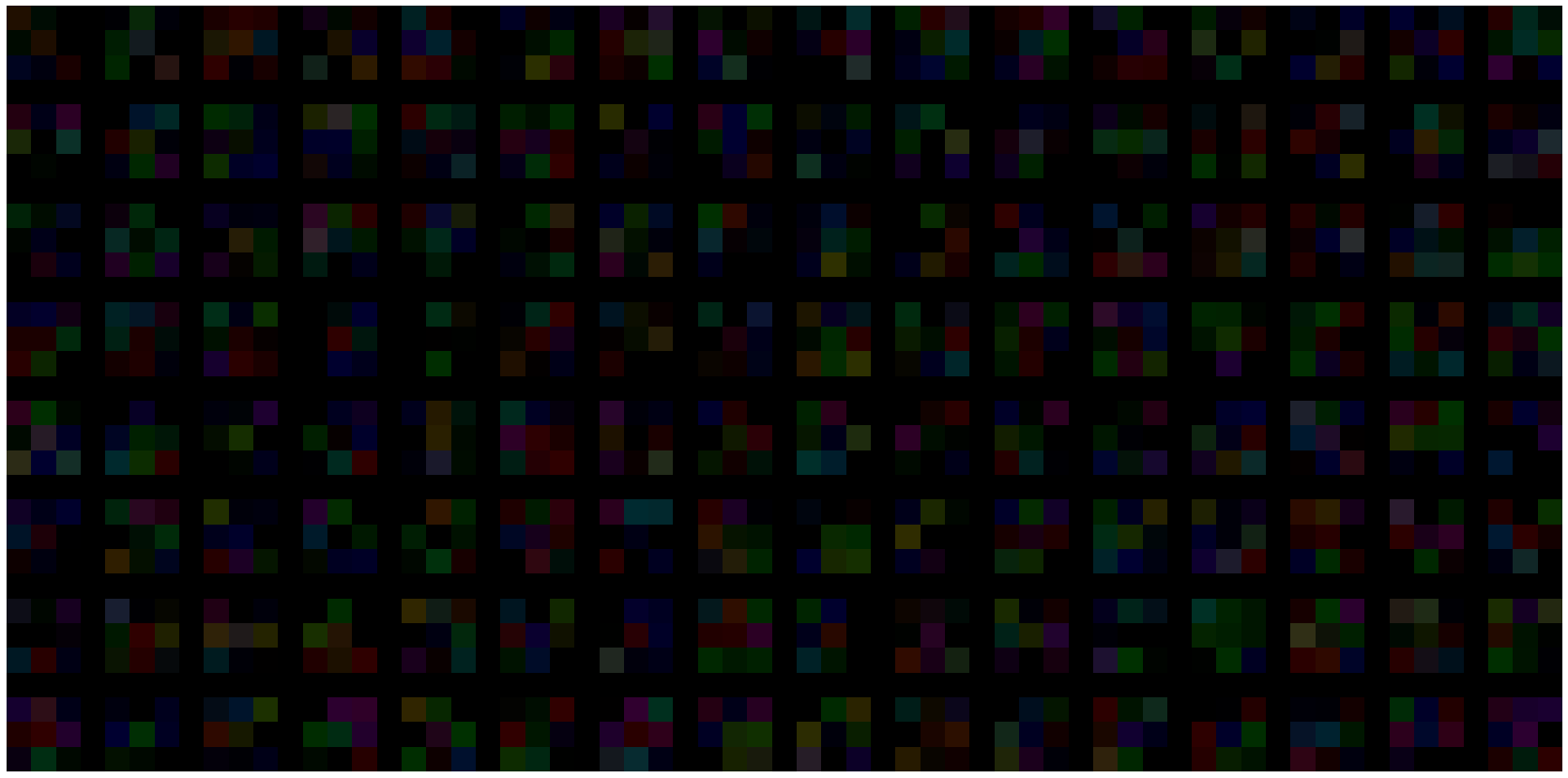
Accuracy of the network on the 1000 test images: 79.8 %

Question 1.b

Total number of parameters: 7682826

Question 1.c

Before .



After

Immagine che contiene testo

Descrizione generata automaticamente

Question 3:

3.1.Data augmentation is known for preventing overfitting and make the model more general by creating more training data.

We used different techniques like Geometric Transformation and Color Transform. And the best validation accuracy lead by Random Horizontal Flip(p=0.5).

1. **Geometric transformation**

|  |  |
| --- | --- |
| **Augmentation technique** | **Validation Accuracy** |
| ﻿RandomAffine(translate=(0.1,0.3)) | 80.6 % |
| ﻿RandomRotation(degrees=(-45,45) | 73.5 % |
| ﻿RandomAffine(scale=(0.5, 0.75) | 74.1 % |
| RandomCrop(size=(32,32)) | 76.8 % |
| **transforms.RandomHorizontalFlip(p=0.5)** | **82.6 %** |

1. **Color Transformation:**

|  |  |
| --- | --- |
| **Augmentation technique** | **Validation Accuracy** |
| RandomGrayscale | 74.5 % |
| ColorJitter (﻿brightness=0, contrast=0, saturation=0, hue=0.5) | 69.9% |

**3.2.Dropout:**

Dropout is another approach to prevent over fitting and improve model generalization**.**

Here we experimented with different dropout values ranging from (0.1 to 0.9) And the best validation accuracy lead by Dropout(p=0.3).

|  |  |
| --- | --- |
| **Dropout value** | **Validation Accuracy** |
| 0.1 | 82.3 % |
| 0.2 | 80.1 % |
| **0.3** | **82.5 %** |
| 0.4 | 79.3 % |
| 0.5 | 75.4 % |
| 0.6 | 65.7 % |
| 0.7 | 58.4 % |
| 0.8 | 42.7 % |
| 0.9 | 10.2 % |

**A picture containing chart

Description automatically generated**

Dropout(p=0.1)

Dropout(p=0.2)

Diagram

Description automatically generated with medium confidence

Dropout(p=0.3)

A picture containing graphical user interface

Description automatically generated

A picture containing chart

Description automatically generated

Dropout(p=0.4)

Chart, line chart

Description automatically generated

Dropout(p=0.5)

Chart, line chart

Description automatically generated

Dropout(p=0.6)

Chart, line chart

Description automatically generated

Dropout(p=0.7)

Chart, line chart

Description automatically generated

Dropout(p=0.8)

Chart, line chart

Description automatically generated

Dropout(p=0.9)