Computer Vision Task Summary

# Question 1

This question involved image processing tasks. The outputs indicate dimensions and computed array values,   
suggesting operations such as image transformation or analysis.

Open the Question 1 folder and run the code, the Output is saved with the code in the .ipynb file  
  
OUTPUT of Gradient Magnitude

array([12.72792206, 18. , 12.72792206, ..., 27.78488798,

33.37663854, 19.79898987])

OUTPUT of Direction

array([1.57079633, 2.35619449, 1.23787305, ..., 3.1062092 , 3.09212808,

3.07502449])

# Question 2

Focused on the execution of clustering algorithms with numerical arrays as outputs.  
  
  
OUTPUT

For 1,1 Division :

[ 9. 11. 14. 19. 13. 8. 13. 5. 4. 9.]

For 2,2 Division :

[1. 4. 4. 6. 2. 1. 2. 0. 0. 1. 1. 6. 8. 1. 0. 1. 0. 2. 2. 2. 3. 1. 2. 9.

5. 2. 5. 0. 2. 3. 4. 0. 0. 3. 6. 4. 6. 3. 0. 3.]

For 2,3 Division :

[0. 4. 4. 2. 1. 0. 1. 0. 0. 1. 2. 1. 2. 4. 1. 2. 1. 0. 1. 0. 0. 5. 6. 1.

0. 0. 0. 2. 1. 2. 0. 0. 0. 3. 3. 0. 2. 0. 1. 1. 4. 1. 2. 6. 3. 3. 4. 0.

1. 4. 3. 0. 0. 3. 5. 3. 5. 3. 0. 1.]

# Question 3

Provided a numerical output resembling a transformation matrix. This is typically associated with operations   
like rotation, scaling, translation, or shearing in the context of computer vision tasks.

OUTPUT:

[[ 0.70710678 -0.70710678 643.61612368]

[ 0.70710678 0.70710678 -153.24637476]

[ 0. 0. 1. ]]

# Question 4

Showed extensive training logs indicating the progress of model training over epochs. The final output   
mentioned "Finished training and saved model weights," suggesting that model weights were saved,.

OUTPUT:

Train Epoch: 49 [6912/8000 (86%)] Loss: 0.666756

Train Epoch: 49 [6976/8000 (87%)] Loss: 0.639180

Train Epoch: 49 [7040/8000 (88%)] Loss: 0.896807

Train Epoch: 49 [7104/8000 (89%)] Loss: 0.743212

Train Epoch: 49 [7168/8000 (90%)] Loss: 1.093118

Train Epoch: 49 [7232/8000 (90%)] Loss: 0.779465

Train Epoch: 49 [7296/8000 (91%)] Loss: 0.881436

Train Epoch: 49 [7360/8000 (92%)] Loss: 0.842165

Train Epoch: 49 [7424/8000 (93%)] Loss: 0.896738

Train Epoch: 49 [7488/8000 (94%)] Loss: 0.955606

Train Epoch: 49 [7552/8000 (94%)] Loss: 0.952188

Train Epoch: 49 [7616/8000 (95%)] Loss: 0.773583

Train Epoch: 49 [7680/8000 (96%)] Loss: 0.737092

Train Epoch: 49 [7744/8000 (97%)] Loss: 0.770900

Train Epoch: 49 [7808/8000 (98%)] Loss: 0.999413

Train Epoch: 49 [7872/8000 (98%)] Loss: 0.944519

Train Epoch: 49 [7936/8000 (99%)] Loss: 1.109933

Finished training and saved model weights

# Question 5 and 6

- The model's accuracy on the validation images for Question 5 is reported as 65.35%.  
- A confusion matrix was also provided, which is essential for understanding the model's performance   
across different classes. This matrix shows the precision of predictions for each class.

OUTPUT of 5 :

Accuracy of the model on the validation images: 65.35%

[0 0 0 ... 9 9 8]

OUTPUT of 6 :

[[163 10 11 0 1 0 1 0 7 7]

[ 14 116 1 16 11 13 2 26 0 1]

[ 1 3 170 0 0 0 4 0 0 22]

[ 1 23 2 80 29 21 8 34 1 1]

[ 2 13 0 14 110 9 24 26 1 1]

[ 0 8 0 20 23 74 34 40 0 1]

[ 1 3 2 2 12 21 151 7 0 1]

[ 0 12 0 9 13 18 4 144 0 0]

[ 16 4 2 2 0 1 0 0 150 25]

[ 5 0 23 3 1 0 7 0 12 149]]

# MAPE Score for Question 7

- \*\*MAPE Score\*\*: [ 53.78%]  
  
  
Output :   
  
  
  
  
  
Counts per class: [[15 0 0]

[10 0 0]

[ 2 0 0]

[ 3 0 0]

[10 0 0]

[10 0 0]

[ 4 0 0]

[14 0 0]

[ 1 0 1]

[ 6 0 0]

[ 9 0 0]

[ 1 0 0]

[ 6 0 0]

[ 2 0 0]

[ 7 0 0]

[13 0 0]

[19 0 1]

[ 1 0 0]

[ 6 0 0]

[10 0 0]

[12 0 0]

[ 1 0 0]

[ 1 0 0]