


Assignment 13: Image Classification Analysis

3. Tasks:

- Step 1: Construct a 3x3 confusion matrix based on the above data. Here's the format for your matrix:

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3. Tasks : Step 1

	Predicted Cat	Predicted Dog	Predicted Person
True Cat	5	2	1
True Dog	1	3	2
True Person	1	2	3

Step 2 :

$$\text{Precision} = \frac{TP}{TP + FP}$$
$$\text{Recall} = \frac{TP}{TP + FN}$$
$$F1 : 2 \times \frac{\text{Precision} \times \text{Recall}}{\text{Precision} + \text{Recall}}$$

For Cat: $TP = 5, FP = 2, FN = 3$

$$\text{Precision} : \frac{5}{5+2} = 0.714$$
$$\text{Recall} : \frac{5}{5+3} = 0.625$$
$$F1 : 2 \times \frac{0.714 \times 0.625}{0.714 + 0.625} = 0.666$$

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For Dog : TP = 3, FP = 4, FN = 3

$$\text{Precision} = \frac{3}{3+4} = 0.429$$

$$\text{Recall} = \frac{3}{3+3} = 0.5$$

$$F1 = 2 \times \frac{0.429 \times 0.5}{0.429 + 0.5} = 0.462$$

For Person : TP = 3, FP = 3, FN = 3

$$\text{Precision} = \frac{3}{3+3} = 0.5$$

$$\text{Recall} = \frac{3}{3+3} = 0.5$$

$$F1 = 2 \times \frac{0.5 \times 0.5}{0.5 + 0.5} = 0.5$$

Note

Step 3: Analysis

- **Cat:** Moderate precision (71.4%) but lower recall (62.5%). The model correctly identifies most Cats but misses some.
- **Dog:** Poor precision (42.9%) and recall (50%). The model frequently misclassifies Dogs as Cats or Persons.
- **Person:** Balanced precision and recall (50% each), indicating average performance with room for improvement.