

EEEM066: Fundamentals of Machine Learning

Coursework Assignment

Knife Classification in Real-World Images

Taman Bachani
URN: 6846172

Start your assignment

Write your assignment in the designated space provided below. Each of the sections outlines the tasks required and specifies the information you must include in your report for that section.

Section 1: Familiarity with the code provided (40 marks)

1. Run the code using the default settings. Discuss the steps involved in the training and evaluation process, and explain the impact of the observed performance using an appropriate metric. (20 marks)
2. Apply a different CNN variant from the one used in the code provided. Critically compare the results with those observed in Question 1. (10 marks)
3. Apply one more neural network architecture different from those in Questions 1 and 2. Critically discuss and compare the results from these previous two steps. (10 marks)

Note:

For Questions 2 and 3, ensure the new architecture is explicitly specified in your shell script command if you are using one from the codebase.

Start writing here:

Section 2: Dataset preparation and augmentation experiment (30 marks)

Begin with the default data augmentation setting of the default command line, which uses colour jittering.

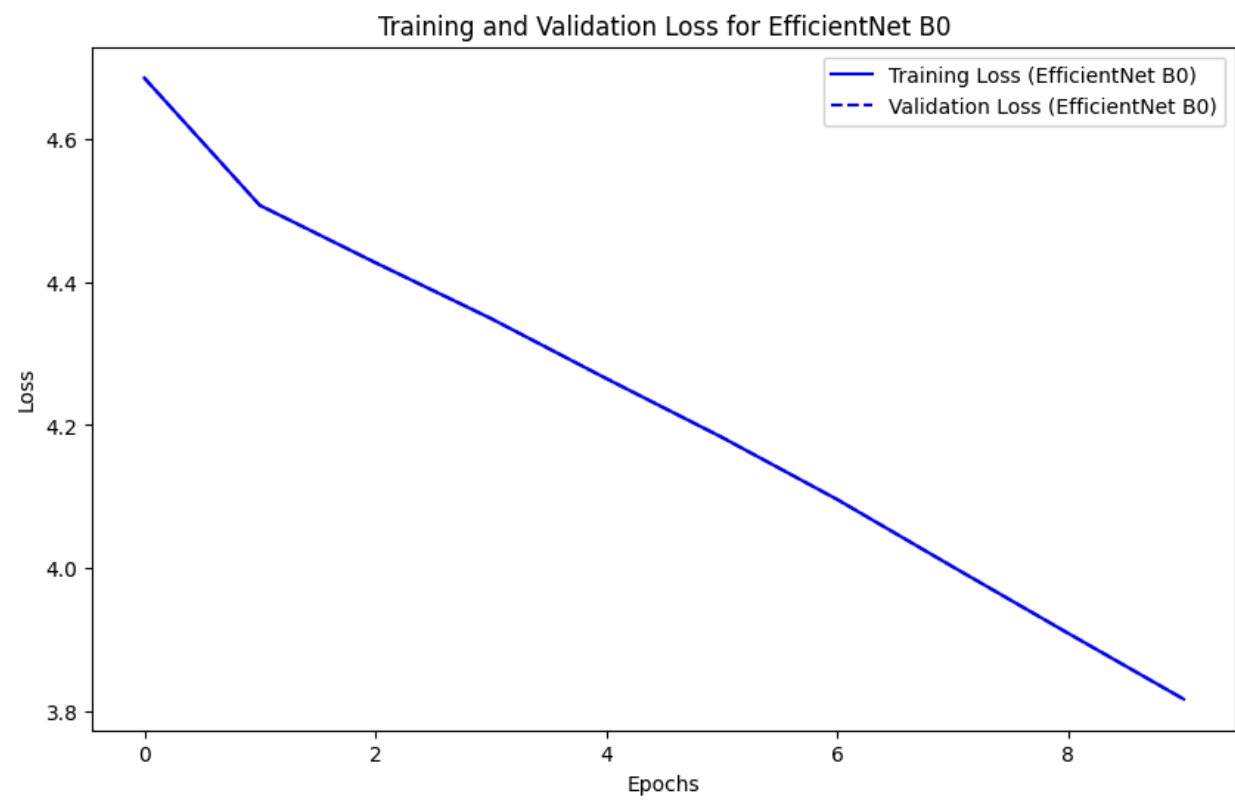
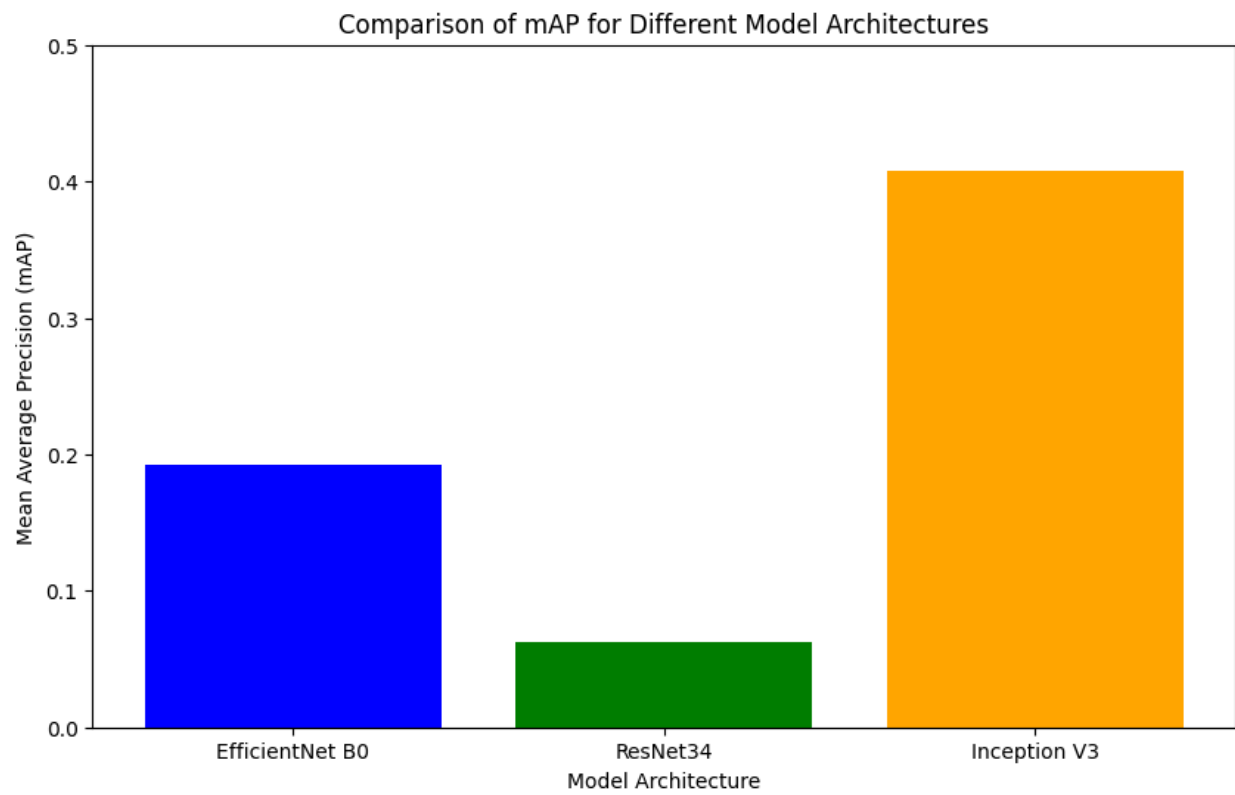
1. Further append on top two additional data augmentation techniques, one at a time e.g., Default + “random rotation”, Default + “horizontal flip”. Compare the results with the default configuration in the provided code and discuss the differences in performance. (20 marks)
2. Combine the augmentation techniques from Question 1 to find the best-performing combination. Highlight any improvement or drop in the overall score. (10 marks)

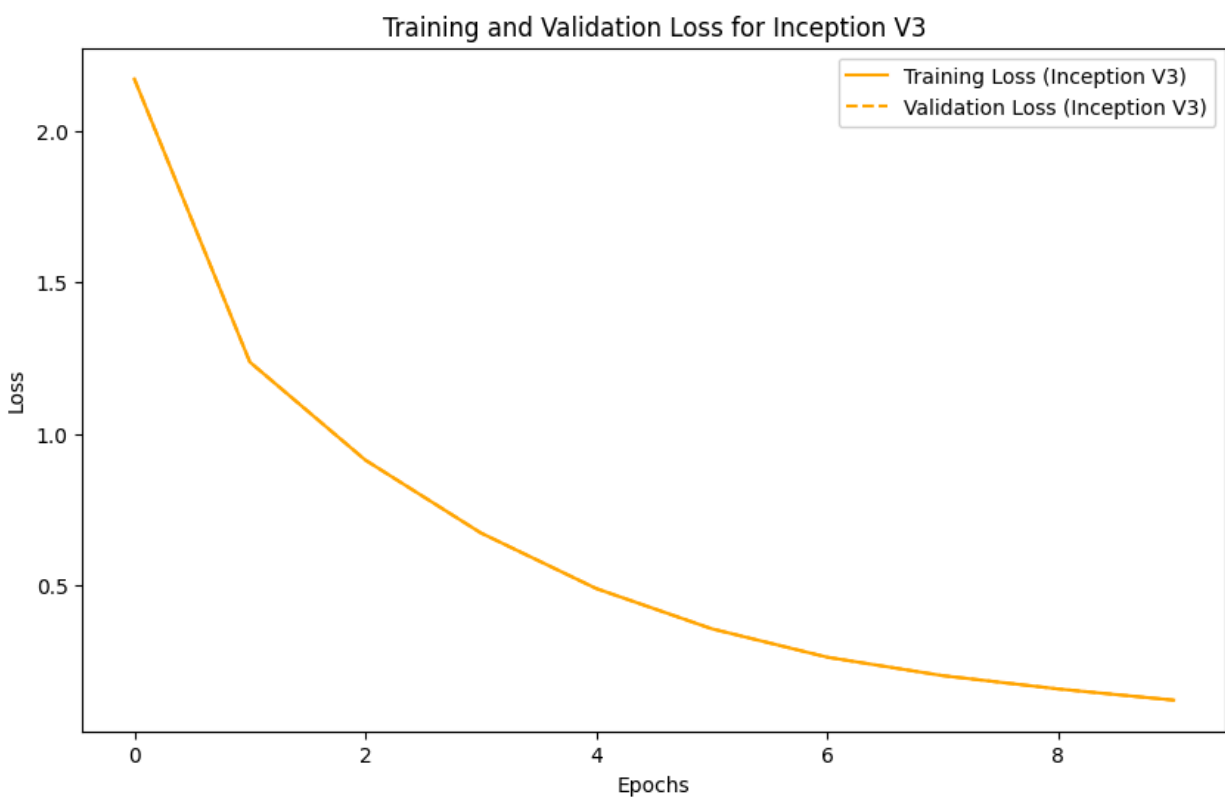
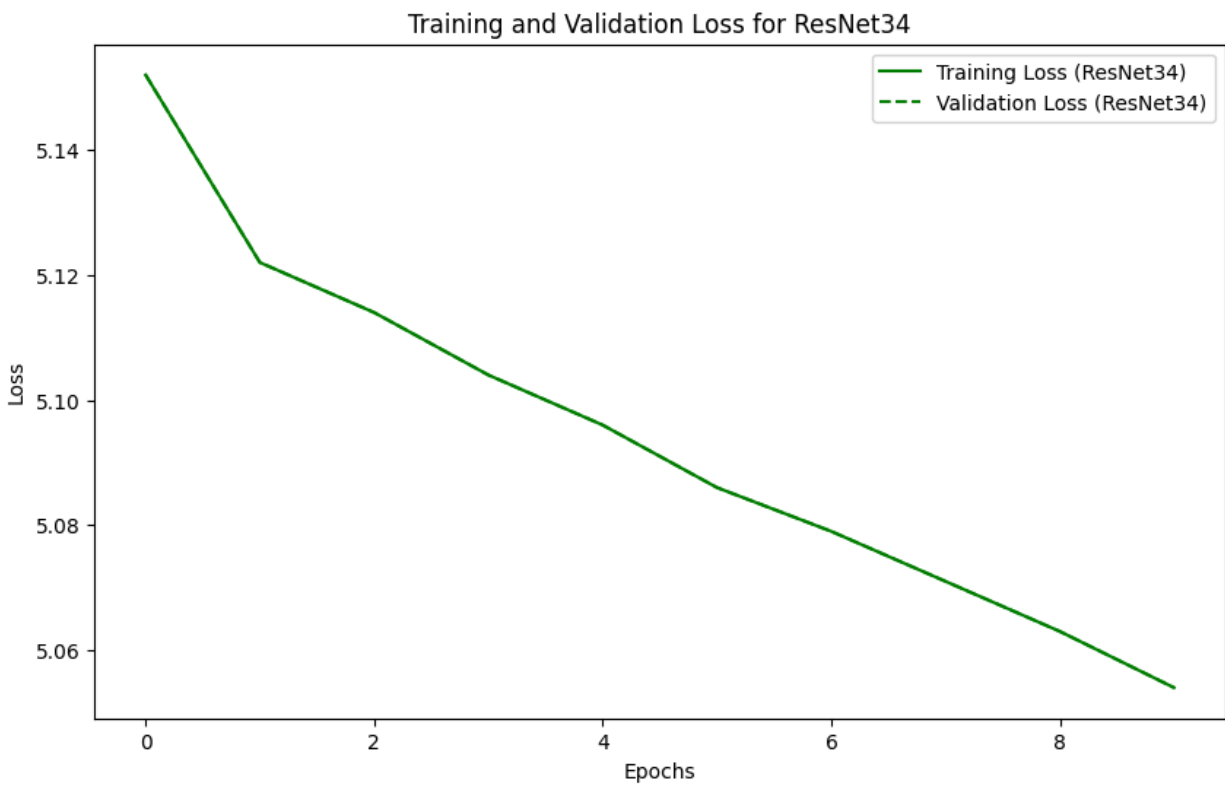
Start writing here:

Section 3: Exploration of Hyperparameters (20 marks)

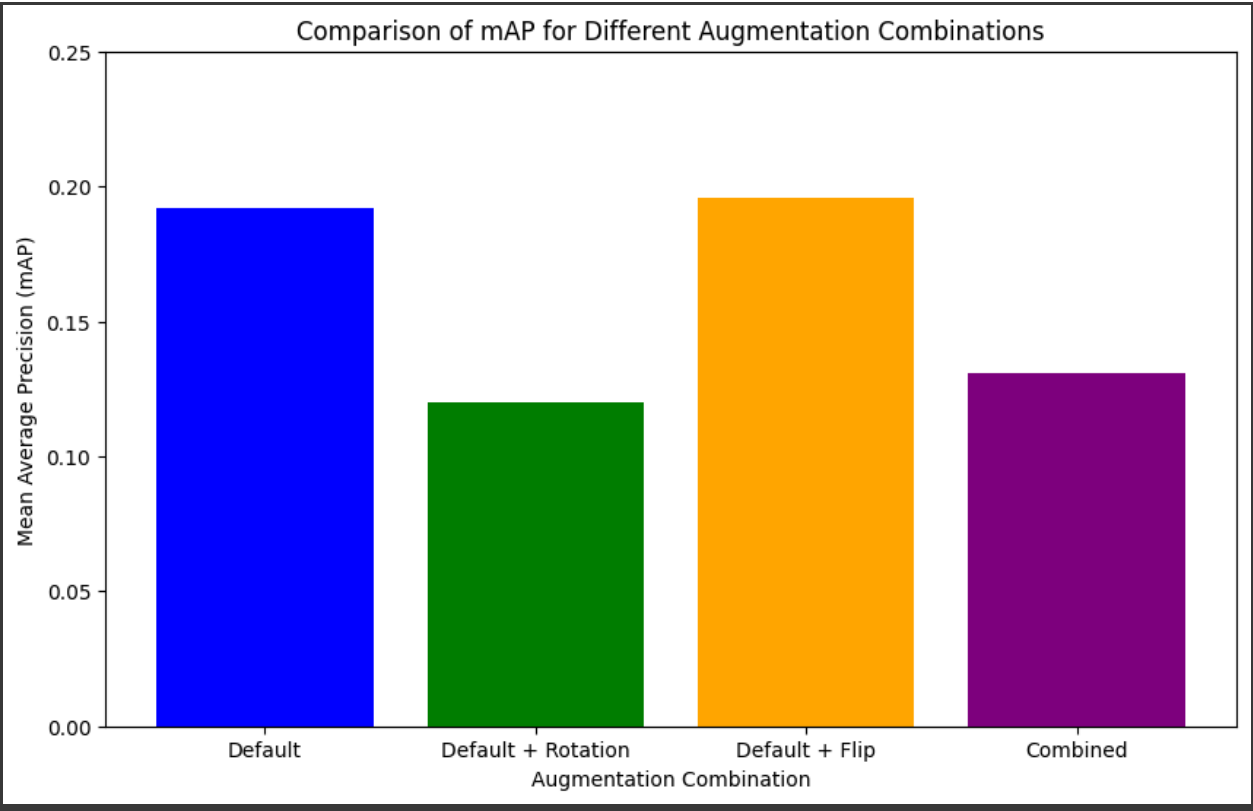
Start with the default learning rate (LR) and batch size (BS).

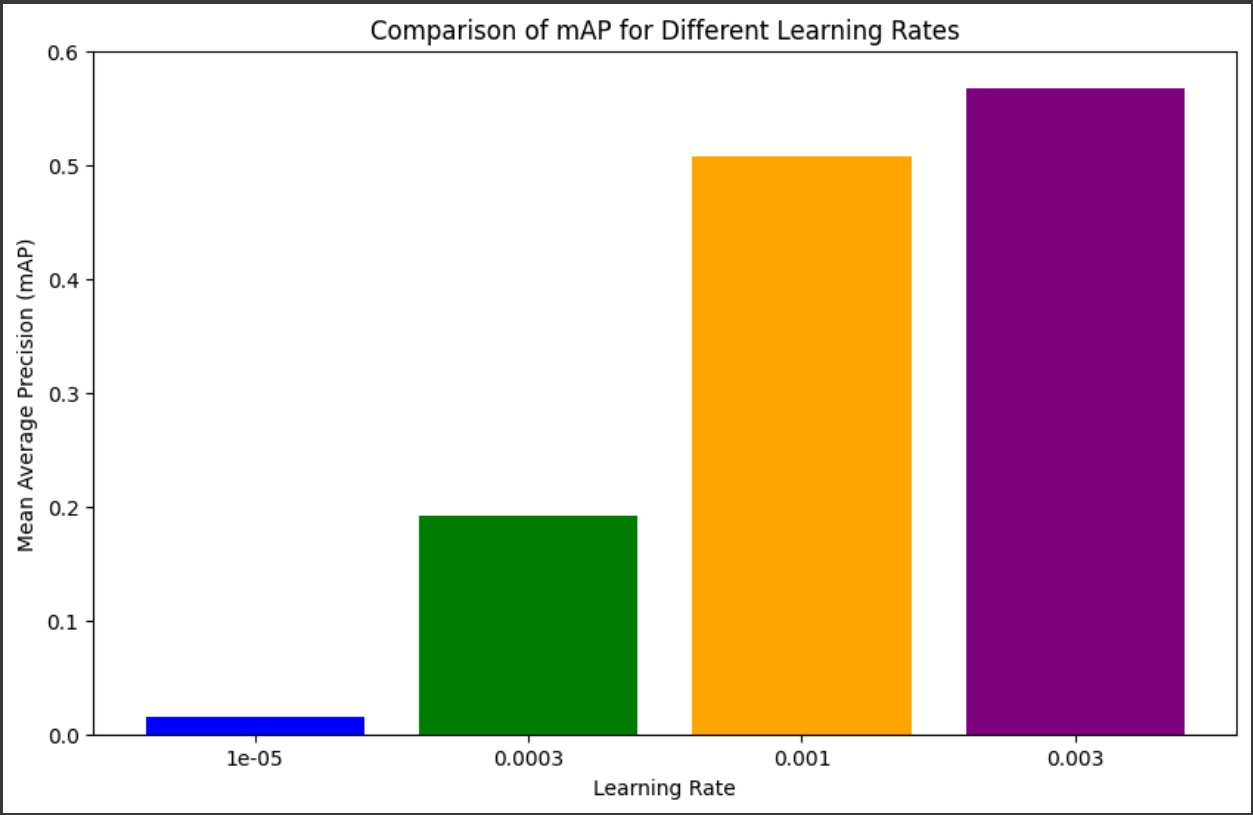
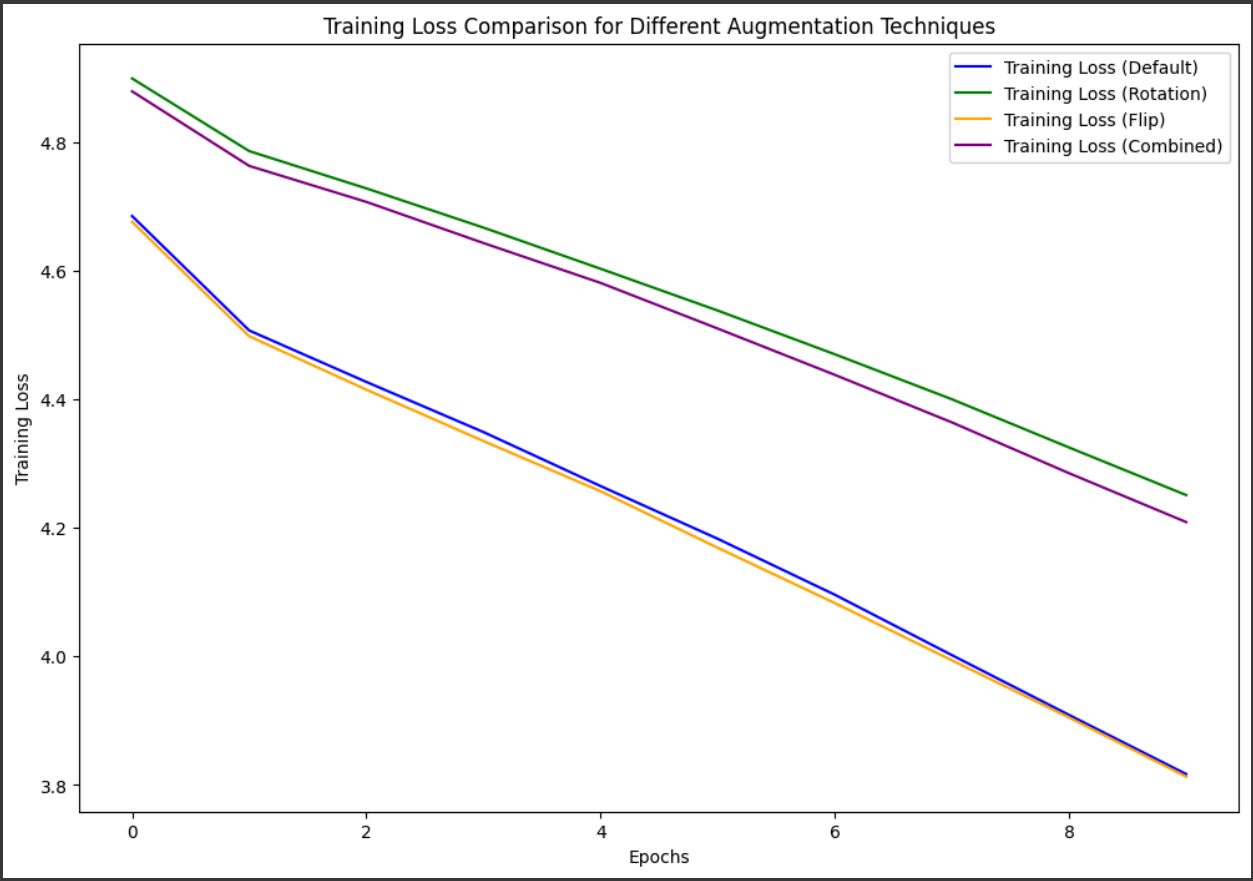
1. Exploration of LR. (10 marks)
 - a. Experiment with three values of LR (in addition to the default value).
 - b. Discuss the observed impact of each value on overall performance.
2. Exploration BS. (10 marks)
 - a. Using the best LR value from the experiments in Question 1, test three different values of the BS in addition to the default value.
 - b. Discuss how the changes in BS affect overall performance.

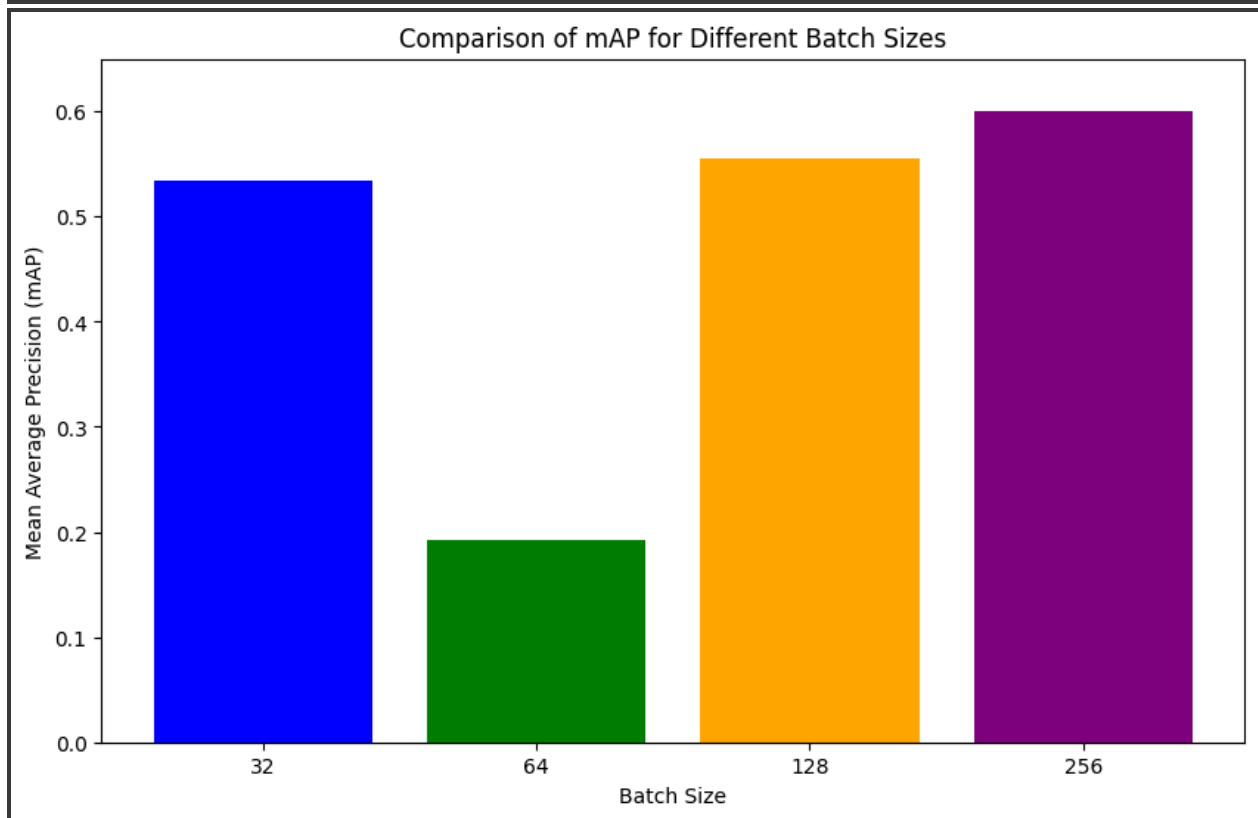
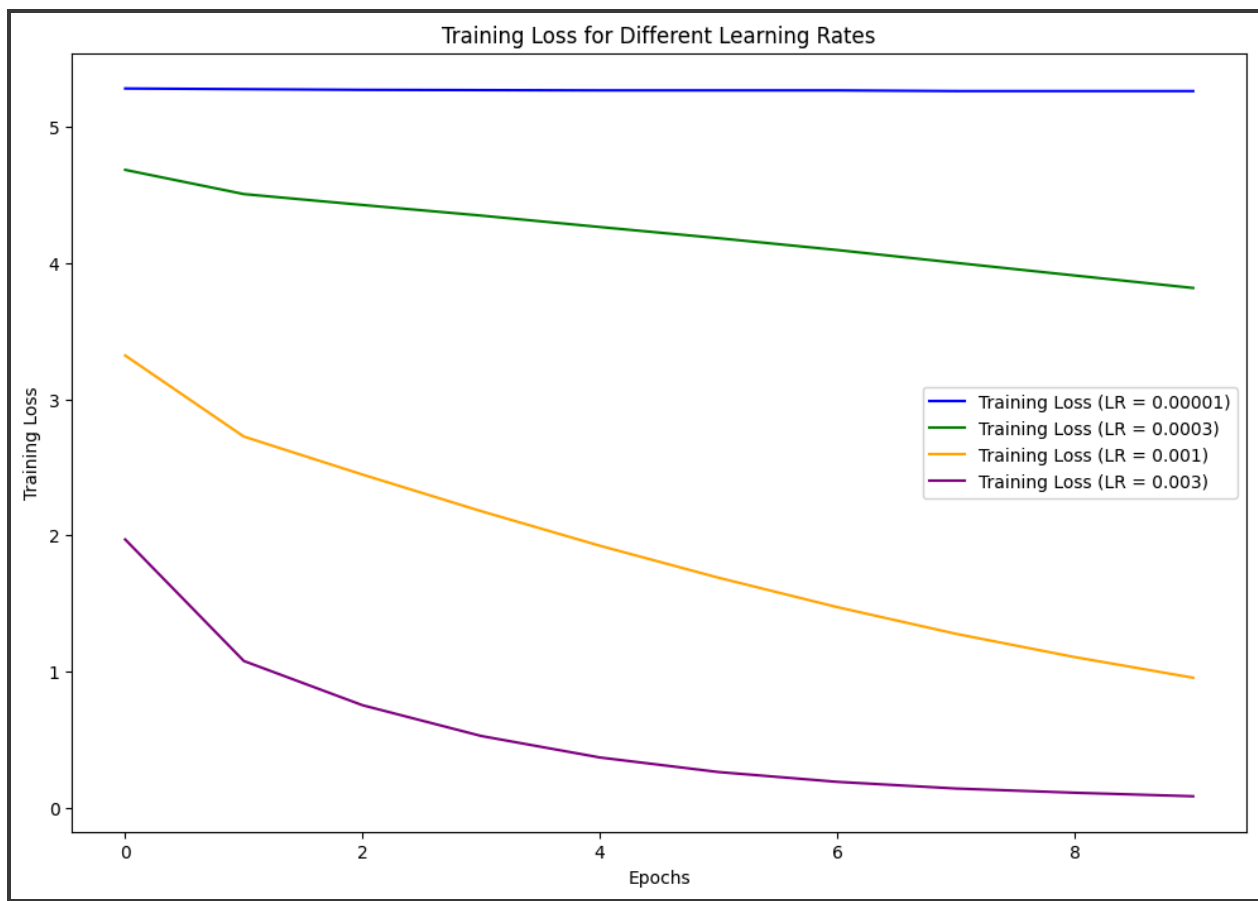


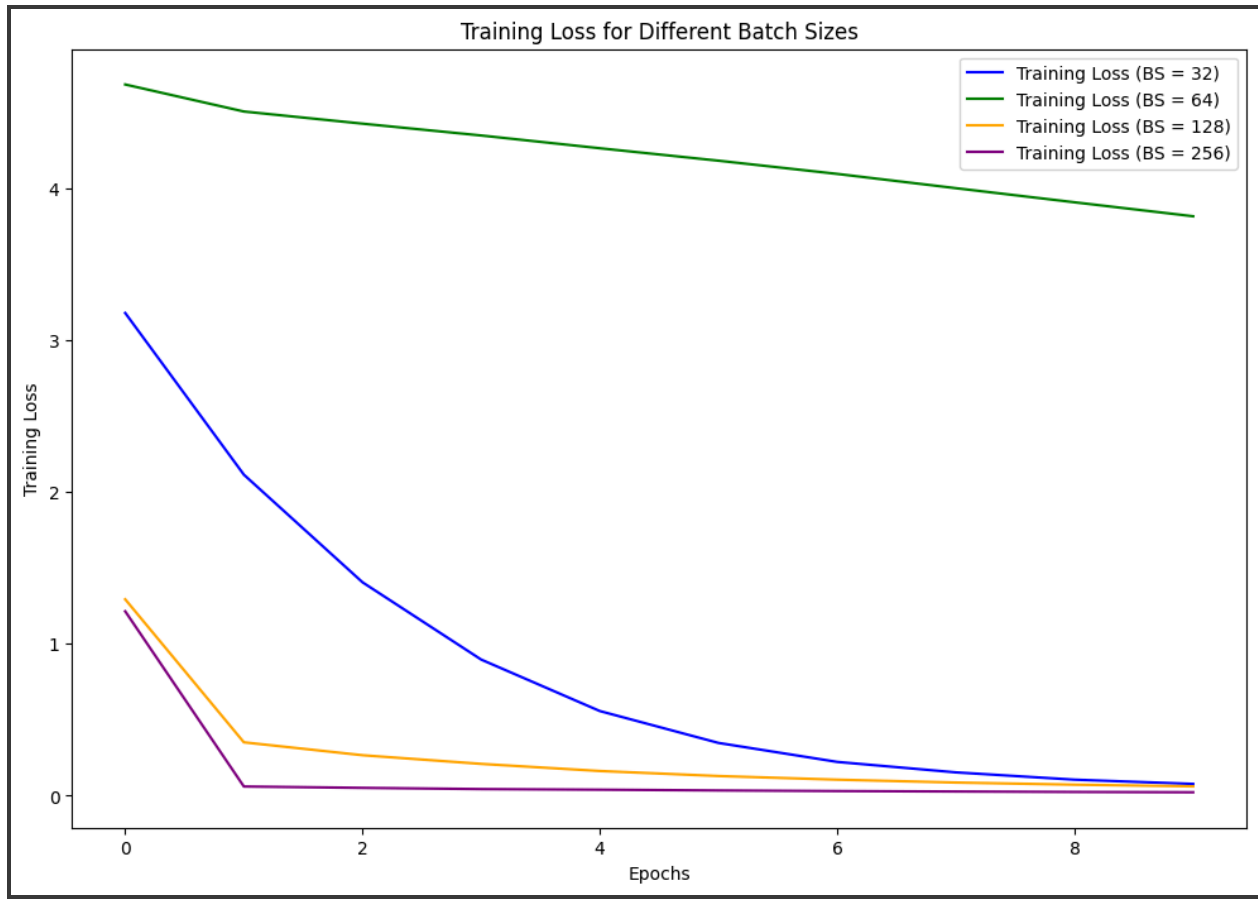


	Model	mAP	Training Time (min)
1	EfficientNet B0	0.192	16.45
2	ResNet 34	0.063	7.75
3	Inception V3	0.408	7.91









Learning Rate (LR)	Total Training Time	mAP After 10 Epochs
0.00001	12 min 30 sec	0.015
0.0003 (default)	16 min 19 sec	0.192
0.001	7 min 42 sec	0.507
0.003	7 min 43 sec	0.586

Batch Size (BS)	Total Training Time	mAP After 10 Epochs
32	7 min 46 sec	0.534
64 (default)	16 min 19 sec	0.192
128	8 min 25 sec	0.555

256	9 min 45 sec	0.600
------------	---------------------	--------------