

APPENDIX

MOUNT FOLDER DATA FROM GOOGLE DRIVE

1. `from google.colab import drive`
2. `drive.mount('/content/drive')`

INSTALL SPLIT FOLDERS PACKAGE

3. `!pip install split-folders`

IMPORTING LIBRARY

4. `from keras.models import Sequential`
5. `from keras.layers import Conv2D, MaxPooling2D, Dense, Flatten, Dropout`
6. `from tensorflow.keras.optimizers import Adam`
7. `from keras.preprocessing.image import ImageDataGenerator`
8. `import matplotlib.pyplot as plt`
9. `import tensorflow as tf`
10. `import numpy as np`
11. `import splitfolders`

SPLIT DATA INTO 50% TRAINING, 10% VALIDATION, AND 40% TESTING

DATA

12. `input_folder = '/content/drive/MyDrive/meatDatasets'`
13. `splitfolders.ratio(input_folder, output='/content/drive/MyDrive/meatDatasets2', seed=42, ratio=(.5, .1, .4), group_prefix=None)`

SPLIT DATA INTO 50% TRAINING, 20% VALIDATION, AND 30% TESTING

DATA

14. `splitfolders.ratio(input_folder, output='/content/drive/MyDrive/meatDatasets2', seed=42, ratio=(.5, .2, .3), group_prefix=None)`

SPLIT DATA INTO 60% TRAINING, 20% VALIDATION, AND 20% TESTING

DATA

15. `splitfolders.ratio(input_folder, output='/content/drive/MyDrive/meatDatasets3', seed=42, ratio=(.6, .2, .2), group_prefix=None)`

SPLIT DATA INTO 70% TRAINING, 10% VALIDATION, AND 20% TESTING

DATA

16. `splitfolders.ratio(input_folder, output='/content/drive/MyDrive/meatDatasets4', seed=42, ratio=(.7, .1, .2), group_prefix=None)`

SPLIT DATA INTO 80% TRAINING, 10% VALIDATION, AND 10% TESTING

DATA

```
17. splitfolders.ratio(input_folder,
    output='/content/drive/MyDrive/meatDatasets5', seed=42, ratio=(.8, .1,
    .1), group_prefix=None)
```

PREPARING AND PROCESSING TRAIN AND VALIDATION DATA

```
18. train_dir = "/content/drive/MyDrive/meatDatasets1/train"
19. val_dir = "/content/drive/MyDrive/meatDatasets1/val"
20.
21. train_gen = ImageDataGenerator(rescale=1/255)
22. val_gen = ImageDataGenerator(rescale=1/255)
23.
24. train_generator = train_gen.flow_from_directory(
25.     train_dir,
26.     target_size=(128, 128),
27.     batch_size=64,
28.     color_mode='rgb',
29.     class_mode='categorical')
30.
31. validation_generator = val_gen.flow_from_directory(
32.     val_dir,
33.     target_size=(128, 128),
34.     batch_size=64,
35.     color_mode='rgb',
36.     class_mode='categorical')
```

CREATING CNN MODEL

```
37. model = Sequential()
38.
39. model.add(Conv2D(32, kernel_size=(3, 3), strides=1,
    activation='relu', input_shape=(128, 128, 3)))
40. model.add(MaxPooling2D(pool_size=(2, 2), strides=2))
41.
42. model.add(Conv2D(64, kernel_size=(3, 3), strides=1,
    activation='relu'))
43. model.add(MaxPooling2D(pool_size=(2, 2), strides=2))
44.
45. model.add(Conv2D(128, kernel_size=(3, 3), strides=1,
    activation='relu'))
46. model.add(MaxPooling2D(pool_size=(2, 2), strides=2))
47.
48. model.add(Conv2D(256, kernel_size=(3, 3), strides=1,
    activation='relu'))
49. model.add(MaxPooling2D(pool_size=(2, 2), strides=2))
50.
51. model.add(Flatten())
52. model.add(Dense(512, activation='relu'))
53. model.add(Dropout(0.5))
54. model.add(Dense(3, activation='softmax'))
55.
56. model.summary()
```

MODEL COMPILE

```
57. model.compile(loss='categorical_crossentropy',
                 optimizer=Adam(learning_rate=1e-4), metrics=['accuracy'])
```

MODEL FITTING

```
58. model_info = model.fit(train_generator,
59.                        epochs= 50,
60.                        validation_data=validation_generator)
```

SHOWING THE RESULTS FROM MODEL FITTING USING GRAPH

```
61. #Loss Graph
62.
63. plt.plot(model_info.history['loss'], label='train')
64. plt.plot(model_info.history['val_loss'], label='validation')
65. plt.xlabel('epoch')
66. plt.ylabel('loss')
67. plt.legend()
68. plt.title('Train & Val Loss')
69. plt.show()
70.
71. #Accuracy Graph
72.
73. plt.plot(model_info.history['accuracy'], label='train')
74. plt.plot(model_info.history['val_accuracy'], label='validation')
75. plt.xlabel('epoch')
76. plt.ylabel('accuracy')
77. plt.legend()
78. plt.title('Train & Val Accuracy')
79. plt.show()
```

SAVE CNN MODEL USING 50% TRAINING, 10% VALIDATION, AND 40%

TESTING DATA

```
80. model.save('/content/drive/MyDrive/model1.h5')
```

SAVE CNN MODEL USING 50% TRAINING, 20% VALIDATION, AND 30%

TESTING DATA

```
81. model.save('/content/drive/MyDrive/model2.h5')
```

SAVE CNN MODEL USING 60% TRAINING, 20% VALIDATION, AND 20%

TESTING DATA

```
82. model.save('/content/drive/MyDrive/model3.h5')
```

SAVE CNN MODEL USING 70% TRAINING, 10% VALIDATION, AND 20%

TESTING DATA

```
83. model.save('/content/drive/MyDrive/model4.h5')
```

SAVE CNN MODEL USING 80% TRAINING, 10% VALIDATION, AND 10%

TESTING DATA

```
84. model.save('/content/drive/MyDrive/model5.h5')
```

LOAD CNN MODEL

```
85. from tensorflow.keras.models import load_model
86. model = load_model('/content/drive/MyDrive/model1.h5')
```

PREPARING AND PROCESSING TEST DATA

```
87. test_dir = "/content/drive/MyDrive/meatDatasets1/test"
88.
89. test_gen = ImageDataGenerator(rescale=1/255)
90.
91. test_generator = test_gen.flow_from_directory(
92.     test_dir,
93.     target_size=(128, 128),
94.     shuffle=False
95. )
```

SHOWING THE RESULTS OF TEST DATA USING CONFUSION MATRIX

```
96. from sklearn.metrics import confusion_matrix, accuracy_score
97.
98. prediction = model.predict_generator(test_generator)
99. y_pred = np.argmax(prediction, axis=1)
100. print("Confusion Matrix For Meat Freshness Detection Using CNN Method\n")
101. print(confusion_matrix(test_generator.classes, y_pred))
```

RESULT OF MODEL FITTING PROCESS AT 50% OF TRAINING DATA AND 10% OF VALIDATION DATA USING EPOCH 50

Epoch 1/50

18/18 [=====] - 8s 317ms/step - loss: 1.0891 - accuracy: 0.3993 - val_loss: 1.0706 - val_accuracy: 0.3778

Epoch 2/50

18/18 [=====] - 7s 365ms/step - loss: 1.0536 - accuracy: 0.4532 - val_loss: 1.0067 - val_accuracy: 0.4044

Epoch 3/50

18/18 [=====] - 5s 303ms/step - loss: 0.9186 - accuracy: 0.6369 - val_loss: 0.8122 - val_accuracy: 0.6489

Epoch 4/50

18/18 [=====] - 7s 367ms/step - loss: 0.7515 - accuracy: 0.6528 - val_loss: 0.6665 - val_accuracy: 0.6711

Epoch 5/50

18/18 [=====] - 6s 308ms/step - loss: 0.6722 - accuracy:
0.6837 - val_loss: 0.6210 - val_accuracy: 0.7244

Epoch 6/50

18/18 [=====] - 6s 349ms/step - loss: 0.6248 - accuracy:
0.7111 - val_loss: 0.5542 - val_accuracy: 0.7511

Epoch 7/50

18/18 [=====] - 6s 319ms/step - loss: 0.5805 - accuracy:
0.7420 - val_loss: 0.5125 - val_accuracy: 0.7556

Epoch 8/50

18/18 [=====] - 7s 387ms/step - loss: 0.5712 - accuracy:
0.7341 - val_loss: 0.5293 - val_accuracy: 0.7867

Epoch 9/50

18/18 [=====] - 6s 318ms/step - loss: 0.5513 - accuracy:
0.7438 - val_loss: 0.5073 - val_accuracy: 0.7689

Epoch 10/50

18/18 [=====] - 7s 388ms/step - loss: 0.5032 - accuracy:
0.7836 - val_loss: 0.5205 - val_accuracy: 0.7822

Epoch 11/50

18/18 [=====] - 5s 304ms/step - loss: 0.4755 - accuracy:
0.8065 - val_loss: 0.4471 - val_accuracy: 0.8133

Epoch 12/50

18/18 [=====] - 8s 426ms/step - loss: 0.4318 - accuracy:
0.8039 - val_loss: 0.4083 - val_accuracy: 0.7778

Epoch 13/50

18/18 [=====] - 5s 305ms/step - loss: 0.4258 - accuracy:
0.8207 - val_loss: 0.3676 - val_accuracy: 0.8489

Epoch 14/50

18/18 [=====] - 6s 348ms/step - loss: 0.3763 - accuracy:
0.8534 - val_loss: 0.3438 - val_accuracy: 0.8622

Epoch 15/50

18/18 [=====] - 6s 317ms/step - loss: 0.3631 - accuracy:
0.8507 - val_loss: 0.3279 - val_accuracy: 0.8667

Epoch 16/50

18/18 [=====] - 5s 303ms/step - loss: 0.3586 - accuracy:
0.8560 - val_loss: 0.3420 - val_accuracy: 0.8400

Epoch 17/50

18/18 [=====] - 6s 359ms/step - loss: 0.3164 - accuracy:
0.8852 - val_loss: 0.3300 - val_accuracy: 0.8756

Epoch 18/50

18/18 [=====] - 6s 309ms/step - loss: 0.3044 - accuracy:
0.8807 - val_loss: 0.2938 - val_accuracy: 0.8711

Epoch 19/50

18/18 [=====] - 7s 374ms/step - loss: 0.3219 - accuracy:
0.8595 - val_loss: 0.2990 - val_accuracy: 0.8578

Epoch 20/50

18/18 [=====] - 6s 307ms/step - loss: 0.2730 - accuracy:
0.8922 - val_loss: 0.2599 - val_accuracy: 0.8978

Epoch 21/50

18/18 [=====] - 7s 365ms/step - loss: 0.2683 - accuracy:
0.9055 - val_loss: 0.2891 - val_accuracy: 0.8933

Epoch 22/50

18/18 [=====] - 6s 301ms/step - loss: 0.2652 - accuracy:
0.8993 - val_loss: 0.2467 - val_accuracy: 0.9067

Epoch 23/50

18/18 [=====] - 6s 318ms/step - loss: 0.2319 - accuracy:
0.9258 - val_loss: 0.2330 - val_accuracy: 0.9156

Epoch 24/50

18/18 [=====] - 6s 345ms/step - loss: 0.2236 - accuracy:
0.9205 - val_loss: 0.2528 - val_accuracy: 0.8978

Epoch 25/50

18/18 [=====] - 6s 328ms/step - loss: 0.2239 - accuracy:
0.9143 - val_loss: 0.2292 - val_accuracy: 0.9067

Epoch 26/50

18/18 [=====] - 8s 420ms/step - loss: 0.2072 - accuracy:
0.9284 - val_loss: 0.2428 - val_accuracy: 0.9022

Epoch 27/50

18/18 [=====] - 5s 298ms/step - loss: 0.1872 - accuracy:
0.9443 - val_loss: 0.2049 - val_accuracy: 0.9200

Epoch 28/50

18/18 [=====] - 6s 363ms/step - loss: 0.1737 - accuracy:
0.9373 - val_loss: 0.1944 - val_accuracy: 0.9289

Epoch 29/50

18/18 [=====] - 5s 299ms/step - loss: 0.1834 - accuracy:
0.9337 - val_loss: 0.2166 - val_accuracy: 0.8933

Epoch 30/50

18/18 [=====] - 6s 343ms/step - loss: 0.1641 - accuracy:
0.9435 - val_loss: 0.1881 - val_accuracy: 0.9422

Epoch 31/50

18/18 [=====] - 6s 331ms/step - loss: 0.1568 - accuracy:
0.9443 - val_loss: 0.2007 - val_accuracy: 0.9111

Epoch 32/50

18/18 [=====] - 5s 299ms/step - loss: 0.1643 - accuracy:
0.9461 - val_loss: 0.1801 - val_accuracy: 0.9467

Epoch 33/50

18/18 [=====] - 7s 369ms/step - loss: 0.1301 - accuracy:
0.9567 - val_loss: 0.1692 - val_accuracy: 0.9289

Epoch 34/50

18/18 [=====] - 5s 302ms/step - loss: 0.1290 - accuracy:
0.9541 - val_loss: 0.1725 - val_accuracy: 0.9289

Epoch 35/50

18/18 [=====] - 5s 302ms/step - loss: 0.1289 - accuracy:
0.9611 - val_loss: 0.1758 - val_accuracy: 0.9156

Epoch 36/50

18/18 [=====] - 6s 323ms/step - loss: 0.1100 - accuracy:
0.9655 - val_loss: 0.2402 - val_accuracy: 0.8844

Epoch 37/50

18/18 [=====] - 6s 329ms/step - loss: 0.1251 - accuracy:
0.9567 - val_loss: 0.1536 - val_accuracy: 0.9511

Epoch 38/50

18/18 [=====] - 5s 301ms/step - loss: 0.0981 - accuracy:
0.9744 - val_loss: 0.1609 - val_accuracy: 0.9378

Epoch 39/50

18/18 [=====] - 6s 358ms/step - loss: 0.0890 - accuracy:
0.9726 - val_loss: 0.1430 - val_accuracy: 0.9511

Epoch 40/50

18/18 [=====] - 5s 300ms/step - loss: 0.0923 - accuracy:
0.9717 - val_loss: 0.1427 - val_accuracy: 0.9511

Epoch 41/50

18/18 [=====] - 6s 355ms/step - loss: 0.0872 - accuracy:
0.9770 - val_loss: 0.1517 - val_accuracy: 0.9556

Epoch 42/50

18/18 [=====] - 5s 295ms/step - loss: 0.0814 - accuracy:
0.9806 - val_loss: 0.1551 - val_accuracy: 0.9422

Epoch 43/50

18/18 [=====] - 6s 324ms/step - loss: 0.0730 - accuracy:
0.9806 - val_loss: 0.1354 - val_accuracy: 0.9422

Epoch 44/50

18/18 [=====] - 5s 303ms/step - loss: 0.0652 - accuracy:
0.9867 - val_loss: 0.1273 - val_accuracy: 0.9600

Epoch 45/50

18/18 [=====] - 7s 367ms/step - loss: 0.0608 - accuracy:
0.9867 - val_loss: 0.1343 - val_accuracy: 0.9556

Epoch 46/50

18/18 [=====] - 5s 300ms/step - loss: 0.0550 - accuracy:
0.9885 - val_loss: 0.1329 - val_accuracy: 0.9689

Epoch 47/50

18/18 [=====] - 6s 350ms/step - loss: 0.0519 - accuracy:
0.9885 - val_loss: 0.1272 - val_accuracy: 0.9556

Epoch 48/50

18/18 [=====] - 6s 302ms/step - loss: 0.0467 - accuracy:
0.9894 - val_loss: 0.1309 - val_accuracy: 0.9556

Epoch 49/50

18/18 [=====] - 6s 322ms/step - loss: 0.0468 - accuracy:
0.9912 - val_loss: 0.1391 - val_accuracy: 0.9600

Epoch 50/50

18/18 [=====] - 5s 296ms/step - loss: 0.0671 - accuracy:
0.9841 - val_loss: 0.1649 - val_accuracy: 0.9333

**RESULT OF MODEL FITTING PROCESS AT 50% OF TRAINING DATA AND 20%
OF VALIDATION DATA USING EPOCH 50**

Epoch 1/50

18/18 [=====] - 10s 400ms/step - loss: 1.0925 - accuracy:
0.4099 - val_loss: 1.0751 - val_accuracy: 0.5455

Epoch 2/50

18/18 [=====] - 7s 411ms/step - loss: 1.0499 - accuracy:
0.4779 - val_loss: 0.9958 - val_accuracy: 0.6297

Epoch 3/50

18/18 [=====] - 6s 347ms/step - loss: 0.9775 - accuracy:
0.5256 - val_loss: 0.9107 - val_accuracy: 0.5388

Epoch 4/50

18/18 [=====] - 7s 412ms/step - loss: 0.8376 - accuracy:
0.6193 - val_loss: 0.7369 - val_accuracy: 0.6918

Epoch 5/50

18/18 [=====] - 6s 352ms/step - loss: 0.6698 - accuracy:
0.6979 - val_loss: 0.6013 - val_accuracy: 0.7295

Epoch 6/50

18/18 [=====] - 7s 410ms/step - loss: 0.6339 - accuracy:
0.7067 - val_loss: 0.6226 - val_accuracy: 0.6807

Epoch 7/50

18/18 [=====] - 6s 350ms/step - loss: 0.5831 - accuracy:
0.7341 - val_loss: 0.5418 - val_accuracy: 0.7783

Epoch 8/50

18/18 [=====] - 7s 412ms/step - loss: 0.5470 - accuracy:
0.7633 - val_loss: 0.5381 - val_accuracy: 0.7783

Epoch 9/50

18/18 [=====] - 6s 358ms/step - loss: 0.5196 - accuracy:
0.7756 - val_loss: 0.4880 - val_accuracy: 0.7960

Epoch 10/50

18/18 [=====] - 6s 357ms/step - loss: 0.4758 - accuracy:
0.7959 - val_loss: 0.4495 - val_accuracy: 0.7982

Epoch 11/50

18/18 [=====] - 6s 349ms/step - loss: 0.4507 - accuracy:
0.8057 - val_loss: 0.4385 - val_accuracy: 0.8115

Epoch 12/50

18/18 [=====] - 7s 420ms/step - loss: 0.4168 - accuracy:
0.8269 - val_loss: 0.4045 - val_accuracy: 0.8381

Epoch 13/50

18/18 [=====] - 6s 355ms/step - loss: 0.4074 - accuracy:
0.8295 - val_loss: 0.3852 - val_accuracy: 0.8359

Epoch 14/50

18/18 [=====] - 7s 418ms/step - loss: 0.3855 - accuracy:
0.8534 - val_loss: 0.3800 - val_accuracy: 0.8315

Epoch 15/50

18/18 [=====] - 6s 353ms/step - loss: 0.3893 - accuracy:
0.8428 - val_loss: 0.3861 - val_accuracy: 0.8381

Epoch 16/50

18/18 [=====] - 7s 411ms/step - loss: 0.3737 - accuracy:
0.8498 - val_loss: 0.3512 - val_accuracy: 0.8470

Epoch 17/50

18/18 [=====] - 6s 354ms/step - loss: 0.3571 - accuracy:
0.8587 - val_loss: 0.3443 - val_accuracy: 0.8625

Epoch 18/50

18/18 [=====] - 7s 409ms/step - loss: 0.3185 - accuracy:
0.8781 - val_loss: 0.3154 - val_accuracy: 0.8714

Epoch 19/50

18/18 [=====] - 6s 356ms/step - loss: 0.3019 - accuracy:
0.8781 - val_loss: 0.2992 - val_accuracy: 0.8847

Epoch 20/50

18/18 [=====] - 7s 411ms/step - loss: 0.2817 - accuracy:
0.8878 - val_loss: 0.3023 - val_accuracy: 0.8780

Epoch 21/50

18/18 [=====] - 6s 361ms/step - loss: 0.2710 - accuracy:
0.8984 - val_loss: 0.2742 - val_accuracy: 0.8847

Epoch 22/50

18/18 [=====] - 7s 416ms/step - loss: 0.2645 - accuracy:
0.8993 - val_loss: 0.2721 - val_accuracy: 0.8914

Epoch 23/50

18/18 [=====] - 6s 352ms/step - loss: 0.2592 - accuracy:
0.9081 - val_loss: 0.2714 - val_accuracy: 0.8825

Epoch 24/50

18/18 [=====] - 7s 417ms/step - loss: 0.2342 - accuracy:
0.9117 - val_loss: 0.2456 - val_accuracy: 0.9069

Epoch 25/50

18/18 [=====] - 6s 353ms/step - loss: 0.2203 - accuracy:
0.9276 - val_loss: 0.2582 - val_accuracy: 0.8958

Epoch 26/50

18/18 [=====] - 7s 411ms/step - loss: 0.2062 - accuracy:
0.9223 - val_loss: 0.2285 - val_accuracy: 0.9157

Epoch 27/50

18/18 [=====] - 6s 349ms/step - loss: 0.2095 - accuracy:
0.9258 - val_loss: 0.3106 - val_accuracy: 0.8559

Epoch 28/50

18/18 [=====] - 7s 404ms/step - loss: 0.2299 - accuracy:
0.9055 - val_loss: 0.2455 - val_accuracy: 0.8958

Epoch 29/50

18/18 [=====] - 6s 349ms/step - loss: 0.1952 - accuracy:
0.9320 - val_loss: 0.2063 - val_accuracy: 0.9290

Epoch 30/50

18/18 [=====] - 7s 415ms/step - loss: 0.1722 - accuracy:
0.9417 - val_loss: 0.2128 - val_accuracy: 0.9224

Epoch 31/50

18/18 [=====] - 7s 366ms/step - loss: 0.1897 - accuracy:
0.9276 - val_loss: 0.2825 - val_accuracy: 0.8891

Epoch 32/50

18/18 [=====] - 8s 469ms/step - loss: 0.1561 - accuracy:
0.9452 - val_loss: 0.1900 - val_accuracy: 0.9401

Epoch 33/50

18/18 [=====] - 6s 361ms/step - loss: 0.1435 - accuracy:
0.9558 - val_loss: 0.2111 - val_accuracy: 0.9202

Epoch 34/50

18/18 [=====] - 8s 425ms/step - loss: 0.1392 - accuracy:
0.9541 - val_loss: 0.1770 - val_accuracy: 0.9401

Epoch 35/50

18/18 [=====] - 7s 419ms/step - loss: 0.1317 - accuracy:
0.9602 - val_loss: 0.1854 - val_accuracy: 0.9313

Epoch 36/50

18/18 [=====] - 7s 415ms/step - loss: 0.1237 - accuracy:
0.9655 - val_loss: 0.2176 - val_accuracy: 0.9047

Epoch 37/50

18/18 [=====] - 6s 355ms/step - loss: 0.1474 - accuracy:
0.9470 - val_loss: 0.2948 - val_accuracy: 0.8803

Epoch 38/50

18/18 [=====] - 7s 414ms/step - loss: 0.1326 - accuracy:
0.9576 - val_loss: 0.1725 - val_accuracy: 0.9401

Epoch 39/50

18/18 [=====] - 6s 354ms/step - loss: 0.1208 - accuracy:
0.9611 - val_loss: 0.2438 - val_accuracy: 0.8891

Epoch 40/50

18/18 [=====] - 7s 416ms/step - loss: 0.1417 - accuracy:
0.9443 - val_loss: 0.1805 - val_accuracy: 0.9335

Epoch 41/50

18/18 [=====] - 6s 359ms/step - loss: 0.1057 - accuracy:
0.9700 - val_loss: 0.1552 - val_accuracy: 0.9490

Epoch 42/50

18/18 [=====] - 7s 418ms/step - loss: 0.0842 - accuracy:
0.9814 - val_loss: 0.1574 - val_accuracy: 0.9401

Epoch 43/50

18/18 [=====] - 6s 358ms/step - loss: 0.1012 - accuracy:
0.9629 - val_loss: 0.2072 - val_accuracy: 0.9135

Epoch 44/50

18/18 [=====] - 7s 414ms/step - loss: 0.0907 - accuracy:
0.9708 - val_loss: 0.1593 - val_accuracy: 0.9490

Epoch 45/50

18/18 [=====] - 6s 354ms/step - loss: 0.0811 - accuracy:
0.9779 - val_loss: 0.1530 - val_accuracy: 0.9401

Epoch 46/50

18/18 [=====] - 7s 415ms/step - loss: 0.0740 - accuracy:
0.9788 - val_loss: 0.1512 - val_accuracy: 0.9446

Epoch 47/50

18/18 [=====] - 6s 351ms/step - loss: 0.0720 - accuracy:
0.9832 - val_loss: 0.1574 - val_accuracy: 0.9424

Epoch 48/50

18/18 [=====] - 7s 412ms/step - loss: 0.0564 - accuracy:
0.9912 - val_loss: 0.1389 - val_accuracy: 0.9468

Epoch 49/50

18/18 [=====] - 6s 351ms/step - loss: 0.0577 - accuracy:
0.9867 - val_loss: 0.1902 - val_accuracy: 0.9313

Epoch 50/50

18/18 [=====] - 7s 413ms/step - loss: 0.0722 - accuracy:
0.9806 - val_loss: 0.1400 - val_accuracy: 0.9512

**RESULT OF MODEL FITTING PROCESS AT 60% OF TRAINING DATA AND 20%
OF VALIDATION DATA USING EPOCH 50**

Epoch 1/50

22/22 [=====] - 11s 395ms/step - loss: 1.0902 - accuracy:
0.4021 - val_loss: 1.0713 - val_accuracy: 0.3814

Epoch 2/50

22/22 [=====] - 7s 331ms/step - loss: 1.0316 - accuracy:
0.5015 - val_loss: 0.9395 - val_accuracy: 0.6341

Epoch 3/50

22/22 [=====] - 8s 384ms/step - loss: 0.8347 - accuracy:
0.6568 - val_loss: 0.6865 - val_accuracy: 0.7051

Epoch 4/50

22/22 [=====] - 8s 350ms/step - loss: 0.6604 - accuracy:
0.6775 - val_loss: 0.6172 - val_accuracy: 0.7029

Epoch 5/50

22/22 [=====] - 9s 395ms/step - loss: 0.5838 - accuracy:
0.7283 - val_loss: 0.5595 - val_accuracy: 0.7494

Epoch 6/50

22/22 [=====] - 8s 377ms/step - loss: 0.5655 - accuracy:
0.7445 - val_loss: 0.5124 - val_accuracy: 0.7627

Epoch 7/50

22/22 [=====] - 7s 332ms/step - loss: 0.5187 - accuracy:
0.7732 - val_loss: 0.4905 - val_accuracy: 0.7827

Epoch 8/50

22/22 [=====] - 8s 378ms/step - loss: 0.4994 - accuracy:
0.7820 - val_loss: 0.4712 - val_accuracy: 0.7849

Epoch 9/50

22/22 [=====] - 8s 370ms/step - loss: 0.4789 - accuracy:
0.7968 - val_loss: 0.5968 - val_accuracy: 0.7361

Epoch 10/50

22/22 [=====] - 7s 334ms/step - loss: 0.4698 - accuracy:
0.7916 - val_loss: 0.4194 - val_accuracy: 0.8137

Epoch 11/50

22/22 [=====] - 8s 381ms/step - loss: 0.4143 - accuracy:
0.8328 - val_loss: 0.3973 - val_accuracy: 0.8293

Epoch 12/50

22/22 [=====] - 8s 354ms/step - loss: 0.3794 - accuracy:
0.8564 - val_loss: 0.3786 - val_accuracy: 0.8404

Epoch 13/50

22/22 [=====] - 8s 361ms/step - loss: 0.3594 - accuracy:
0.8623 - val_loss: 0.4191 - val_accuracy: 0.8271

Epoch 14/50

22/22 [=====] - 8s 382ms/step - loss: 0.3686 - accuracy:
0.8468 - val_loss: 0.3559 - val_accuracy: 0.8470

Epoch 15/50

22/22 [=====] - 7s 326ms/step - loss: 0.3311 - accuracy:
0.8682 - val_loss: 0.3724 - val_accuracy: 0.8426

Epoch 16/50

22/22 [=====] - 8s 374ms/step - loss: 0.2952 - accuracy:
0.8851 - val_loss: 0.3100 - val_accuracy: 0.8803

Epoch 17/50

22/22 [=====] - 7s 329ms/step - loss: 0.2722 - accuracy:
0.8969 - val_loss: 0.3169 - val_accuracy: 0.8603

Epoch 18/50

22/22 [=====] - 8s 378ms/step - loss: 0.2838 - accuracy:
0.8918 - val_loss: 0.3326 - val_accuracy: 0.8492

Epoch 19/50

22/22 [=====] - 8s 370ms/step - loss: 0.2639 - accuracy:
0.8999 - val_loss: 0.2815 - val_accuracy: 0.8958

Epoch 20/50

22/22 [=====] - 8s 355ms/step - loss: 0.2276 - accuracy:
0.9116 - val_loss: 0.2937 - val_accuracy: 0.8625

Epoch 21/50

22/22 [=====] - 8s 383ms/step - loss: 0.2675 - accuracy:
0.8918 - val_loss: 0.3634 - val_accuracy: 0.8603

Epoch 22/50

22/22 [=====] - 7s 327ms/step - loss: 0.2588 - accuracy:
0.8969 - val_loss: 0.2579 - val_accuracy: 0.9180

Epoch 23/50

22/22 [=====] - 8s 377ms/step - loss: 0.2220 - accuracy:
0.9205 - val_loss: 0.2856 - val_accuracy: 0.8803

Epoch 24/50

22/22 [=====] - 8s 374ms/step - loss: 0.1911 - accuracy:
0.9300 - val_loss: 0.2470 - val_accuracy: 0.9091

Epoch 25/50

22/22 [=====] - 7s 329ms/step - loss: 0.1809 - accuracy:
0.9448 - val_loss: 0.2407 - val_accuracy: 0.9290

Epoch 26/50

22/22 [=====] - 9s 434ms/step - loss: 0.1920 - accuracy:
0.9197 - val_loss: 0.2361 - val_accuracy: 0.9246

Epoch 27/50

22/22 [=====] - 8s 368ms/step - loss: 0.1663 - accuracy:
0.9440 - val_loss: 0.2306 - val_accuracy: 0.9290

Epoch 28/50

22/22 [=====] - 7s 326ms/step - loss: 0.1593 - accuracy:
0.9411 - val_loss: 0.2173 - val_accuracy: 0.9313

Epoch 29/50

22/22 [=====] - 8s 377ms/step - loss: 0.1662 - accuracy:
0.9470 - val_loss: 0.2319 - val_accuracy: 0.9157

Epoch 30/50

22/22 [=====] - 8s 364ms/step - loss: 0.1626 - accuracy:
0.9389 - val_loss: 0.2473 - val_accuracy: 0.9157

Epoch 31/50

22/22 [=====] - 8s 352ms/step - loss: 0.1628 - accuracy:
0.9448 - val_loss: 0.2075 - val_accuracy: 0.9379

Epoch 32/50

22/22 [=====] - 8s 375ms/step - loss: 0.1195 - accuracy:
0.9654 - val_loss: 0.1995 - val_accuracy: 0.9379

Epoch 33/50

22/22 [=====] - 7s 331ms/step - loss: 0.1152 - accuracy:
0.9661 - val_loss: 0.2416 - val_accuracy: 0.9069

Epoch 34/50

22/22 [=====] - 8s 375ms/step - loss: 0.1364 - accuracy:
0.9499 - val_loss: 0.2672 - val_accuracy: 0.9069

Epoch 35/50

22/22 [=====] - 7s 328ms/step - loss: 0.1264 - accuracy:
0.9573 - val_loss: 0.1919 - val_accuracy: 0.9379

Epoch 36/50

22/22 [=====] - 8s 376ms/step - loss: 0.0903 - accuracy:
0.9728 - val_loss: 0.2085 - val_accuracy: 0.9357

Epoch 37/50

22/22 [=====] - 8s 348ms/step - loss: 0.0962 - accuracy:
0.9691 - val_loss: 0.1971 - val_accuracy: 0.9357

Epoch 38/50

22/22 [=====] - 8s 357ms/step - loss: 0.0826 - accuracy:
0.9757 - val_loss: 0.1853 - val_accuracy: 0.9379

Epoch 39/50

22/22 [=====] - 8s 388ms/step - loss: 0.0709 - accuracy:
0.9794 - val_loss: 0.1865 - val_accuracy: 0.9446

Epoch 40/50

22/22 [=====] - 11s 519ms/step - loss: 0.0681 - accuracy:
0.9853 - val_loss: 0.2040 - val_accuracy: 0.9313

Epoch 41/50

22/22 [=====] - 8s 394ms/step - loss: 0.0759 - accuracy:
0.9764 - val_loss: 0.2164 - val_accuracy: 0.9224

Epoch 42/50

22/22 [=====] - 7s 329ms/step - loss: 0.0698 - accuracy:
0.9801 - val_loss: 0.1714 - val_accuracy: 0.9468

Epoch 43/50

22/22 [=====] - 11s 507ms/step - loss: 0.0686 - accuracy:
0.9816 - val_loss: 0.1807 - val_accuracy: 0.9490

Epoch 44/50

22/22 [=====] - 8s 376ms/step - loss: 0.0498 - accuracy:
0.9912 - val_loss: 0.1804 - val_accuracy: 0.9468

Epoch 45/50

22/22 [=====] - 7s 326ms/step - loss: 0.0494 - accuracy:
0.9897 - val_loss: 0.1878 - val_accuracy: 0.9379

Epoch 46/50

22/22 [=====] - 7s 339ms/step - loss: 0.0611 - accuracy:
0.9816 - val_loss: 0.2212 - val_accuracy: 0.9246

Epoch 47/50

22/22 [=====] - 8s 369ms/step - loss: 0.0871 - accuracy:
0.9683 - val_loss: 0.1751 - val_accuracy: 0.9512

Epoch 48/50

22/22 [=====] - 7s 336ms/step - loss: 0.0783 - accuracy:
0.9779 - val_loss: 0.1904 - val_accuracy: 0.9357

Epoch 49/50

22/22 [=====] - 8s 370ms/step - loss: 0.0484 - accuracy:
0.9875 - val_loss: 0.1874 - val_accuracy: 0.9468

Epoch 50/50

22/22 [=====] - 7s 324ms/step - loss: 0.0431 - accuracy:
0.9919 - val_loss: 0.1854 - val_accuracy: 0.9401

**RESULT OF MODEL FITTING PROCESS AT 70% OF TRAINING DATA AND 10%
OF VALIDATION DATA USING EPOCH 50**

Epoch 1/50

25/25 [=====] - 11s 356ms/step - loss: 1.0849 - accuracy:
0.4088 - val_loss: 1.0528 - val_accuracy: 0.3822

Epoch 2/50

25/25 [=====] - 7s 294ms/step - loss: 1.0154 - accuracy:
0.4946 - val_loss: 0.9170 - val_accuracy: 0.4978

Epoch 3/50

25/25 [=====] - 8s 329ms/step - loss: 0.8519 - accuracy:
0.6126 - val_loss: 0.7034 - val_accuracy: 0.7111

Epoch 4/50

25/25 [=====] - 8s 318ms/step - loss: 0.6856 - accuracy:
0.7054 - val_loss: 0.7328 - val_accuracy: 0.6178

Epoch 5/50

25/25 [=====] - 8s 305ms/step - loss: 0.6017 - accuracy:
0.7199 - val_loss: 0.5425 - val_accuracy: 0.7467

Epoch 6/50

25/25 [=====] - 8s 336ms/step - loss: 0.5587 - accuracy:
0.7527 - val_loss: 0.4905 - val_accuracy: 0.7778

Epoch 7/50

25/25 [=====] - 7s 289ms/step - loss: 0.4922 - accuracy:
0.7823 - val_loss: 0.4618 - val_accuracy: 0.7956

Epoch 8/50

25/25 [=====] - 8s 335ms/step - loss: 0.4573 - accuracy:
0.8050 - val_loss: 0.4044 - val_accuracy: 0.8267

Epoch 9/50

25/25 [=====] - 8s 322ms/step - loss: 0.4555 - accuracy:
0.8095 - val_loss: 0.3906 - val_accuracy: 0.8311

Epoch 10/50

25/25 [=====] - 7s 300ms/step - loss: 0.4161 - accuracy:
0.8290 - val_loss: 0.3613 - val_accuracy: 0.8400

Epoch 11/50

25/25 [=====] - 8s 335ms/step - loss: 0.3797 - accuracy:
0.8423 - val_loss: 0.3358 - val_accuracy: 0.8578

Epoch 12/50

25/25 [=====] - 8s 306ms/step - loss: 0.3668 - accuracy:
0.8442 - val_loss: 0.3411 - val_accuracy: 0.8622

Epoch 13/50

25/25 [=====] - 8s 318ms/step - loss: 0.3110 - accuracy:
0.8744 - val_loss: 0.3042 - val_accuracy: 0.8800

Epoch 14/50

25/25 [=====] - 9s 368ms/step - loss: 0.2967 - accuracy:
0.8890 - val_loss: 0.2971 - val_accuracy: 0.8756

Epoch 15/50

25/25 [=====] - 8s 310ms/step - loss: 0.2890 - accuracy:
0.8858 - val_loss: 0.3187 - val_accuracy: 0.8711

Epoch 16/50

25/25 [=====] - 8s 321ms/step - loss: 0.2648 - accuracy:
0.8978 - val_loss: 0.2616 - val_accuracy: 0.8889

Epoch 17/50

25/25 [=====] - 9s 342ms/step - loss: 0.2552 - accuracy:
0.8953 - val_loss: 0.2329 - val_accuracy: 0.9200

Epoch 18/50

25/25 [=====] - 7s 288ms/step - loss: 0.2212 - accuracy:
0.9199 - val_loss: 0.2384 - val_accuracy: 0.9067

Epoch 19/50

25/25 [=====] - 8s 330ms/step - loss: 0.1986 - accuracy:
0.9262 - val_loss: 0.2177 - val_accuracy: 0.9422

Epoch 20/50

25/25 [=====] - 7s 285ms/step - loss: 0.1934 - accuracy:
0.9312 - val_loss: 0.2125 - val_accuracy: 0.9378

Epoch 21/50

25/25 [=====] - 8s 331ms/step - loss: 0.2194 - accuracy:
0.9098 - val_loss: 0.2436 - val_accuracy: 0.8978

Epoch 22/50

25/25 [=====] - 8s 301ms/step - loss: 0.1876 - accuracy:
0.9338 - val_loss: 0.2083 - val_accuracy: 0.9289

Epoch 23/50

25/25 [=====] - 8s 306ms/step - loss: 0.1562 - accuracy:
0.9521 - val_loss: 0.2011 - val_accuracy: 0.9422

Epoch 24/50

25/25 [=====] - 8s 325ms/step - loss: 0.1445 - accuracy:
0.9552 - val_loss: 0.1778 - val_accuracy: 0.9556

Epoch 25/50

25/25 [=====] - 7s 288ms/step - loss: 0.1304 - accuracy:
0.9565 - val_loss: 0.1789 - val_accuracy: 0.9467

Epoch 26/50

25/25 [=====] - 8s 328ms/step - loss: 0.1372 - accuracy:
0.9539 - val_loss: 0.1688 - val_accuracy: 0.9556

Epoch 27/50

25/25 [=====] - 7s 288ms/step - loss: 0.1257 - accuracy:
0.9590 - val_loss: 0.1787 - val_accuracy: 0.9511

Epoch 28/50

25/25 [=====] - 8s 328ms/step - loss: 0.1208 - accuracy:
0.9584 - val_loss: 0.1754 - val_accuracy: 0.9467

Epoch 29/50

25/25 [=====] - 7s 303ms/step - loss: 0.1060 - accuracy:
0.9659 - val_loss: 0.1601 - val_accuracy: 0.9556

Epoch 30/50

25/25 [=====] - 7s 285ms/step - loss: 0.0912 - accuracy:
0.9760 - val_loss: 0.1711 - val_accuracy: 0.9511

Epoch 31/50

25/25 [=====] - 8s 329ms/step - loss: 0.1021 - accuracy:
0.9621 - val_loss: 0.1773 - val_accuracy: 0.9333

Epoch 32/50

25/25 [=====] - 8s 323ms/step - loss: 0.0960 - accuracy:
0.9672 - val_loss: 0.1565 - val_accuracy: 0.9600

Epoch 33/50

25/25 [=====] - 8s 312ms/step - loss: 0.0837 - accuracy:
0.9748 - val_loss: 0.1864 - val_accuracy: 0.9378

Epoch 34/50

25/25 [=====] - 8s 330ms/step - loss: 0.0815 - accuracy:
0.9710 - val_loss: 0.1736 - val_accuracy: 0.9511

Epoch 35/50

25/25 [=====] - 7s 289ms/step - loss: 0.0897 - accuracy:
0.9659 - val_loss: 0.1681 - val_accuracy: 0.9511

Epoch 36/50

25/25 [=====] - 9s 328ms/step - loss: 0.0809 - accuracy:
0.9773 - val_loss: 0.1567 - val_accuracy: 0.9733

Epoch 37/50

25/25 [=====] - 8s 319ms/step - loss: 0.0704 - accuracy:
0.9779 - val_loss: 0.1515 - val_accuracy: 0.9600

Epoch 38/50

25/25 [=====] - 8s 301ms/step - loss: 0.0528 - accuracy:
0.9899 - val_loss: 0.1527 - val_accuracy: 0.9689

Epoch 39/50

25/25 [=====] - 8s 337ms/step - loss: 0.0509 - accuracy:
0.9880 - val_loss: 0.1553 - val_accuracy: 0.9600

Epoch 40/50

25/25 [=====] - 7s 291ms/step - loss: 0.0459 - accuracy:
0.9855 - val_loss: 0.1580 - val_accuracy: 0.9644

Epoch 41/50

25/25 [=====] - 8s 328ms/step - loss: 0.0468 - accuracy:
0.9868 - val_loss: 0.1572 - val_accuracy: 0.9600

Epoch 42/50

25/25 [=====] - 8s 324ms/step - loss: 0.0434 - accuracy:
0.9899 - val_loss: 0.1600 - val_accuracy: 0.9644

Epoch 43/50

25/25 [=====] - 9s 347ms/step - loss: 0.0481 - accuracy:
0.9868 - val_loss: 0.1795 - val_accuracy: 0.9333

Epoch 44/50

25/25 [=====] - 8s 320ms/step - loss: 0.0540 - accuracy:
0.9886 - val_loss: 0.1535 - val_accuracy: 0.9556

Epoch 45/50

25/25 [=====] - 7s 293ms/step - loss: 0.0698 - accuracy:
0.9779 - val_loss: 0.1610 - val_accuracy: 0.9511

Epoch 46/50

25/25 [=====] - 8s 324ms/step - loss: 0.0449 - accuracy:
0.9905 - val_loss: 0.1643 - val_accuracy: 0.9511

Epoch 47/50

25/25 [=====] - 7s 294ms/step - loss: 0.0246 - accuracy:
0.9968 - val_loss: 0.1682 - val_accuracy: 0.9511

Epoch 48/50

25/25 [=====] - 8s 333ms/step - loss: 0.0236 - accuracy:
0.9968 - val_loss: 0.1693 - val_accuracy: 0.9644

Epoch 49/50

25/25 [=====] - 8s 302ms/step - loss: 0.0293 - accuracy:
0.9893 - val_loss: 0.1606 - val_accuracy: 0.9556

Epoch 50/50

25/25 [=====] - 7s 286ms/step - loss: 0.0288 - accuracy:
0.9924 - val_loss: 0.1644 - val_accuracy: 0.9600

**RESULT OF MODEL FITTING PROCESS AT 80% OF TRAINING DATA AND 10%
OF VALIDATION DATA USING EPOCH 50**

Epoch 1/50

29/29 [=====] - 11s 288ms/step - loss: 1.0734 - accuracy:
0.4172 - val_loss: 1.0230 - val_accuracy: 0.6222

Epoch 2/50

29/29 [=====] - 9s 314ms/step - loss: 0.9500 - accuracy:
0.5513 - val_loss: 0.9277 - val_accuracy: 0.5511

Epoch 3/50

29/29 [=====] - 9s 308ms/step - loss: 0.7764 - accuracy:
0.6446 - val_loss: 0.7107 - val_accuracy: 0.6578

Epoch 4/50

29/29 [=====] - 9s 297ms/step - loss: 0.6878 - accuracy:
0.6854 - val_loss: 0.6722 - val_accuracy: 0.6844

Epoch 5/50

29/29 [=====] - 10s 348ms/step - loss: 0.6525 - accuracy:
0.7020 - val_loss: 0.6891 - val_accuracy: 0.6800

Epoch 6/50

29/29 [=====] - 9s 315ms/step - loss: 0.6274 - accuracy:
0.7252 - val_loss: 0.5886 - val_accuracy: 0.7511

Epoch 7/50

29/29 [=====] - 8s 278ms/step - loss: 0.5323 - accuracy:
0.7748 - val_loss: 0.6259 - val_accuracy: 0.7378

Epoch 8/50

29/29 [=====] - 9s 315ms/step - loss: 0.4680 - accuracy:
0.8068 - val_loss: 0.4927 - val_accuracy: 0.7956

Epoch 9/50

29/29 [=====] - 9s 303ms/step - loss: 0.4123 - accuracy:
0.8355 - val_loss: 0.4853 - val_accuracy: 0.7778

Epoch 10/50

29/29 [=====] - 8s 277ms/step - loss: 0.3981 - accuracy:
0.8355 - val_loss: 0.5099 - val_accuracy: 0.7467

Epoch 11/50

29/29 [=====] - 9s 318ms/step - loss: 0.3638 - accuracy:
0.8526 - val_loss: 0.4022 - val_accuracy: 0.8400

Epoch 12/50

29/29 [=====] - 9s 312ms/step - loss: 0.3242 - accuracy:
0.8664 - val_loss: 0.3720 - val_accuracy: 0.8178

Epoch 13/50

29/29 [=====] - 8s 277ms/step - loss: 0.3127 - accuracy:
0.8775 - val_loss: 0.3577 - val_accuracy: 0.8489

Epoch 14/50

29/29 [=====] - 9s 316ms/step - loss: 0.2790 - accuracy:
0.8951 - val_loss: 0.3814 - val_accuracy: 0.8533

Epoch 15/50

29/29 [=====] - 9s 315ms/step - loss: 0.2768 - accuracy:
0.8935 - val_loss: 0.3433 - val_accuracy: 0.8756

Epoch 16/50

29/29 [=====] - 8s 280ms/step - loss: 0.2363 - accuracy:
0.9172 - val_loss: 0.3160 - val_accuracy: 0.8711

Epoch 17/50

29/29 [=====] - 9s 312ms/step - loss: 0.2137 - accuracy:
0.9255 - val_loss: 0.2989 - val_accuracy: 0.8711

Epoch 18/50

29/29 [=====] - 9s 305ms/step - loss: 0.1871 - accuracy:
0.9382 - val_loss: 0.2606 - val_accuracy: 0.9022

Epoch 19/50

29/29 [=====] - 8s 270ms/step - loss: 0.1808 - accuracy:
0.9398 - val_loss: 0.2654 - val_accuracy: 0.8978

Epoch 20/50

29/29 [=====] - 9s 315ms/step - loss: 0.1561 - accuracy:
0.9525 - val_loss: 0.2637 - val_accuracy: 0.8933

Epoch 21/50

29/29 [=====] - 9s 314ms/step - loss: 0.1582 - accuracy:
0.9481 - val_loss: 0.2460 - val_accuracy: 0.9111

Epoch 22/50

29/29 [=====] - 8s 276ms/step - loss: 0.1575 - accuracy:
0.9514 - val_loss: 0.4514 - val_accuracy: 0.8178

Epoch 23/50

29/29 [=====] - 9s 312ms/step - loss: 0.1890 - accuracy:
0.9327 - val_loss: 0.2555 - val_accuracy: 0.8933

Epoch 24/50

29/29 [=====] - 9s 317ms/step - loss: 0.1296 - accuracy:
0.9625 - val_loss: 0.2790 - val_accuracy: 0.9067

Epoch 25/50

29/29 [=====] - 8s 282ms/step - loss: 0.1174 - accuracy:
0.9663 - val_loss: 0.2240 - val_accuracy: 0.9156

Epoch 26/50

29/29 [=====] - 9s 315ms/step - loss: 0.1379 - accuracy:
0.9525 - val_loss: 0.2590 - val_accuracy: 0.9289

Epoch 27/50

29/29 [=====] - 9s 312ms/step - loss: 0.1053 - accuracy:
0.9685 - val_loss: 0.1948 - val_accuracy: 0.9422

Epoch 28/50

29/29 [=====] - 8s 280ms/step - loss: 0.0836 - accuracy:
0.9785 - val_loss: 0.2585 - val_accuracy: 0.9156

Epoch 29/50

29/29 [=====] - 9s 327ms/step - loss: 0.0885 - accuracy:
0.9719 - val_loss: 0.1898 - val_accuracy: 0.9422

Epoch 30/50

29/29 [=====] - 10s 335ms/step - loss: 0.0806 - accuracy:
0.9774 - val_loss: 0.2258 - val_accuracy: 0.9156

Epoch 31/50

29/29 [=====] - 8s 279ms/step - loss: 0.0747 - accuracy:
0.9818 - val_loss: 0.3217 - val_accuracy: 0.8800

Epoch 32/50

29/29 [=====] - 9s 318ms/step - loss: 0.0981 - accuracy:
0.9708 - val_loss: 0.1876 - val_accuracy: 0.9467

Epoch 33/50

29/29 [=====] - 9s 315ms/step - loss: 0.0730 - accuracy:
0.9801 - val_loss: 0.1656 - val_accuracy: 0.9467

Epoch 34/50

29/29 [=====] - 8s 277ms/step - loss: 0.0499 - accuracy:
0.9895 - val_loss: 0.1803 - val_accuracy: 0.9422

Epoch 35/50

29/29 [=====] - 9s 312ms/step - loss: 0.0536 - accuracy:
0.9873 - val_loss: 0.1839 - val_accuracy: 0.9422

Epoch 36/50

29/29 [=====] - 9s 301ms/step - loss: 0.0450 - accuracy:
0.9906 - val_loss: 0.1587 - val_accuracy: 0.9511

Epoch 37/50

29/29 [=====] - 8s 276ms/step - loss: 0.0413 - accuracy:
0.9906 - val_loss: 0.1486 - val_accuracy: 0.9511

Epoch 38/50

29/29 [=====] - 9s 315ms/step - loss: 0.0386 - accuracy:
0.9917 - val_loss: 0.1503 - val_accuracy: 0.9556

Epoch 39/50

29/29 [=====] - 9s 315ms/step - loss: 0.0709 - accuracy:
0.9741 - val_loss: 0.2678 - val_accuracy: 0.9333

Epoch 40/50

29/29 [=====] - 8s 277ms/step - loss: 0.0417 - accuracy:
0.9906 - val_loss: 0.1507 - val_accuracy: 0.9511

Epoch 41/50

29/29 [=====] - 9s 327ms/step - loss: 0.0284 - accuracy:
0.9950 - val_loss: 0.1464 - val_accuracy: 0.9556

Epoch 42/50

29/29 [=====] - 9s 303ms/step - loss: 0.0240 - accuracy:
0.9972 - val_loss: 0.1875 - val_accuracy: 0.9467

Epoch 43/50

29/29 [=====] - 8s 279ms/step - loss: 0.0234 - accuracy:
0.9961 - val_loss: 0.1458 - val_accuracy: 0.9511

Epoch 44/50

29/29 [=====] - 9s 316ms/step - loss: 0.0347 - accuracy:
0.9901 - val_loss: 0.1633 - val_accuracy: 0.9511

Epoch 45/50

29/29 [=====] - 9s 315ms/step - loss: 0.0249 - accuracy:
0.9967 - val_loss: 0.1615 - val_accuracy: 0.9422

Epoch 46/50

29/29 [=====] - 8s 281ms/step - loss: 0.0308 - accuracy:
0.9917 - val_loss: 0.1776 - val_accuracy: 0.9467

Epoch 47/50

29/29 [=====] - 9s 315ms/step - loss: 0.0167 - accuracy:
0.9989 - val_loss: 0.1457 - val_accuracy: 0.9600

Epoch 48/50

29/29 [=====] - 9s 302ms/step - loss: 0.0144 - accuracy:
0.9972 - val_loss: 0.1494 - val_accuracy: 0.9511

Epoch 49/50

29/29 [=====] - 8s 274ms/step - loss: 0.0319 - accuracy:
0.9912 - val_loss: 0.2482 - val_accuracy: 0.9333

Epoch 50/50

29/29 [=====] - 9s 315ms/step - loss: 0.0291 - accuracy:
0.9945 - val_loss: 0.1869 - val_accuracy: 0.9556

**LOSS, VAL LOSS, ACC, VAL ACC GRAPH AT 50% OF TRAINING DATA AND
10% OF VALIDATION DATA USING EPOCH 50**

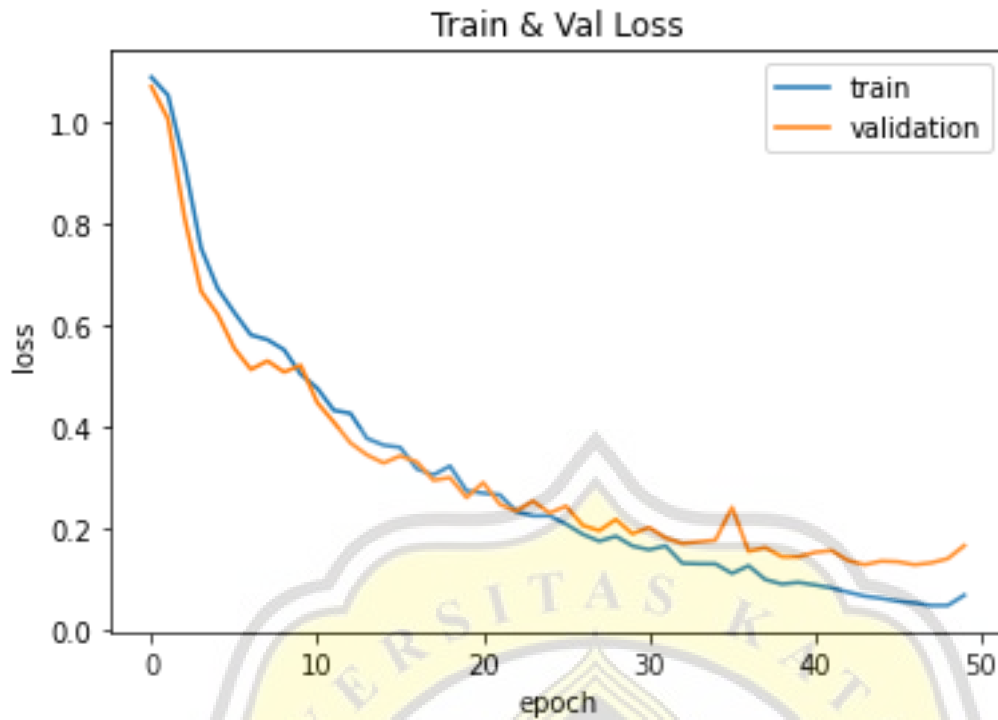


Figure 6.1 Training And Validation Loss Graph At 50 : 10 Data

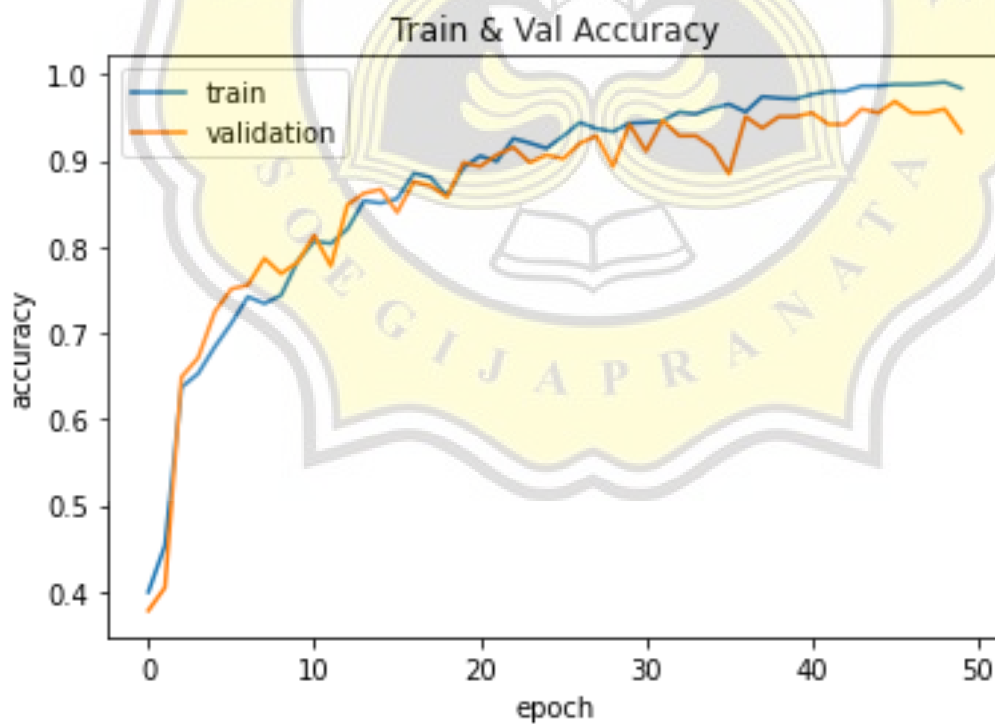


Figure 6.2 Training And Validation Accuracy Graph At 50 : 10 Data

LOSS, VAL_LOSS, ACC, VAL_ACC GRAPH AT 50% OF TRAINING DATA AND 20% OF VALIDATION DATA USING EPOCH 50

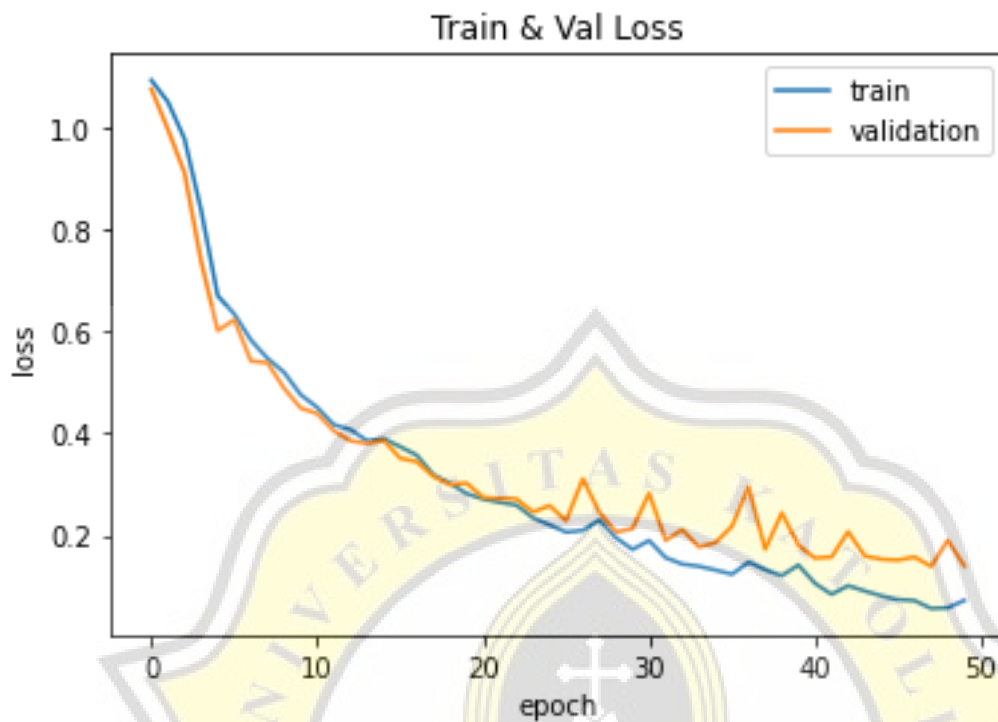


Figure 6.3 Training And Validation Loss Graph At 50 : 20 Data

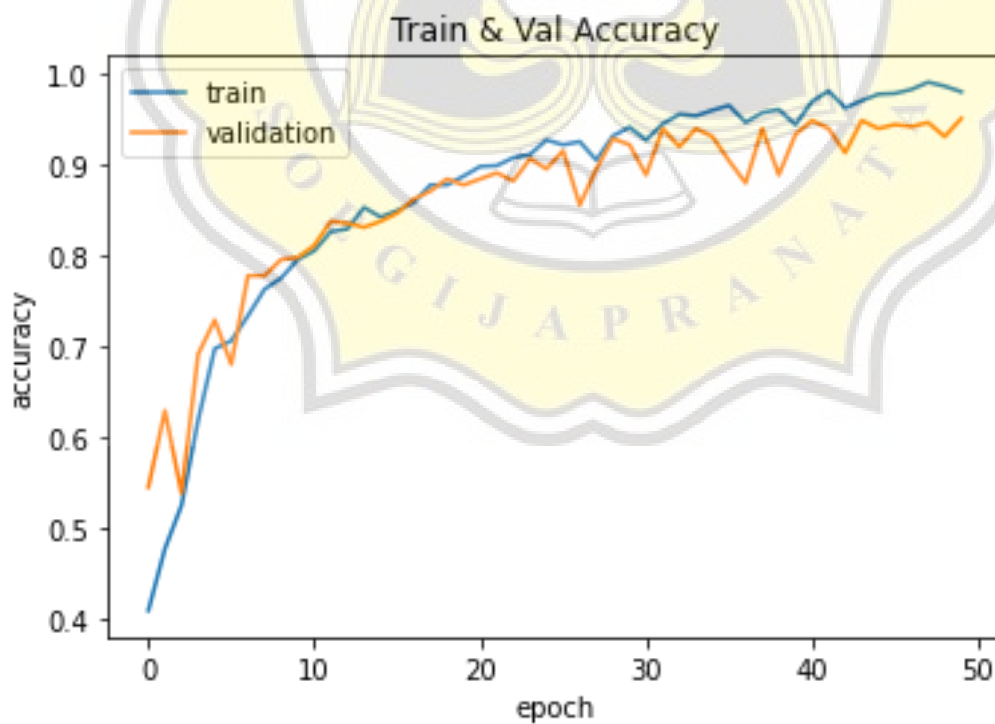


Figure 6.4 Training And Validation Accuracy Graph At 50 : 20 Data

LOSS, VAL_LOSS, ACC, VAL_ACC GRAPH AT 60% OF TRAINING DATA AND 20% OF VALIDATION DATA USING EPOCH 50

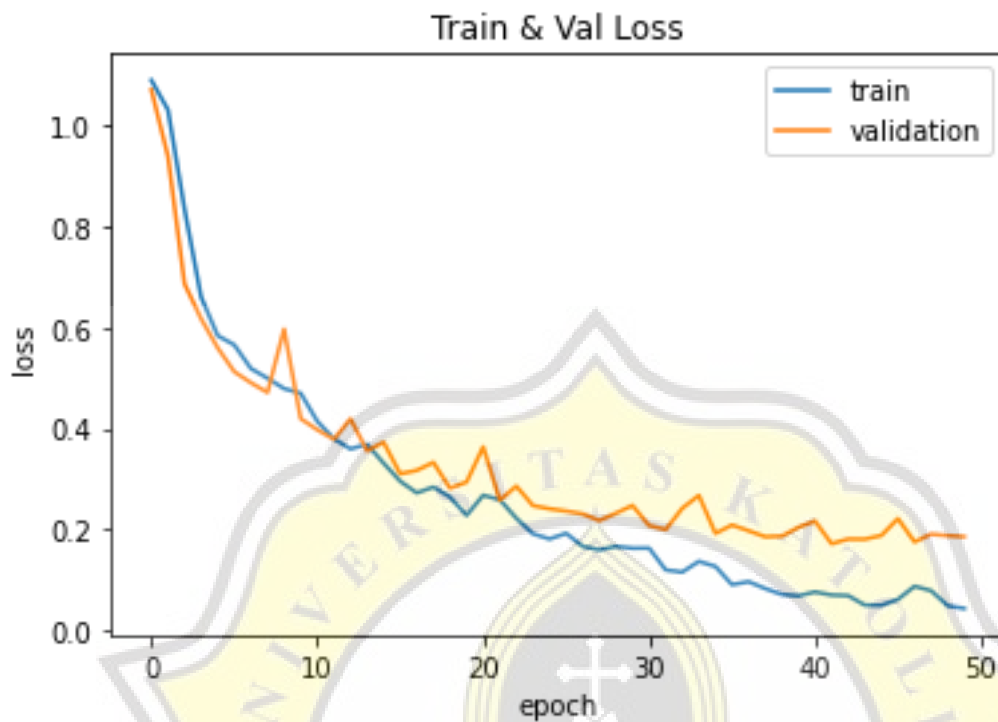


Figure 6.5 Training And Validation Loss Graph At 60 : 20 Data

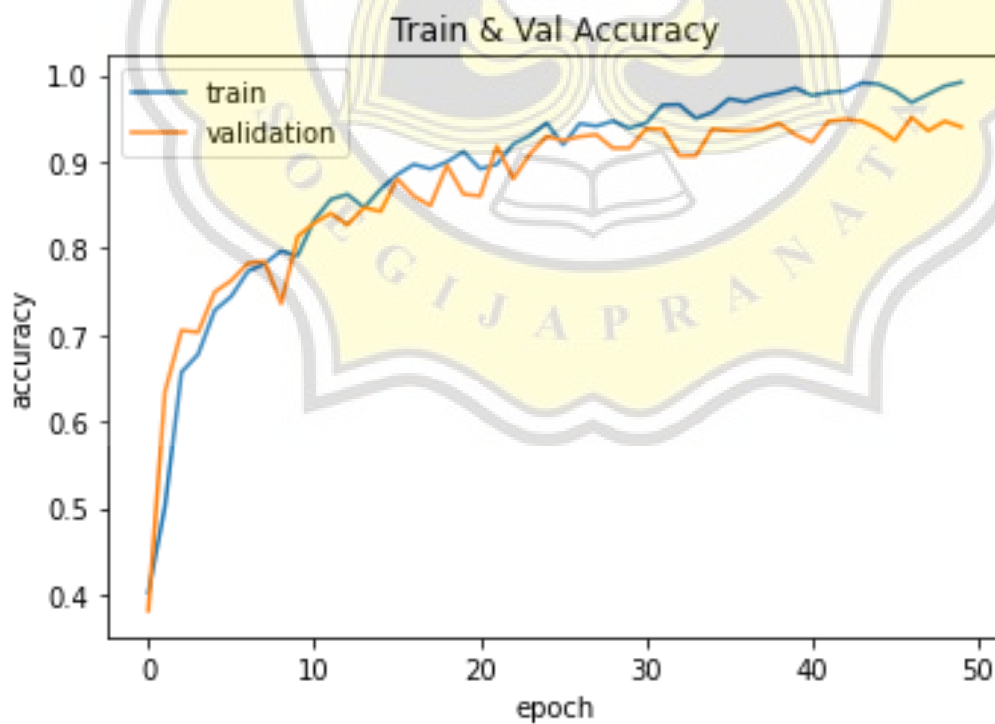


Figure 6.6 Training And Validation Accuracy Graph At 60 : 20 Data

LOSS, VAL_LOSS, ACC, VAL_ACC GRAPH AT 70% OF TRAINING DATA AND 10% OF VALIDATION DATA USING EPOCH 50

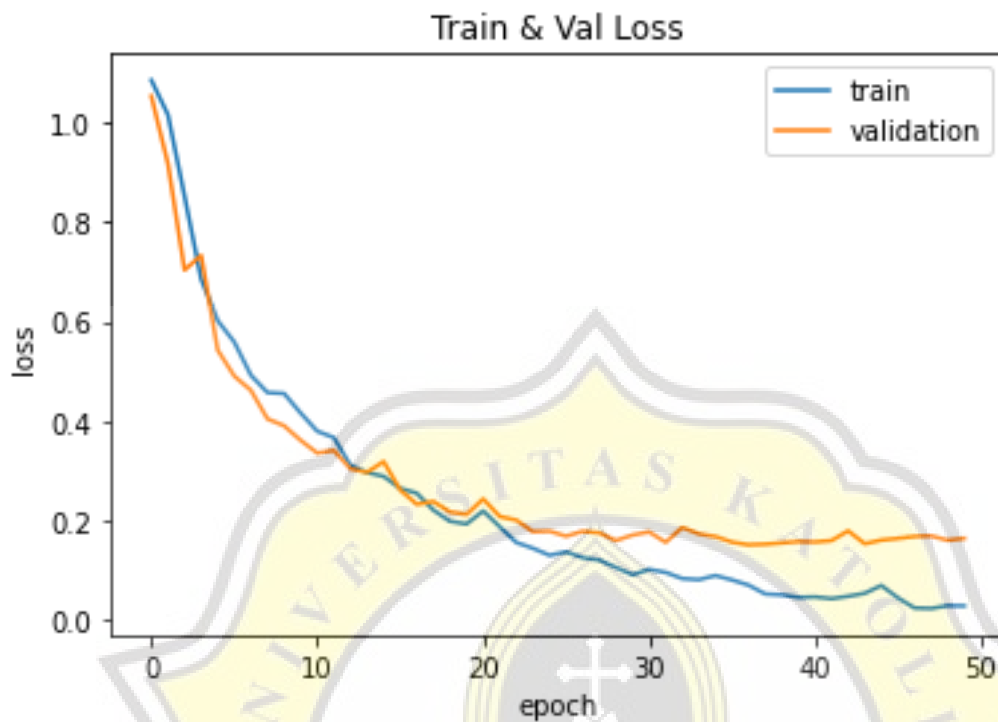


Figure 6.7 Training And Validation Loss Graph At 70 : 10 Data

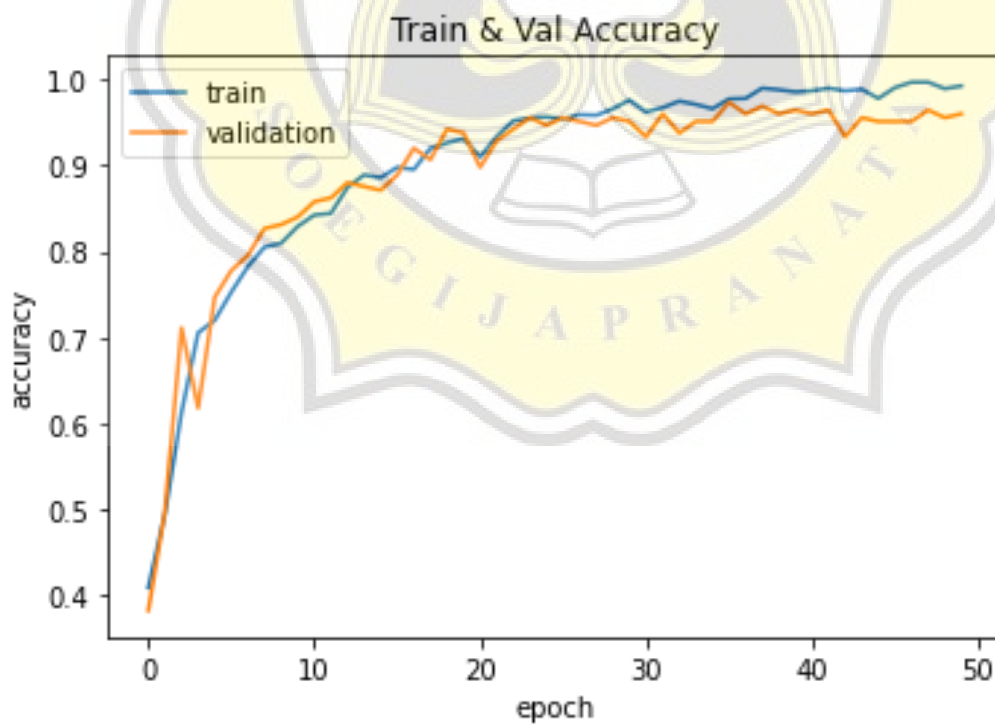


Figure 6.8 Training And Validation Accuracy Graph At 70 : 10 Data

LOSS, VAL_LOSS, ACC, VAL_ACC GRAPH AT 80% OF TRAINING DATA AND 10% OF VALIDATION DATA USING EPOCH 50

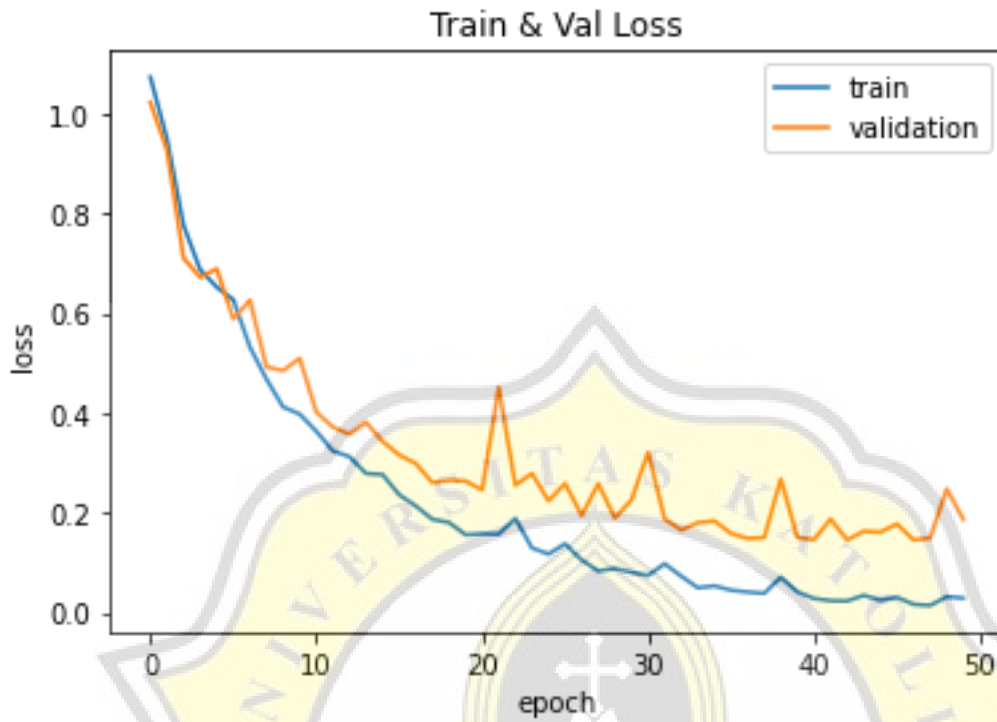


Figure 6.9 Training And Validation Loss Graph At 80 : 10 Data

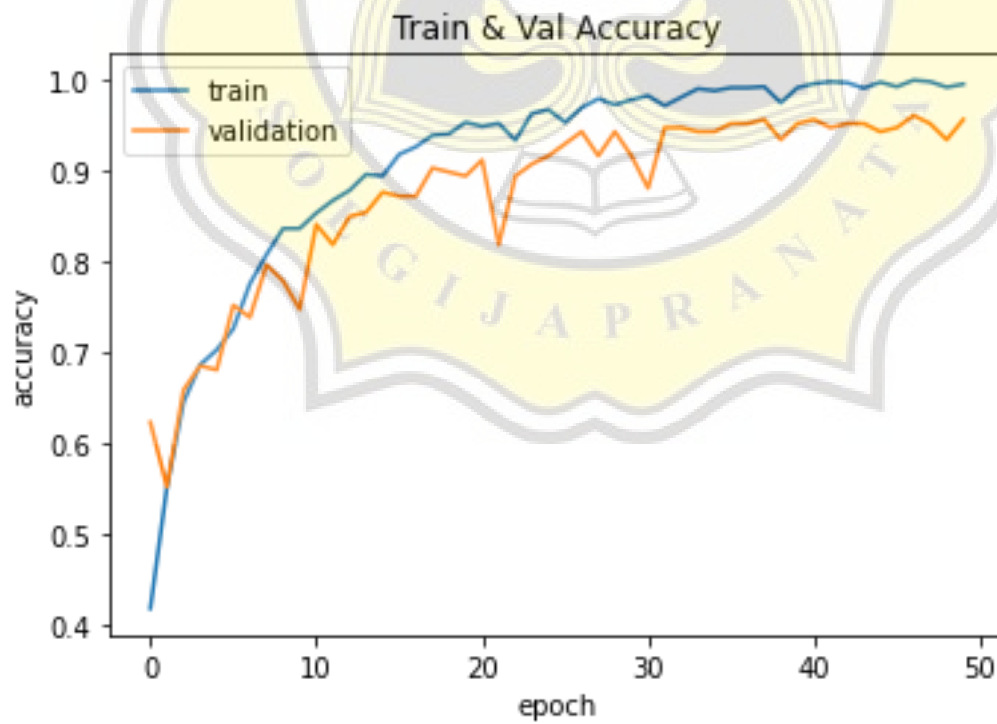


Figure 6.10 Training And Validation Accuracy Graph At 80 : 10 Data

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