**Assignment 3**

1. Assignment is to be done in teams of 2-3 members.
2. Only one team member is required to submit.
3. Submission date: **Nov 21, 2023**.
4. Maximum marks: **10**

**Question 1.** The aim of this question is to perform an ablation study for the **depth of the network** in the program shared in notebook Conv\_neural\_network.ipynb.

* Report the accuracy values for Experiment-1 and Experiment-2, where the experiments add new Conv2D layers for filters and strides as described in the Table below. Note that kernel\_size = 3 and padding = 'same' for new Conv2D layers **(1 Mark)**

| Conv\_neural\_network.ipynb | **Experiment 1**  (new configuration) | **Experiment 2**  (new configuration) |
| --- | --- | --- |
| filters = 32, strides = 1  filters = 32, strides = 2  filters = 64, strides = 1  filters = 64, strides = 2 | filters = 32, strides = 1  filters = 64, strides = 1 | filters = 8, strides = 1  filters = 8, strides = 1  filters = 8, strides = 2  filters = 16, strides = 1  filters = 16, strides = 1  filters = 16, strides = 2  filters = 32, strides = 1  filters = 32, strides = 1  filters = 32, strides = 2  filters = 64, strides = 1  filters = 64, strides = 1  filters = 64, strides = 2 |

* Do you observe any difference in performance by modifying Conv2D layers? If yes then provide justification. **(1 Mark)**

**Question 2.** The aim of this question is to perform an ablation study for the effects of kernel size.

* Report the accuracy values for Experiment-1 and Experiment-2, where the experiment modify the kernel size as shown in Table below. **(1 Mark)**

| Conv\_neural\_network.ipynb | **Experiment 1**  (new configuration) | **Experiment 2**  (new configuration) |
| --- | --- | --- |
| kernel\_size = 3 and padding = 'same' | kernel\_size = 5 and padding = 'same' | kernel\_size = 7 and padding = 'same' |

* Do you observe any difference in performance between the above experimental setups? If yes then provide justification. **(1 Mark)**

**Question 3.** The aim of this question is to perform an ablation study for the effects using 1x1 convolutions.

* Report the accuracy values for Experiment-1 where the experiments modify the convolution layers as shown in Table below **(1 Mark).**

| Conv\_neural\_network.ipynb | **Experiment 1**  (new configuration) |
| --- | --- |
| Not using 1x1 convolutions | Using 1x1 convolutions  **(You may choose network configuration)** |

* Do you observe any difference in performance between the above experimental setups? If yes then provide justification. **(1 Mark)**

**Question 4.** The aim of this question is to perform an ablation study for the Inception Block (Experiment 1) and ResNet Block (Experiment 2) in the program shared in notebook Conv\_neural\_network.ipynb.

| **Experiment 1**  (Inception Block) | **Experiment 2**  (ResNet Block) |
| --- | --- |
| Two inception\_module (similar to figure below) with the first inception block with all convolution layers having 16 filters and second inception block with all convolution layers having 32 filters. | Two resnet\_block (similar to figure below) with the first ResNet block with all convolution layers having 16 filters and second ResNet block with all convolution layers having 32 filters.   | 3x3, 16  3x3, 16 |  | | --- | --- | | 3x3, 32  3x3, 32 | |

* Report the accuracy values for Experiment-1 (Inception Block) and Experiment-2 (ResNet Block). **(2 Mark)**
* Do you observe any difference in performance by using Inception Block and ResNet Block? If yes then provide justification. **(2 Mark)**