به نام خدا

گزارش پروژه دوم درس یادگیری عمیق

دکتر سید ابوالقاسم میرروشندل

تاریخ تحویل: 1401/01/31

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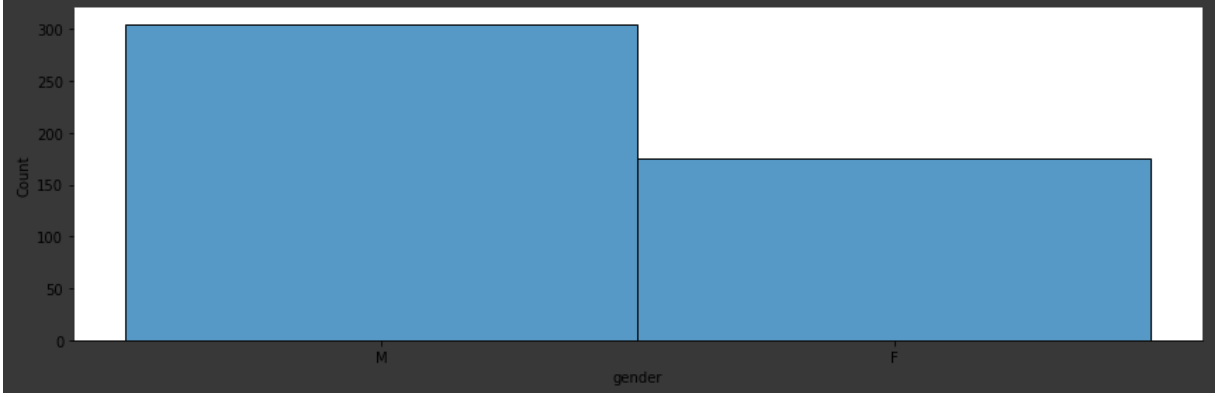
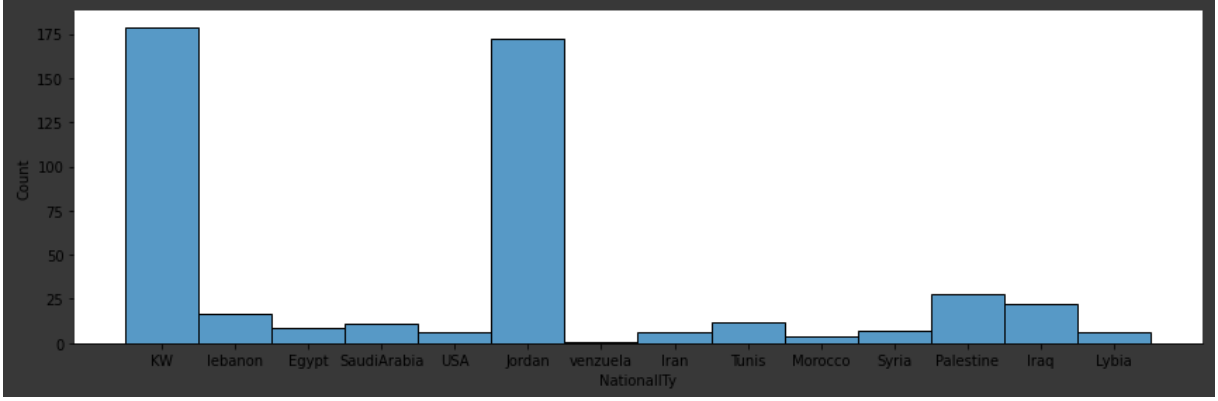
- **بررسی دیتاست (تعداد داده ها، توزیع داده های هر کلاس و سایر تحلیل ها)**
- اینجا در هر پارت، پارامترهای هر ستون، تعداد آن ها با نمودار های توزیع آن ها نشان داده شده است.

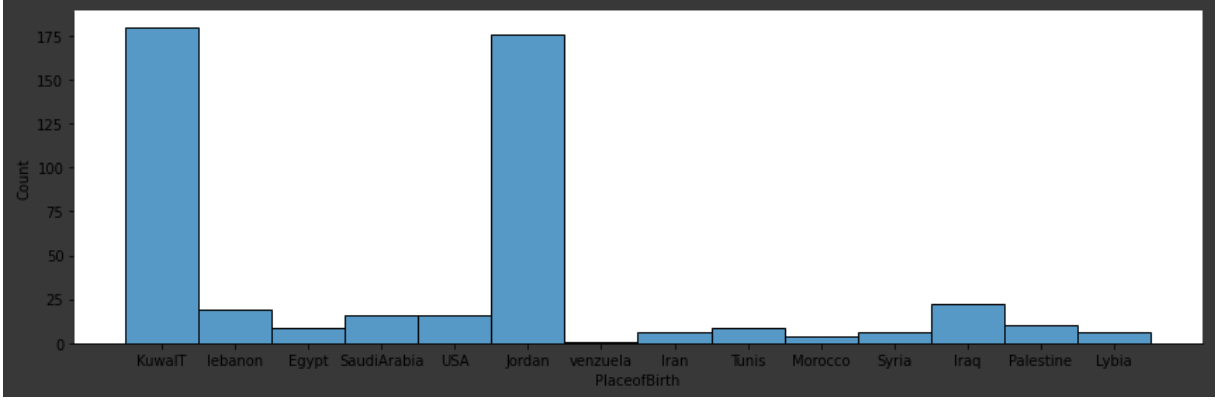
```
Kind of Data:['M' 'F']

Number of Data:
M    305
F    175
Name: gender, dtype: int64

<seaborn.axisgrid.FacetGrid at 0x7fcb26cf73d0>
```



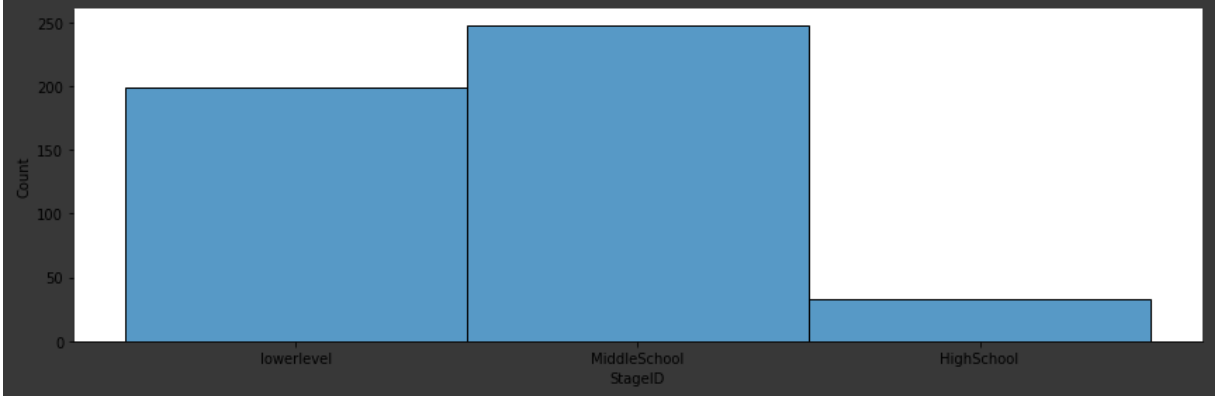
```
Kind of Data:['KW' 'lebanon' 'Egypt' 'SaudiArabia' 'USA' 'Jordan'
'venzuela' 'Iran'
 'Tunis' 'Morocco' 'Syria' 'Palestine' 'Iraq' 'Lybia']

Number of Data:
KW             179
Jordan         172
Palestine       28
Iraq            22
lebanon         17
Tunis           12
SaudiArabia     11
Egypt            9
Syria            7
USA              6
Iran             6
Lybia            6
Morocco          4
venzuela         1
Name: NationalITy, dtype: int64

<seaborn.axisgrid.FacetGrid at 0x7fcb2974a850>
```



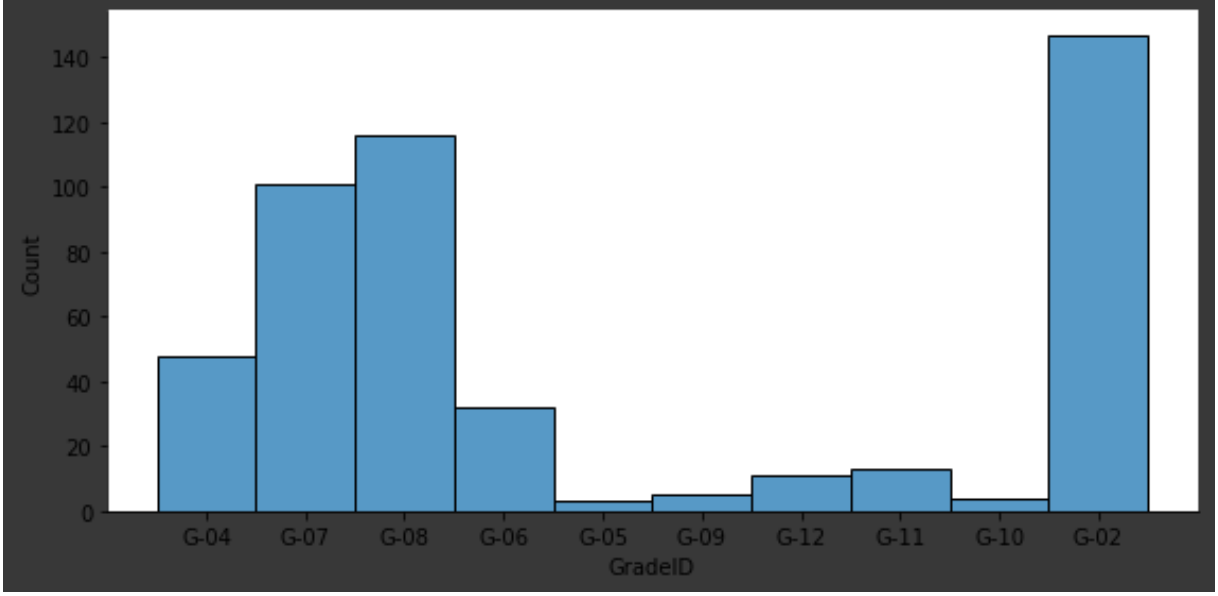
```
Kind of Data:['KuwaIT' 'lebanon' 'Egypt' 'SaudiArabia' 'USA' 'Jordan'
'venzuela' 'Iran'
 'Tunis' 'Morocco' 'Syria' 'Iraq' 'Palestine' 'Lybia']

Number of Data:
KuwaIT         180
Jordan         176
Iraq            22
lebanon         19
SaudiArabia     16
USA             16
Palestine       10
Egypt            9
Tunis            9
Iran             6
Syria            6
Lybia            6
Morocco          4
venzuela         1
Name: PlaceofBirth, dtype: int64

<seaborn.axisgrid.FacetGrid at 0x7fcb26cf7d10>
```



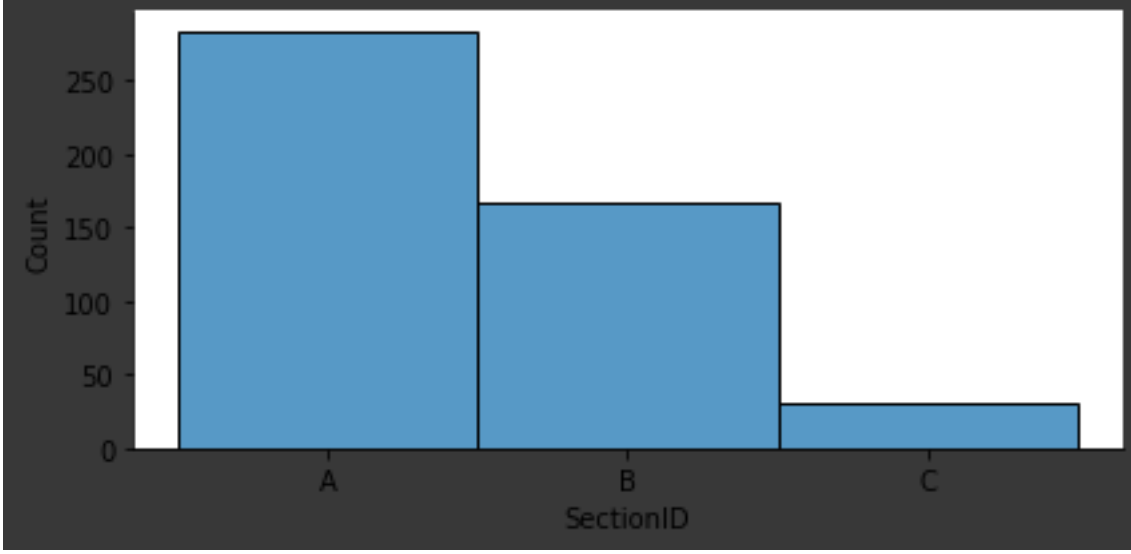

```
Kind of Data:['lowerlevel' 'MiddleSchool' 'HighSchool']

Number of Data:
MiddleSchool    248
lowerlevel      199
HighSchool       33
Name: StageID, dtype: int64

<seaborn.axisgrid.FacetGrid at 0x7fcb29648050>
```



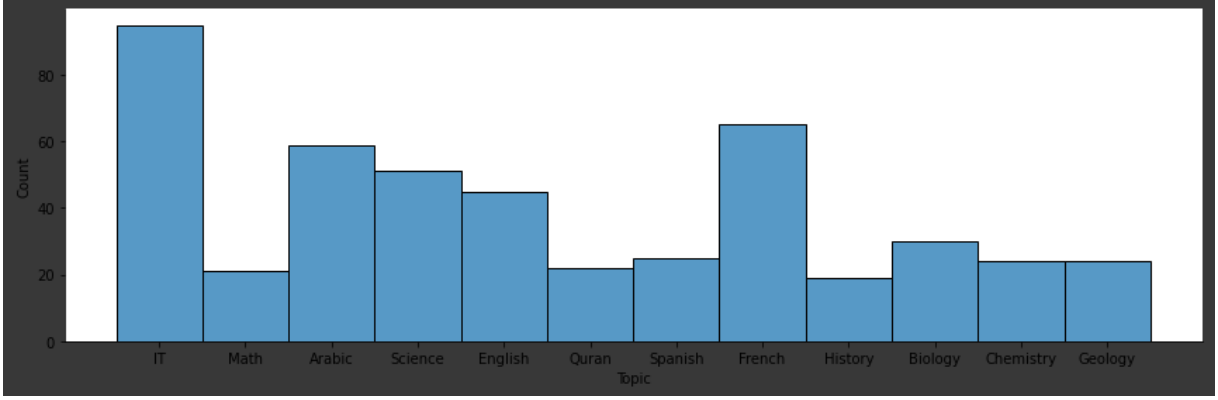
```
Kind of Data:['G-04' 'G-07' 'G-08' 'G-06' 'G-05' 'G-09' 'G-12' 'G-11' 'G-
10' 'G-02']

Number of Data:
G-02    147
G-08    116
G-07    101
G-04     48
G-06     32
G-11     13
G-12     11
G-09      5
G-10      4
G-05      3
Name: GradeID, dtype: int64

<seaborn.axisgrid.FacetGrid at 0x7fcb29678dd0>
```



```
Kind of Data:['A' 'B' 'C']

Number of Data:
A    283
B    167
C     30
Name: SectionID, dtype: int64

<seaborn.axisgrid.FacetGrid at 0x7fcb295e1510>
```

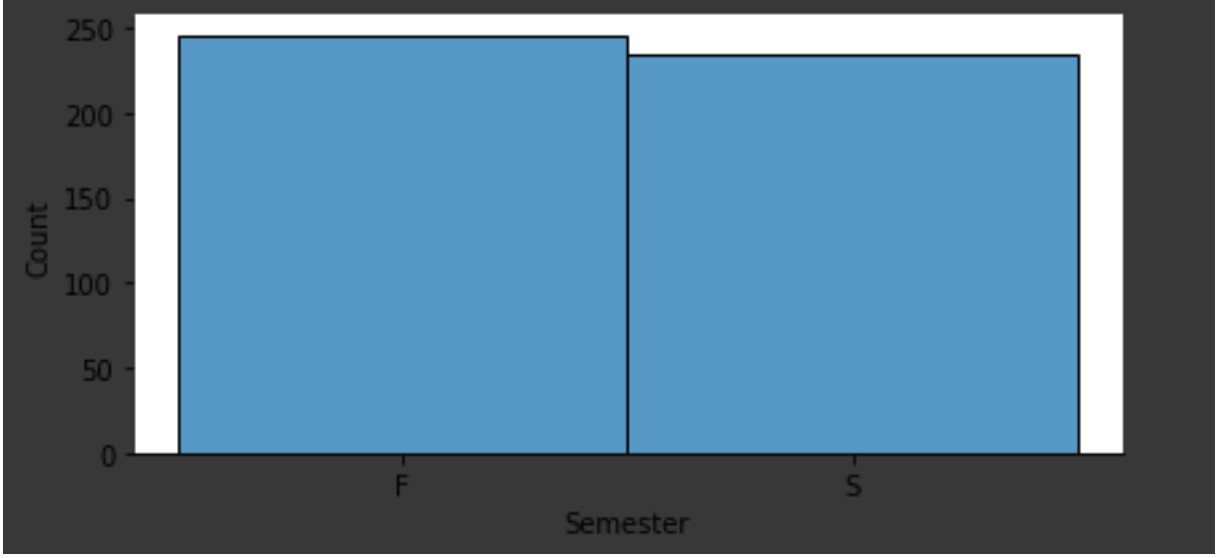



```
Kind of Data:['IT' 'Math' 'Arabic' 'Science' 'English' 'Quran' 'Spanish'
'French'
 'History' 'Biology' 'Chemistry' 'Geology']

Number of Data:
IT           95
French       65
Arabic       59
Science      51
English      45
Biology      30
Spanish      25
Chemistry    24
Geology      24
Quran        22
Math         21
History      19
Name: Topic, dtype: int64

<seaborn.axisgrid.FacetGrid at 0x7fcb294d9ad0>
```

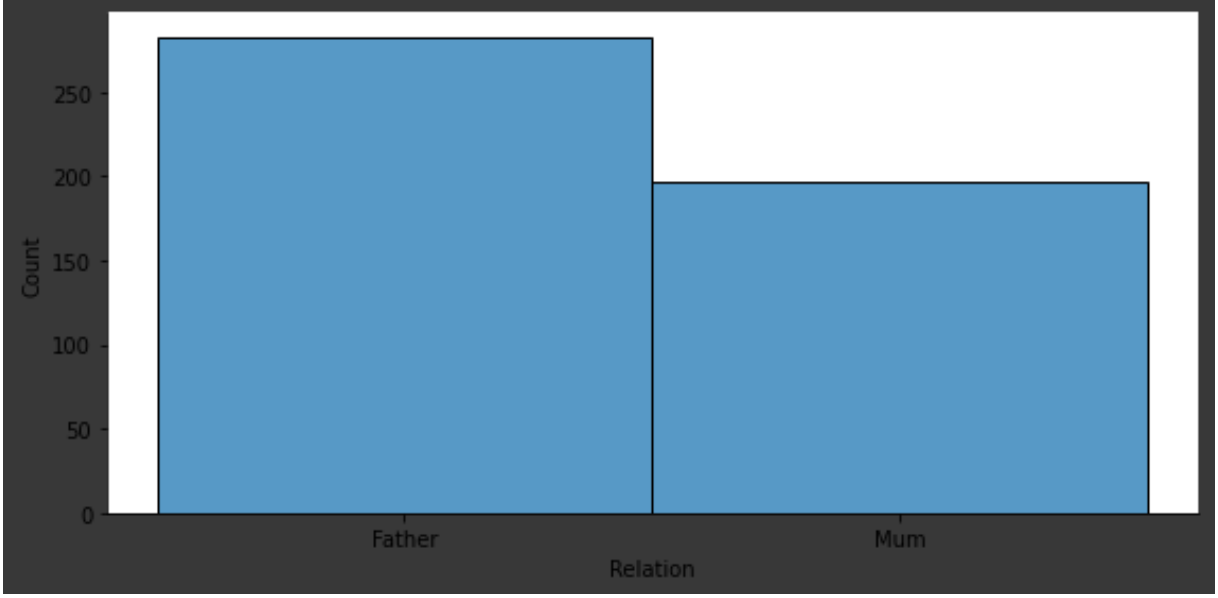



```
Kind of Data:['F' 'S']
```

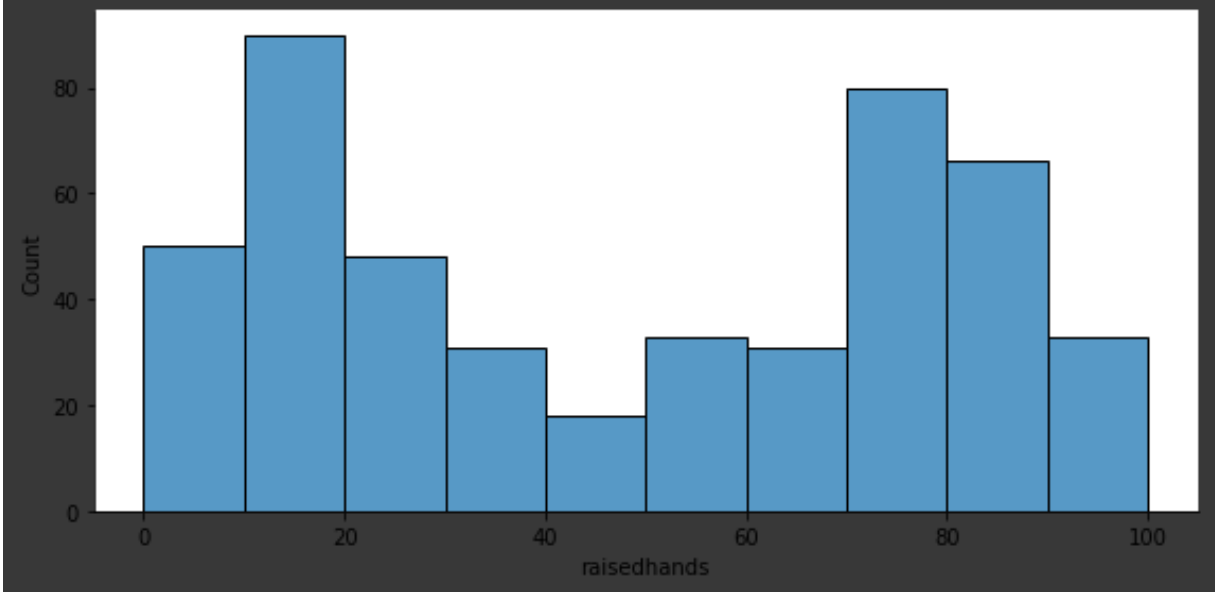
```
Number of Data:
F    245
S    235
Name: Semester, dtype: int64

<seaborn.axisgrid.FacetGrid at 0x7fcb2944d0d0>
```



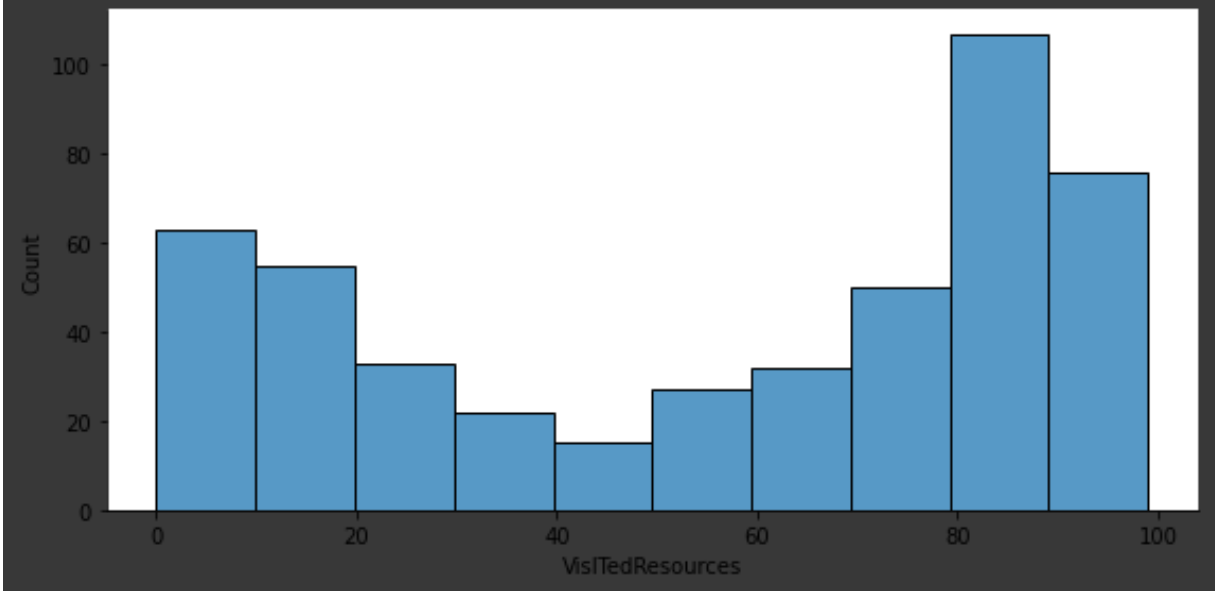

```
Kind of Data:['Father' 'Mum']

Number of Data:
Father    283
Mum       197
Name: Relation, dtype: int64

<seaborn.axisgrid.FacetGrid at 0x7fcb2945d610>
```



```
Kind of Data:[ 15  20  10  30  40  42  35  50  12  70  19   5  62  36  55
69  60   2
   0   8  25  75   4  45  14  33   7  13  29  39  49  16  28  27  21  80
  17  65  22  11   1   3 100   6  90  77  24  66  23  82  72  51  85  87
  95  81  53  92  83  67  96  57  73   9  32  52  59  61  79  18  74  97
  41  71  98  78  89  88  86  76  99  84]

Number of Data:
10    31
70    31
80    28
72    17
50    17
      ..
61     1
83     1
52     1
67     1
97     1
Name: raisedhands, Length: 82, dtype: int64

<seaborn.axisgrid.FacetGrid at 0x7fcb29350850>
```

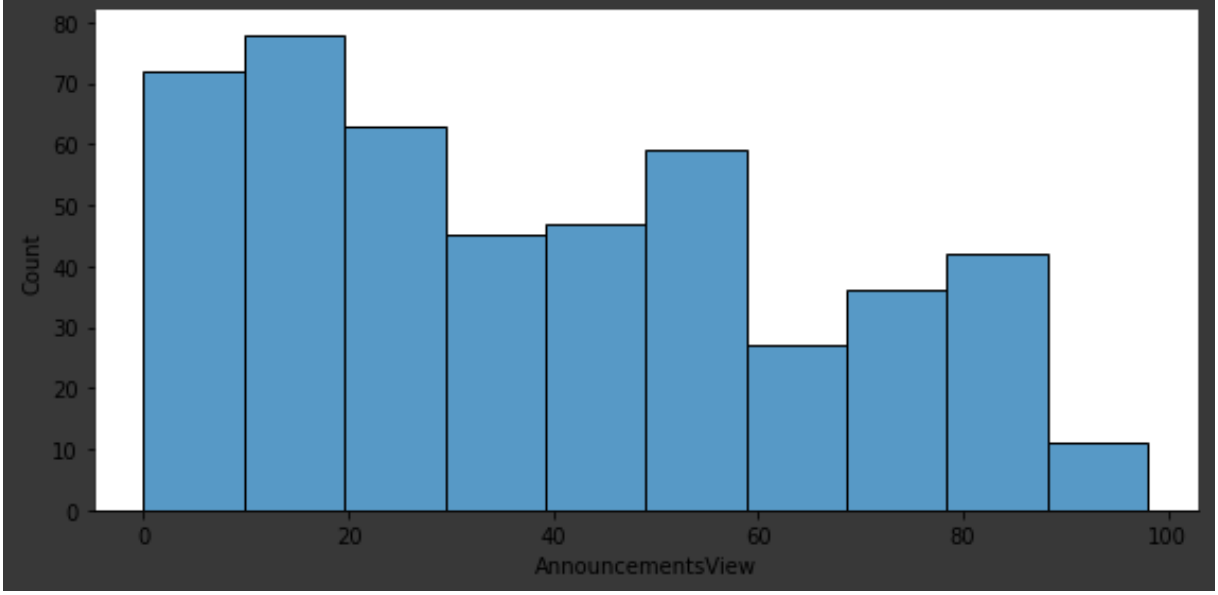


```
Kind of Data:[16 20  7 25 50 30 12 10 21 80 88  6  1 14 70 40 13 15 60  0
2 19 85 90
  5 22 11 54 35 33  4 39 75 69  3  8 89 44 92 26 27 29 98  9 42 65 79 55
 63 91 51 58 68 82 72 52 62 71 66 43 95 31 41 81 61 83 84 17 94 48 86 74
 76 97 87 99 34 64 28 38 36 24 59 57 77 18 93 96 78]

Number of Data:
80    29
90    29
82    16
12    13
88    13
      ..
63     1
55     1
54     1
1      1
78     1
Name: VisITedResources, Length: 89, dtype: int64

<seaborn.axisgrid.FacetGrid at 0x7fcb29415490>
```



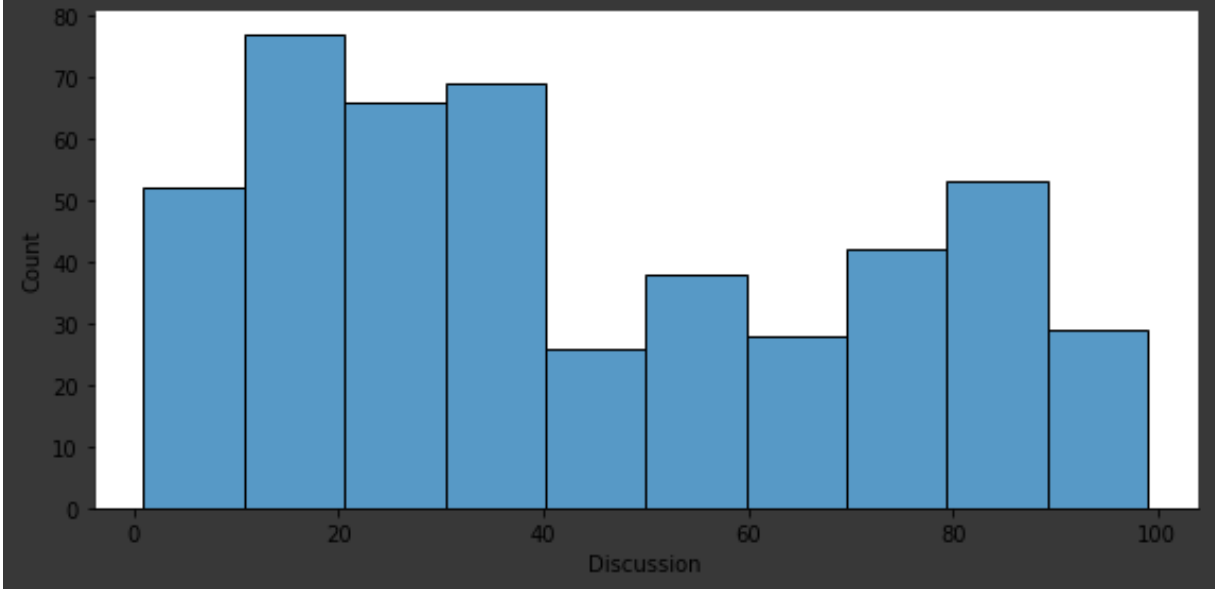
```
Kind of Data:[ 2  3  0  5 12 13 15 16 25 30 19 44 22 20 35 36 40 33  4 52
50 10  9  8
 17 26 37  7 28  1 39  6 32 70 18 23 11 29 49 55 38 41 51 95 85 71 98 73
 48 58 93 83 53 63 62 82 72 42 46 77 21 88 66 86 80 56 91 65 76 24 74 59
 79 34 69 89 31 60 54 57 64 87 75 67 43 45 14 78]

Number of Data:
12    21
42    16
50    16
40    16
2     14
20    14
82    13
29    12
32    12
10    12
52    11
15    11
23    10
22    10
62    10
0     10
30     9
83     9
3      8
9      8
19     8
72     8
6      7
11     7
33     7
21     7
58     7
5      6
55     6
86     6
51     6
4      6
74     6
13     6
41     5
73     5
49     5
16     5
76     5
1      5
7      5
79     5
18     4
80     4
25     4
46     4
89     4
35     4
59     4
66     3
31     3
64     3
14     3
85     3
63     3
71     3
8      3
26     3
```

```
70      3
95      3
37      3
69      2
39      2
54      2
77      2
34      2
48      2
53      2
28      2
65      2
44      2
56      2
98      2
38      2
57      2
45      1
87      1
43      1
67      1
75      1
88      1
36      1
60      1
93      1
17      1
24      1
91      1
78      1

<seaborn.axisgrid.FacetGrid at 0x7fcb29297650>
```

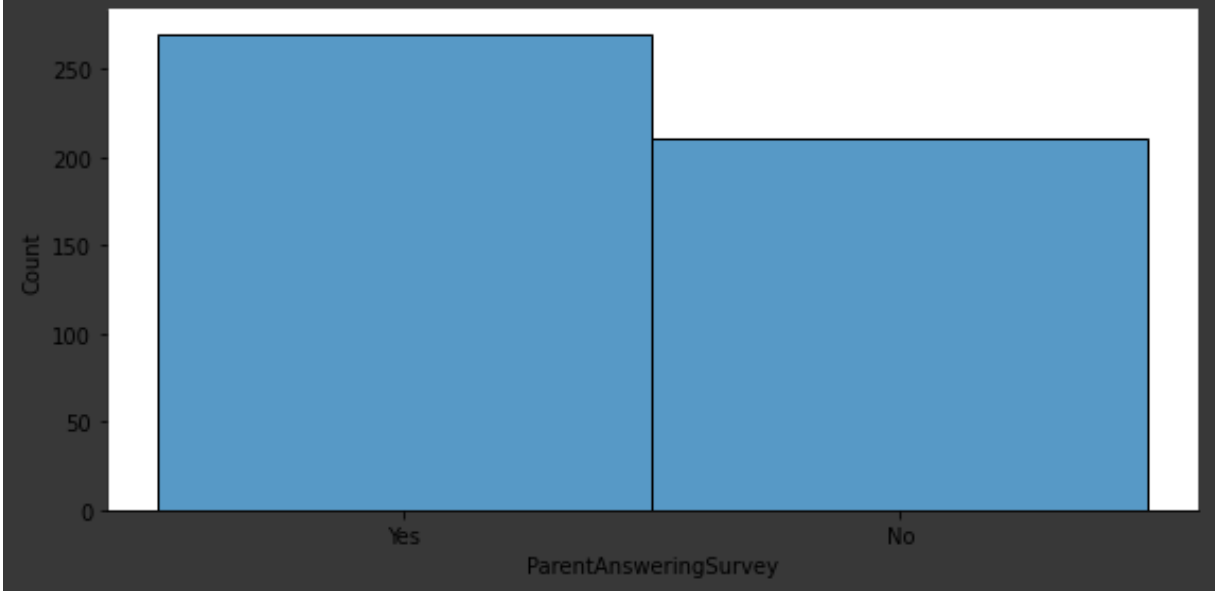


```
Kind of Data:[20 25 30 35 50 70 17 22 80 12 11 19 60 66 90 96 99 40 33 43
16  4 88 77
 75  1  5  2  8 13 44  9 55 10 15  7  3 14 69 59 89 41 91 49 73 23 53 93
 51 83 24 84 61 94 34 81 29 46 26  6 76 86 85 65 95 64 32 37 36 27 39 74
 79 21 31 28 38 48 97 98 63 72 82 71 45 68 92 58 57 62]

Number of Data:
70    24
40    23
33    21
50    18
30    17
10    16
80    15
14    13
53    12
20    11
90    11
13    11
43    11
23    11
83     9
19     9
11     9
89     9
12     8
3      8
66     7
60     7
17     7
21     7
22     6
29     6
7      5
15     5
84     5
81     5
8      5
39     5
28     5
41     5
34     4
24     4
26     4
85     4
31     4
72     4
61     4
5      4
16     4
86     3
96     3
27     3
68     3
75     3
79     3
6      3
1      3
2      3
44     3
9      3
38     3
51     3
35     3
25     3
```

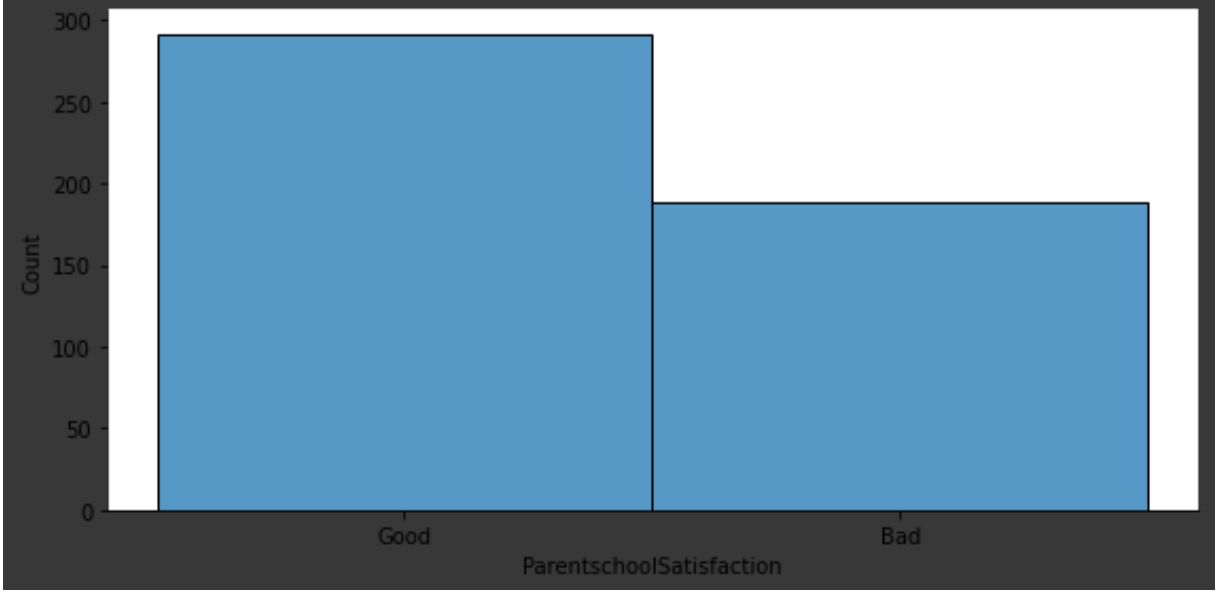
```
98      3
49      3
37      3
36      2
71      2
4       2
97      2
88      2
74      2
77      2
63      2
91      2
92      2
46      2
94      2
55      2
69      2
93      2
45      1
82      1
58      1
57      1
59      1
64      1
99      1
48      1
32      1
95      1
65      1
76      1
73      1
62      1

<seaborn.axisgrid.FacetGrid at 0x7fcb2931d4d0>
```



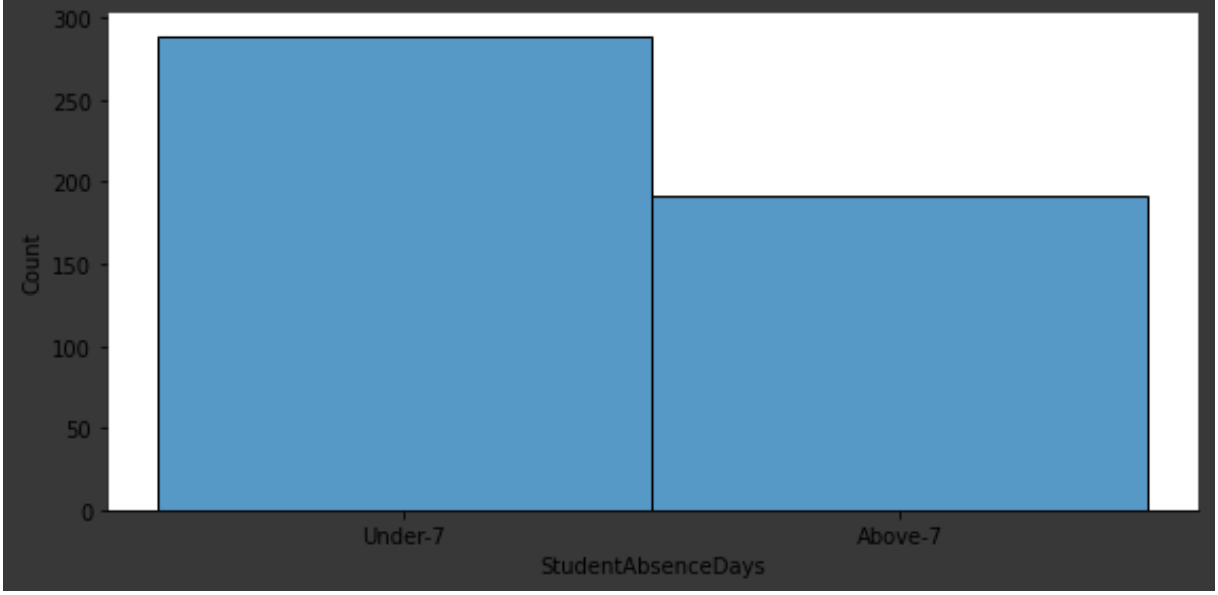
```
Kind of Data:['Yes' 'No']

Number of Data:
Yes    270
No     210
Name: ParentAnsweringSurvey, dtype: int64

<seaborn.axisgrid.FacetGrid at 0x7fcb29358310>
```



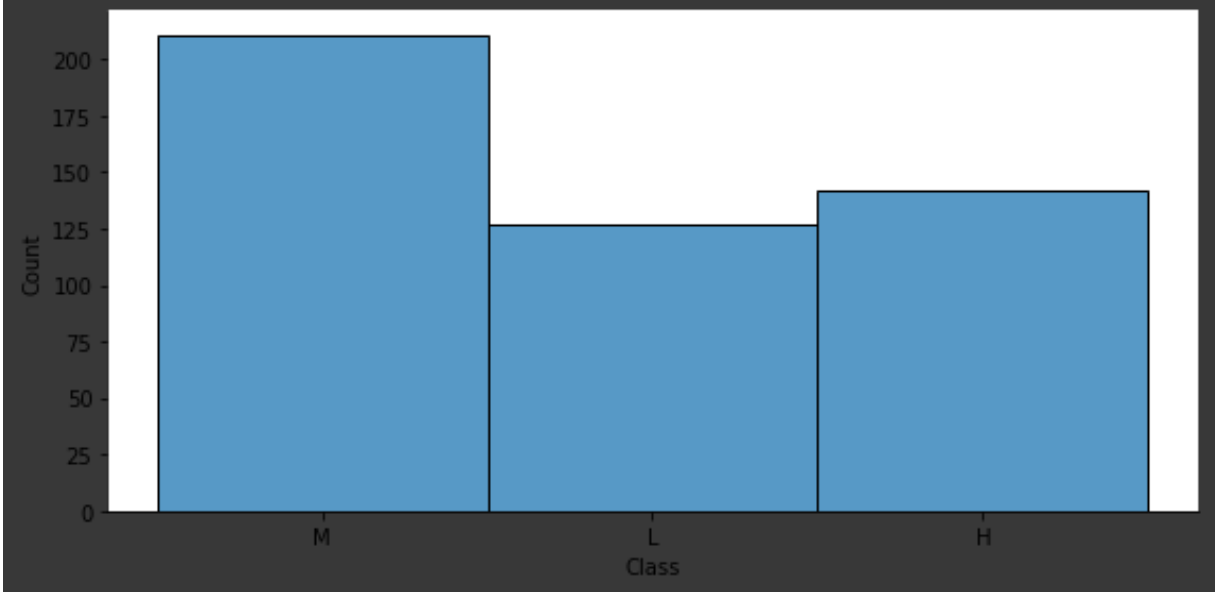

```
Kind of Data:['Good' 'Bad']

Number of Data:
Good    292
Bad     188
Name: ParentschoolSatisfaction, dtype: int64

<seaborn.axisgrid.FacetGrid at 0x7fcb290e6810>
```

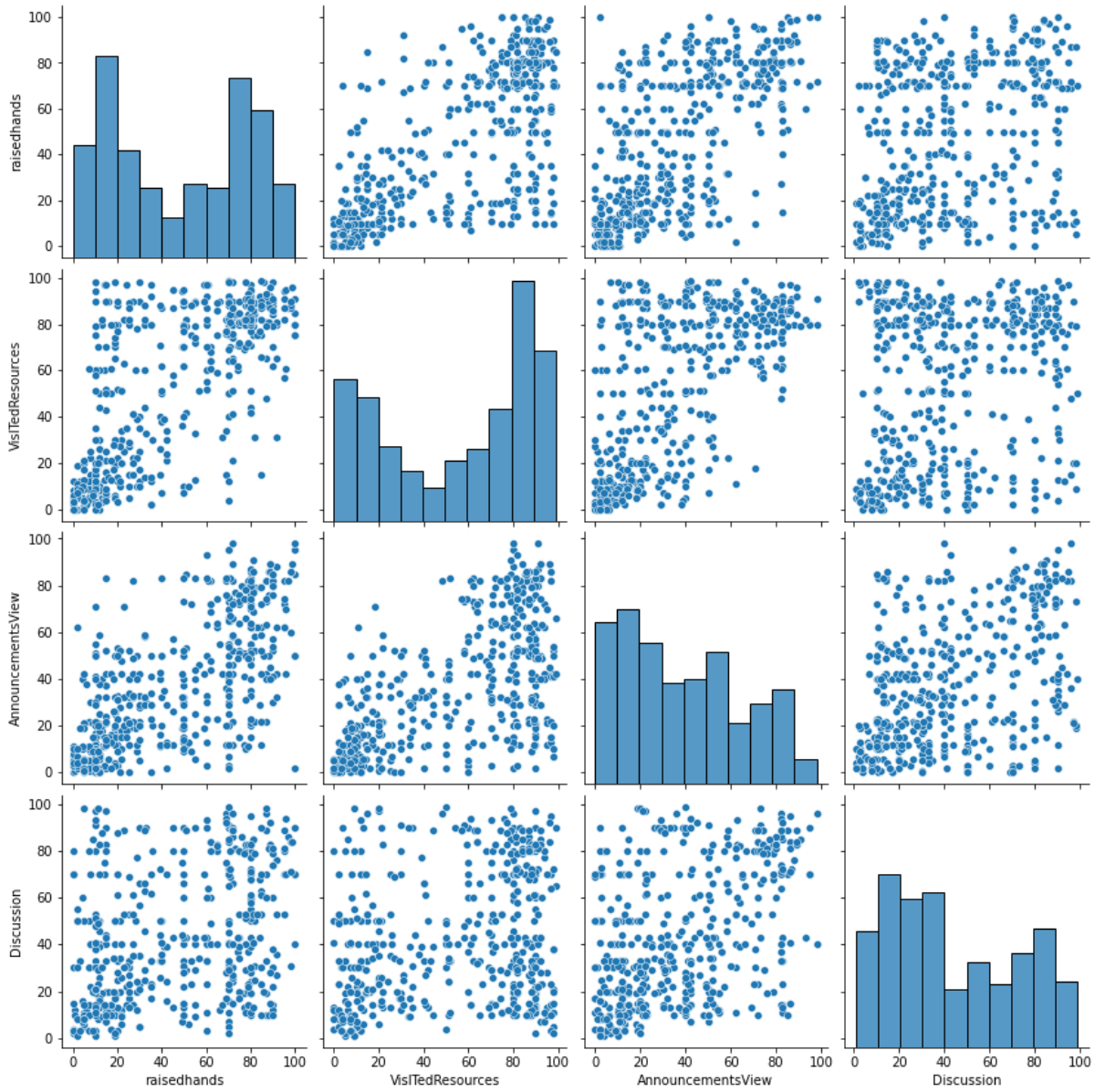


```
Kind of Data:['Under-7' 'Above-7']

Number of Data:
Under-7    289
Above-7    191
Name: StudentAbsenceDays, dtype: int64

<seaborn.axisgrid.FacetGrid at 0x7fcb290e6610>
```




```
Kind of Data:['M' 'L' 'H']

Number of Data:
M    211
H    142
L    127
Name: Class, dtype: int64

<seaborn.axisgrid.FacetGrid at 0x7fcb29028d90>
```





- **یک شبکه عصبی با سه لایه میانی/ چهار لایه میانی / پنج لایه میانی**
  - **نتایج مدل و معیارهای ارزیابی**

هایپرپارامترها: learning rate(0.01) – epoch(100)				
توابع فعال سازی:Relu,softmax				
Optimizer مورد استفاده و جزییات آن(SGD(0.01				
تعداد لایه	Accuracy و Loss بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Accuracy و Loss بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Accuracy و Loss بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Accuracy و Loss بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.1240	val_loss: 0.6967	accuracy: 0.9714	val_accuracy: 0.7292
4	loss: 0.0541	val_loss: 0.9729	accuracy: 0.9844	val_accuracy: 0.7500
5	loss: 0.0844	val_loss: 0.8347	accuracy: 0.9844	val_accuracy: 0.7500

هایپرپارامترها: learning rate(0.0001) – epoch(100)				
توابع فعال سازی:Relu,softmax				
Optimizer مورد استفاده و جزییات آنAdam				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.2622	val_loss: 0.5794	accuracy: 0.9245	val_accuracy: 0.7292
4	loss: 0.0991	val_loss: 0.6865	accuracy: 0.9740	val_accuracy: 0.7396
5	loss: 0.2455	val_loss: 0.6938	accuracy: 0.9193	val_accuracy: 0.6667

هایپرپارامترها: learning rate(0.0001) – epoch(100)				
توابع فعال سازی:Relu,softmax				
Optimizer مورد استفاده و جزییات آن RMSprop				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.2747	val_loss: 0.5885	accuracy: 0.9115	val_accuracy: 0.7292
4	loss: 0.1059	val_loss: 0.7056	accuracy: 0.9635	val_accuracy: 0.7396
5	loss: 0.5642	val_loss: 0.8601	accuracy: 0.7656	val_accuracy: 0.5625

هایپرپارامترها: learning rate(0.01) – epoch(100)				
توابع فعال سازی:tanh,softmax				
Optimizer مورد استفاده و جزییات آنSGD				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.1742	val_loss: 0.5589	accuracy: 0.9661	val_accuracy: 0.7396
4	loss: 0.1466	val_loss: 0.6589	accuracy: 0.9635	val_accuracy: 0.7188
5	loss: 0.1229	val_loss: 0.6094	accuracy: 0.9688	val_accuracy: 0.8021

هایپرپارامترها: learning rate(0.0001) – epoch(100)				
توابع فعال سازی:tanh,softmax				
Optimizer مورد استفاده و جزییات آنAdam				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.3188	val_loss: 0.6062	accuracy: 0.9010	val_accuracy: 0.7188
4	loss: 0.2663	val_loss: 0.5800	accuracy: 0.9219	val_accuracy: 0.7188
5	loss: 0.2821	val_loss: 0.6328	accuracy: 0.9375	val_accuracy: 0.6979

هایپرپارامترها: learning rate(0.0001) – epoch(100)				
توابع فعال سازی:tanh,softmax				
Optimizer مورد استفاده و جزییات آنRMSprop				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.2955	val_loss: 0.5810	accuracy: 0.9036	val_accuracy: 0.7292
4	loss: 0.2608	val_loss: 0.6102	accuracy: 0.9245	val_accuracy: 0.7188
5	loss: 0.2431	val_loss: 0.6043	accuracy: 0.9479	val_accuracy: 0.7292

هایپرپارامترها: learning rate(0.01) – epoch(1000)				
توابع فعال سازی:sigmoid,softmax				
Optimizer مورد استفاده و جزییات آنSGD				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.2197	val_loss: 0.6141	accuracy: 0.9427	val_accuracy: 0.7500
4	loss: 0.3021	val_loss: 0.6330	accuracy: 0.9062	val_accuracy: 0.7500
5	loss: 0.4556	val_loss: 0.5749	accuracy: 0.8047	val_accuracy: 0.6979

هایپرپارامترها: learning rate(0.0001) – epoch(1000)				
توابع فعال سازی:sigmoid,softmax				
Optimizer مورد استفاده و جزییات آنAdam				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.1626	val_loss: 0.7311	accuracy: 0.9557	val_accuracy: 0.7500
4	loss: 0.1760	val_loss: 0.7351	accuracy: 0.9609	val_accuracy: 0.7500
5	loss: 0.2367	val_loss: 0.8336	accuracy: 0.9427	val_accuracy: 0.7188

هایپرپارامترها: learning rate(0.0001) – epoch(1000)				
توابع فعال سازی:sigmoid,softmax				
Optimizer مورد استفاده و جزییات آنRMSprop				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.2026	val_loss: 0.7960	accuracy: 0.9323	val_accuracy: 0.7188
4	loss: 0.2058	val_loss: 0.7608	accuracy: 0.9479	val_accuracy: 0.7292
5	loss: 0.2377	val_loss: 0.7927	accuracy: 0.9453	val_accuracy: 0.7396

از بین مدل های قرار داده شده 5لایه که tanh activation function دارد از همه بهتر است.(با رنگ آبی مشخص شده است). در سایر قسمت ها فقط این مدل قرار داده شده است.

- **سایر معیارهای ارزیابی:**

```
Accuracy: 0.802083
precision: 0.8098937844217152
recall; 0.8089133089133088
F1_score: 0.8082145531277654
confusion_matrix test:
[[21  5  0]
[ 3 32  7]
[ 0  4 24]]
confusion_matrix train:
[[100   1   0]
[  3 162   4]
[  0   2 112]]
```

- **شکل خروجی کد مجموعه آموزش** (در نمونه زیر قرار داده شده است هر دو.)

- **شکل خروجی کد مجموعه ارزیابی**

- Epoch 1/100
- 24/24 [==============================] - 0s 8ms/step - loss: 1.0784 - accuracy: 0.4297 - val_loss: 1.0766 - val_accuracy: 0.4271
- Epoch 2/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.9270 - accuracy: 0.5495 - val_loss: 0.9827 - val_accuracy: 0.4792
- Epoch 3/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.8397 - accuracy: 0.6042 - val_loss: 0.9192 - val_accuracy: 0.5312
- Epoch 4/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.7785 - accuracy: 0.6719 - val_loss: 0.8734 - val_accuracy: 0.5208
- Epoch 5/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.7329 - accuracy: 0.6953 - val_loss: 0.8380 - val_accuracy: 0.5521
- Epoch 6/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.6974 - accuracy: 0.7214 - val_loss: 0.8095 - val_accuracy: 0.5625
- Epoch 7/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.6666 - accuracy: 0.7552 - val_loss: 0.7857 - val_accuracy: 0.6042
- Epoch 8/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.6410 - accuracy: 0.7786 - val_loss: 0.7653 - val_accuracy: 0.6146
- Epoch 9/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.6183 - accuracy: 0.7891 - val_loss: 0.7482 - val_accuracy: 0.6250
- Epoch 10/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.5982 - accuracy: 0.8021 - val_loss: 0.7322 - val_accuracy: 0.6250
- Epoch 11/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.5803 - accuracy: 0.8099 - val_loss: 0.7181 - val_accuracy: 0.6250
- Epoch 12/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.5646 - accuracy: 0.8203 - val_loss: 0.7056 - val_accuracy: 0.6354
- Epoch 13/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.5491 - accuracy: 0.8255 - val_loss: 0.6950 - val_accuracy: 0.6458
- Epoch 14/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.5354 - accuracy: 0.8333 - val_loss: 0.6853 - val_accuracy: 0.6771
- Epoch 15/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.5225 - accuracy: 0.8255 - val_loss: 0.6760 - val_accuracy: 0.6771
- Epoch 16/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.5102 - accuracy: 0.8385 - val_loss: 0.6686 - val_accuracy: 0.6771
- Epoch 17/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.4993 - accuracy: 0.8464 - val_loss: 0.6609 - val_accuracy: 0.6771
- Epoch 18/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.4880 - accuracy: 0.8542 - val_loss: 0.6528 - val_accuracy: 0.6875
- Epoch 19/100

- 24/24 [==============================] - 0s 3ms/step - loss: 0.4784 - accuracy: 0.8490 - val_loss: 0.6464 - val_accuracy: 0.6979
- Epoch 20/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.4685 - accuracy: 0.8542 - val_loss: 0.6406 - val_accuracy: 0.6979
- Epoch 21/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.4590 - accuracy: 0.8542 - val_loss: 0.6351 - val_accuracy: 0.6979
- Epoch 22/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.4507 - accuracy: 0.8620 - val_loss: 0.6300 - val_accuracy: 0.7083
- Epoch 23/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.4412 - accuracy: 0.8594 - val_loss: 0.6252 - val_accuracy: 0.7083
- Epoch 24/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.4336 - accuracy: 0.8672 - val_loss: 0.6207 - val_accuracy: 0.7083
- Epoch 25/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.4258 - accuracy: 0.8698 - val_loss: 0.6164 - val_accuracy: 0.7188
- Epoch 26/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.4176 - accuracy: 0.8672 - val_loss: 0.6124 - val_accuracy: 0.7188
- Epoch 27/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.4097 - accuracy: 0.8672 - val_loss: 0.6094 - val_accuracy: 0.7188
- Epoch 28/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.4029 - accuracy: 0.8776 - val_loss: 0.6050 - val_accuracy: 0.7292
- Epoch 29/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.3960 - accuracy: 0.8698 - val_loss: 0.6021 - val_accuracy: 0.7292
- Epoch 30/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.3893 - accuracy: 0.8776 - val_loss: 0.5999 - val_accuracy: 0.7083
- Epoch 31/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.3824 - accuracy: 0.8776 - val_loss: 0.5984 - val_accuracy: 0.7083
- Epoch 32/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.3758 - accuracy: 0.8776 - val_loss: 0.5958 - val_accuracy: 0.7188
- Epoch 33/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.3699 - accuracy: 0.8828 - val_loss: 0.5957 - val_accuracy: 0.7083
- Epoch 34/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.3639 - accuracy: 0.8828 - val_loss: 0.5944 - val_accuracy: 0.7083
- Epoch 35/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.3583 - accuracy: 0.8802 - val_loss: 0.5915 - val_accuracy: 0.7083
- Epoch 36/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.3526 - accuracy: 0.8906 - val_loss: 0.5907 - val_accuracy: 0.7083
- Epoch 37/100

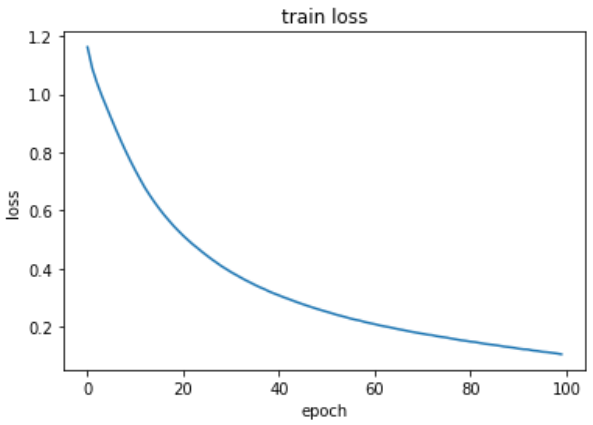
- 24/24 [==============================] - 0s 3ms/step - loss: 0.3462 - accuracy: 0.9010 - val_loss: 0.5904 - val_accuracy: 0.7083
- Epoch 38/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.3409 - accuracy: 0.8958 - val_loss: 0.5900 - val_accuracy: 0.7083
- Epoch 39/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.3357 - accuracy: 0.8958 - val_loss: 0.5889 - val_accuracy: 0.7083
- Epoch 40/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.3305 - accuracy: 0.9062 - val_loss: 0.5891 - val_accuracy: 0.6979
- Epoch 41/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.3254 - accuracy: 0.9089 - val_loss: 0.5888 - val_accuracy: 0.6979
- Epoch 42/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.3205 - accuracy: 0.9036 - val_loss: 0.5894 - val_accuracy: 0.6979
- Epoch 43/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.3160 - accuracy: 0.9062 - val_loss: 0.5880 - val_accuracy: 0.6979
- Epoch 44/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.3105 - accuracy: 0.9062 - val_loss: 0.5877 - val_accuracy: 0.6979
- Epoch 45/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.3067 - accuracy: 0.9115 - val_loss: 0.5881 - val_accuracy: 0.6979
- Epoch 46/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.3013 - accuracy: 0.9141 - val_loss: 0.5892 - val_accuracy: 0.6979
- Epoch 47/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.2977 - accuracy: 0.9141 - val_loss: 0.5890 - val_accuracy: 0.6979
- Epoch 48/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.2925 - accuracy: 0.9271 - val_loss: 0.5907 - val_accuracy: 0.6979
- Epoch 49/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.2881 - accuracy: 0.9245 - val_loss: 0.5921 - val_accuracy: 0.7083
- Epoch 50/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.2836 - accuracy: 0.9271 - val_loss: 0.5922 - val_accuracy: 0.6979
- Epoch 51/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.2789 - accuracy: 0.9271 - val_loss: 0.5938 - val_accuracy: 0.7083
- Epoch 52/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.2745 - accuracy: 0.9349 - val_loss: 0.5937 - val_accuracy: 0.6979
- Epoch 53/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.2705 - accuracy: 0.9349 - val_loss: 0.5961 - val_accuracy: 0.6979
- Epoch 54/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.2663 - accuracy: 0.9401 - val_loss: 0.5965 - val_accuracy: 0.6979
- Epoch 55/100

- 24/24 [==============================] - 0s 3ms/step - loss: 0.2614 - accuracy: 0.9401 - val_loss: 0.5966 - val_accuracy: 0.6979
- Epoch 56/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.2580 - accuracy: 0.9427 - val_loss: 0.5998 - val_accuracy: 0.6979
- Epoch 57/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.2535 - accuracy: 0.9453 - val_loss: 0.5975 - val_accuracy: 0.7188
- Epoch 58/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.2498 - accuracy: 0.9427 - val_loss: 0.5963 - val_accuracy: 0.7188
- Epoch 59/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.2455 - accuracy: 0.9505 - val_loss: 0.5985 - val_accuracy: 0.7083
- Epoch 60/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.2406 - accuracy: 0.9427 - val_loss: 0.5986 - val_accuracy: 0.7188
- Epoch 61/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.2369 - accuracy: 0.9505 - val_loss: 0.6008 - val_accuracy: 0.7188
- Epoch 62/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.2325 - accuracy: 0.9505 - val_loss: 0.6015 - val_accuracy: 0.7083
- Epoch 63/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.2285 - accuracy: 0.9479 - val_loss: 0.6022 - val_accuracy: 0.7188
- Epoch 64/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.2243 - accuracy: 0.9531 - val_loss: 0.6017 - val_accuracy: 0.7188
- Epoch 65/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.2215 - accuracy: 0.9531 - val_loss: 0.5991 - val_accuracy: 0.7083
- Epoch 66/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.2170 - accuracy: 0.9531 - val_loss: 0.6020 - val_accuracy: 0.7188
- Epoch 67/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.2130 - accuracy: 0.9531 - val_loss: 0.6015 - val_accuracy: 0.7188
- Epoch 68/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.2104 - accuracy: 0.9531 - val_loss: 0.5977 - val_accuracy: 0.7292
- Epoch 69/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.2061 - accuracy: 0.9531 - val_loss: 0.5977 - val_accuracy: 0.7396
- Epoch 70/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.2018 - accuracy: 0.9557 - val_loss: 0.5954 - val_accuracy: 0.7500
- Epoch 71/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.1982 - accuracy: 0.9557 - val_loss: 0.5971 - val_accuracy: 0.7500
- Epoch 72/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.1953 - accuracy: 0.9557 - val_loss: 0.5968 - val_accuracy: 0.7500
- Epoch 73/100

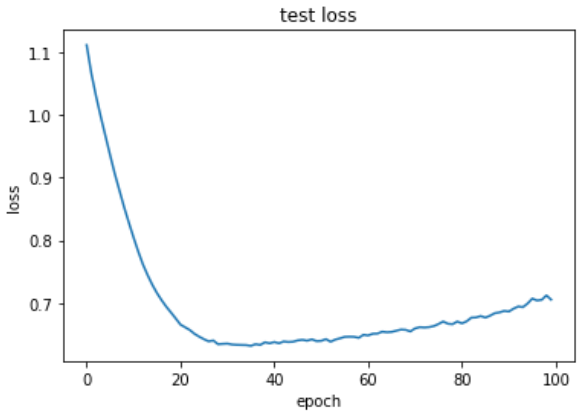
- 24/24 [==============================] - 0s 3ms/step - loss: 0.1927 - accuracy: 0.9583 - val_loss: 0.5945 - val_accuracy: 0.7292
- Epoch 74/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.1890 - accuracy: 0.9609 - val_loss: 0.5961 - val_accuracy: 0.7292
- Epoch 75/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.1854 - accuracy: 0.9609 - val_loss: 0.5987 - val_accuracy: 0.7292
- Epoch 76/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.1820 - accuracy: 0.9635 - val_loss: 0.5988 - val_accuracy: 0.7604
- Epoch 77/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.1791 - accuracy: 0.9635 - val_loss: 0.5977 - val_accuracy: 0.7500
- Epoch 78/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.1758 - accuracy: 0.9635 - val_loss: 0.5963 - val_accuracy: 0.7604
- Epoch 79/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.1737 - accuracy: 0.9661 - val_loss: 0.5986 - val_accuracy: 0.7500
- Epoch 80/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.1701 - accuracy: 0.9661 - val_loss: 0.5977 - val_accuracy: 0.7604
- Epoch 81/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.1670 - accuracy: 0.9635 - val_loss: 0.5975 - val_accuracy: 0.7604
- Epoch 82/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.1643 - accuracy: 0.9661 - val_loss: 0.5957 - val_accuracy: 0.7604
- Epoch 83/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.1613 - accuracy: 0.9688 - val_loss: 0.6005 - val_accuracy: 0.7604
- Epoch 84/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.1606 - accuracy: 0.9688 - val_loss: 0.6007 - val_accuracy: 0.7604
- Epoch 85/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.1566 - accuracy: 0.9688 - val_loss: 0.5977 - val_accuracy: 0.7708
- Epoch 86/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.1535 - accuracy: 0.9688 - val_loss: 0.5999 - val_accuracy: 0.7812
- Epoch 87/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.1518 - accuracy: 0.9688 - val_loss: 0.6015 - val_accuracy: 0.7708
- Epoch 88/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.1496 - accuracy: 0.9661 - val_loss: 0.6019 - val_accuracy: 0.7812
- Epoch 89/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.1468 - accuracy: 0.9688 - val_loss: 0.6038 - val_accuracy: 0.7708
- Epoch 90/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.1447 - accuracy: 0.9661 - val_loss: 0.6019 - val_accuracy: 0.7812
- Epoch 91/100

- 24/24 [==============================] - 0s 2ms/step - loss: 0.1415 - accuracy: 0.9609 - val_loss: 0.5984 - val_accuracy: 0.7812
- Epoch 92/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.1398 - accuracy: 0.9688 - val_loss: 0.6021 - val_accuracy: 0.7917
- Epoch 93/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.1378 - accuracy: 0.9688 - val_loss: 0.6057 - val_accuracy: 0.8021
- Epoch 94/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.1346 - accuracy: 0.9688 - val_loss: 0.6011 - val_accuracy: 0.7812
- Epoch 95/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.1335 - accuracy: 0.9740 - val_loss: 0.6098 - val_accuracy: 0.8021
- Epoch 96/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.1311 - accuracy: 0.9688 - val_loss: 0.6053 - val_accuracy: 0.8021
- Epoch 97/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.1290 - accuracy: 0.9714 - val_loss: 0.6114 - val_accuracy: 0.7812
- Epoch 98/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.1272 - accuracy: 0.9661 - val_loss: 0.6073 - val_accuracy: 0.8021
- Epoch 99/100
- 24/24 [==============================] - 0s 2ms/step - loss: 0.1249 - accuracy: 0.9688 - val_loss: 0.6121 - val_accuracy: 0.7917
- Epoch 100/100
- 24/24 [==============================] - 0s 3ms/step - loss: 0.1229 - accuracy: 0.9688 - val_loss: 0.6094 - val_accuracy: 0.8021
- <keras.callbacks.History at 0x7fcbafa2e650>

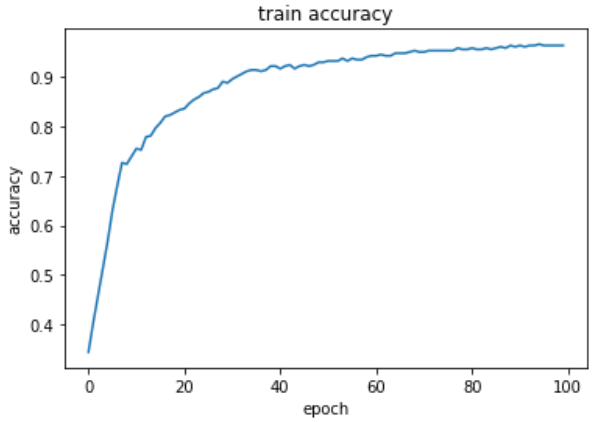
-
- **نمودار تغییر Loss مجموعه آموزش**



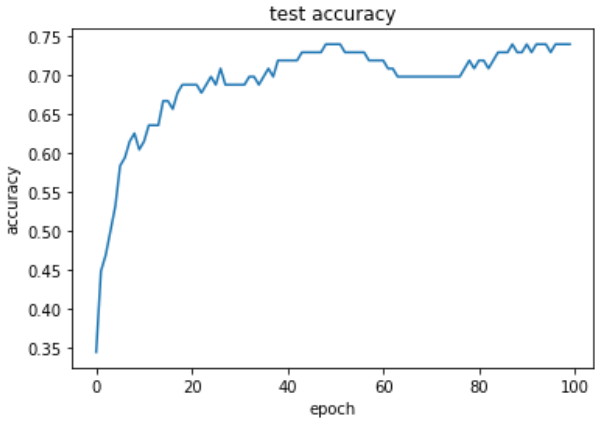
- **نمودار تغییر Loss مجموعه ارزیابی**



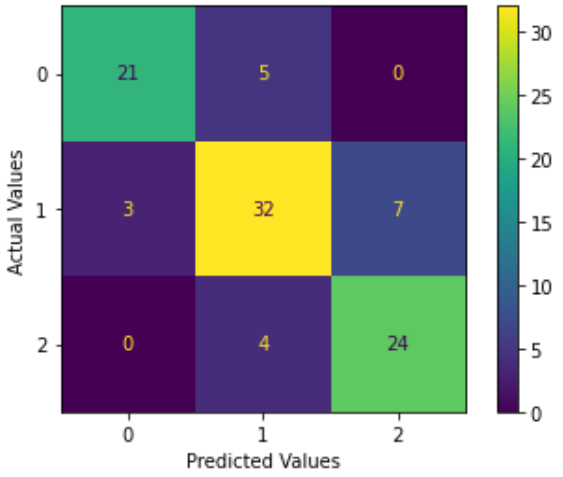
- **نمودار تغییر Accuracy مجموعه آموزش**

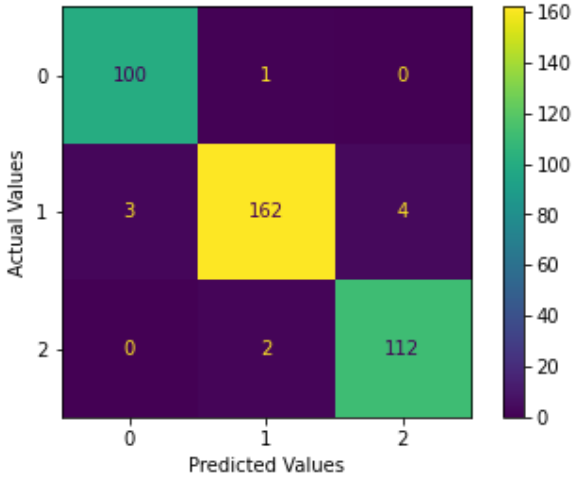


- **نمودار تغییر Accuracy مجموعه ارزیابی**



- **بررسی بیش برازش**
- overfittingدارد .میتوان برای حل آن epochها را کم کرد.
- **Confusion Matrix برای بهترین مدل (بر اساس بیشترین Accuracy)**





- **نتایج بهبود مدل و استفاده از تکنیک های مهندسی ویژگی (نمره مثبت)**

- من از تکنیک get dummies برای جدا کردن x و y استفاده کردم. و برای استفاده برای مدل ها با استفاده از tf.convert_to_tensor آن ها را تبدیل کردم.

- **توضیحات تکمیلی**

در colabبرای هر مدل سه لایه همه ی activation functionها با استفاده از تک تک optimizerها تست شده است و اینجا بهترین مدل از هر کدام قرار داده شده است . در قسمت بالا فقط برای بهترین مدل قرار داده شده است.

- **در نظر گرفتن Dropout در مدل**
  - **نتایج مدل و معیارهای ارزیابی**

هایپرپارامترها:epoch 100/ learning rate 0.01				
توابع فعال سازی:Relu, softmax				
Optimizer مورد استفاده و جزییات آن:SGD				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.5746	val_loss: 0.7146	accuracy: 0.7812	val_accuracy: 0.6458
4	loss: 0.4264	val_loss: 0.6974	accuracy: 0.8307	val_accuracy: 0.7188
5	loss: 0.5940	val_loss: 0.6284	accuracy: 0.7109	val_accuracy: 0.6875

هایپرپارامترها:epoch 100/ learning rate 0.0001				
توابع فعال سازی:Relu, softmax				
Optimizer مورد استفاده و جزییات آن:Adam				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.4532	val_loss: 0.6054	accuracy: 0.8177	val_accuracy: 0.6979
4	loss: 0.3336	val_loss: 0.6851	accuracy: 0.8646	val_accuracy: 0.7083
5	loss: 0.4777	val_loss: 0.6032	accuracy: 0.7786	val_accuracy: 0.7292

هایپرپارامترها:epoch 100/ learning rate 0.0001				
توابع فعال سازی:Relu, softmax				
Optimizer مورد استفاده و جزییات آن:RMSprop				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.5043	val_loss: 0.6303	accuracy: 0.7786	val_accuracy: 0.7188
4	loss: 0.3706	val_loss: 0.6270	accuracy: 0.8776	val_accuracy: 0.6979
5	loss: 0.4924	val_loss: 0.6678	accuracy: 0.7865	val_accuracy: 0.7188

هایپرپارامترها:epoch 100, learning rate 0.01				
توابع فعال سازی:tanh, softmax				
Optimizer مورد استفاده و جزییات آن:SGD				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.3410	val_loss: 0.5564	accuracy: 0.8698	val_accuracy: 0.7396
4	loss: 0.4263	val_loss: 0.5667	accuracy: 0.8490	val_accuracy: 0.7292
5	loss: 0.4511	val_loss: 0.5839	accuracy: 0.8203	val_accuracy: 0.6979

هایپرپارامترها:epoch 100, learning rate 0.0001				
توابع فعال سازی:tanh, softmax				
Optimizer مورد استفاده و جزییات آن:Adam				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.4562	val_loss: 0.6301	accuracy: 0.8229	val_accuracy: 0.7188
4	loss: 0.5211	val_loss: 0.5957	accuracy: 0.7812	val_accuracy: 0.6875
5	loss: 0.5943	val_loss: 0.6003	accuracy: 0.7370	val_accuracy: 0.7188

هایپرپارامترها:epoch 100, learning rate 0.0001				
توابع فعال سازی:tanh, softmax				
Optimizer مورد استفاده و جزییات آن:RMSprop				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.4490	val_loss: 0.6412	accuracy: 0.8359	val_accuracy: 0.6979
4	loss: 0.6525	val_loss: 0.7043	accuracy: 0.7161	val_accuracy: 0.6458
5	loss: 0.4569	val_loss: 0.6200	accuracy: 0.8099	val_accuracy: 0.7083

هایپرپارامترها:epoch 500, learning rate 0.01/0.1				
توابع فعال سازی:sigmoid, softmax				
Optimizer مورد استفاده و جزییات آن:SGD				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.4785	val_loss: 0.5666	accuracy: 0.7760	val_accuracy: 0.7396
4	loss: 0.2083	val_loss: 0.7091	accuracy: 0.9219	val_accuracy: 0.7188
5	loss: 0.3090	val_loss: 0.6914	accuracy: 0.9115	val_accuracy: 0.7396

هایپرپارامترها:epoch 500, learning rate 0.0001				
توابع فعال سازی:sigmoid, softmax				
Optimizer مورد استفاده و جزییات آن:Adam				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.4054	val_loss: 0.6100	accuracy: 0.8724	val_accuracy: 0.7396
4	loss: 0.4177	val_loss: 0.6193	accuracy: 0.8464	val_accuracy: 0.7292
5	loss: 0.3986	val_loss: 0.7002	accuracy: 0.8698	val_accuracy: 0.7292

هایپرپارامترها:epoch 500, learning rate 0.0001				
توابع فعال سازی:sigmoid, softmax				
Optimizer مورد استفاده و جزییات آن:RMSprop				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.4038	accuracy: 0.8411	val_loss: 0.6399	val_accuracy: 0.7292
4	loss: 0.4382	val_loss: 0.6322	accuracy: 0.8307	val_accuracy: 0.7083
5	loss: 0.4541	val_loss: 0.6657	accuracy: 0.8438	val_accuracy: 0.6979

از بین مدل های قرار داده شده 3لایه که sigmoid activation function دارد از همه بهتر است.(با رنگ آبی مشخص شده است). در سایر قسمت ها فقط این مدل قرار داده شده است.

- **سایر معیارهای ارزیابی:**

```
Accuracy: 0.739583
precision: 0.7501092752863011
recall; 0.7484737484737485
F1_score: 0.7481859641957662
confusion_matrix test:
[[20  6  0]
 [ 4 29  9]
 [ 0  6 22]]
confusion_matrix train:
[[ 95   6   0]
 [  8 145  16]
 [  0  15  99]]
```

- **شکل خروجی کد مجموعه آموزش (در قسمتن پایین قرار داده شده است).**
- **شکل خروجی کد مجموعه ارزیابی**

```
Epoch 1/500
24/24 [==============================] - 1s 11ms/step - loss: 1.1976 - accuracy:
0.4427 - val_loss: 1.1310 - val_accuracy: 0.4375
Epoch 2/500
24/24 [==============================] - 0s 4ms/step - loss: 1.2431 - accuracy:
0.3906 - val_loss: 1.1062 - val_accuracy: 0.4375
Epoch 3/500
24/24 [==============================] - 0s 5ms/step - loss: 1.2091 - accuracy:
0.4062 - val_loss: 1.0883 - val_accuracy: 0.4375
Epoch 4/500
24/24 [==============================] - 0s 5ms/step - loss: 1.1361 - accuracy:
0.4219 - val_loss: 1.0727 - val_accuracy: 0.4375
Epoch 5/500
24/24 [==============================] - 0s 4ms/step - loss: 1.1297 - accuracy:
0.4193 - val_loss: 1.0618 - val_accuracy: 0.4375
Epoch 6/500
24/24 [==============================] - 0s 5ms/step - loss: 1.1293 - accuracy:
0.4141 - val_loss: 1.0507 - val_accuracy: 0.4375
Epoch 7/500
24/24 [==============================] - 0s 5ms/step - loss: 1.1609 - accuracy:
0.3646 - val_loss: 1.0415 - val_accuracy: 0.4375
Epoch 8/500
24/24 [==============================] - 0s 4ms/step - loss: 1.1424 - accuracy:
0.4062 - val_loss: 1.0333 - val_accuracy: 0.4375
Epoch 9/500
24/24 [==============================] - 0s 4ms/step - loss: 1.1606 - accuracy:
0.4271 - val_loss: 1.0260 - val_accuracy: 0.4375
Epoch 10/500
24/24 [==============================] - 0s 4ms/step - loss: 1.0761 - accuracy:
0.4323 - val_loss: 1.0196 - val_accuracy: 0.4375
Epoch 11/500
24/24 [==============================] - 0s 4ms/step - loss: 1.1071 - accuracy:
0.4141 - val_loss: 1.0137 - val_accuracy: 0.4375
Epoch 12/500
24/24 [==============================] - 0s 4ms/step - loss: 1.0823 - accuracy:
0.4505 - val_loss: 1.0081 - val_accuracy: 0.4375
Epoch 13/500
24/24 [==============================] - 0s 5ms/step - loss: 1.0594 - accuracy:
0.4401 - val_loss: 1.0026 - val_accuracy: 0.4375
Epoch 14/500
24/24 [==============================] - 0s 5ms/step - loss: 1.0675 - accuracy:
0.4297 - val_loss: 0.9969 - val_accuracy: 0.4271
Epoch 15/500
24/24 [==============================] - 0s 4ms/step - loss: 1.0550 - accuracy:
0.4557 - val_loss: 0.9914 - val_accuracy: 0.4375
Epoch 16/500
24/24 [==============================] - 0s 5ms/step - loss: 1.0434 - accuracy:
0.4635 - val_loss: 0.9855 - val_accuracy: 0.4375
Epoch 17/500
```

```
24/24 [==============================] - 0s 5ms/step - loss: 1.0573 - accuracy:
0.4271 - val_loss: 0.9806 - val_accuracy: 0.4375
Epoch 18/500
24/24 [==============================] - 0s 5ms/step - loss: 1.0521 - accuracy:
0.4427 - val_loss: 0.9753 - val_accuracy: 0.4375
Epoch 19/500
24/24 [==============================] - 0s 5ms/step - loss: 1.0608 - accuracy:
0.4271 - val_loss: 0.9699 - val_accuracy: 0.4375
Epoch 20/500
24/24 [==============================] - 0s 5ms/step - loss: 1.0551 - accuracy:
0.4245 - val_loss: 0.9646 - val_accuracy: 0.4479
Epoch 21/500
24/24 [==============================] - 0s 5ms/step - loss: 1.0758 - accuracy:
0.4245 - val_loss: 0.9595 - val_accuracy: 0.4583
Epoch 22/500
24/24 [==============================] - 0s 5ms/step - loss: 1.0308 - accuracy:
0.4688 - val_loss: 0.9544 - val_accuracy: 0.4583
Epoch 23/500
24/24 [==============================] - 0s 5ms/step - loss: 1.0028 - accuracy:
0.4479 - val_loss: 0.9488 - val_accuracy: 0.4896
Epoch 24/500
24/24 [==============================] - 0s 6ms/step - loss: 1.0396 - accuracy:
0.4323 - val_loss: 0.9435 - val_accuracy: 0.5000
Epoch 25/500
24/24 [==============================] - 0s 4ms/step - loss: 1.0434 - accuracy:
0.4323 - val_loss: 0.9386 - val_accuracy: 0.5000
Epoch 26/500
24/24 [==============================] - 0s 4ms/step - loss: 0.9518 - accuracy:
0.5026 - val_loss: 0.9332 - val_accuracy: 0.5312
Epoch 27/500
24/24 [==============================] - 0s 5ms/step - loss: 0.9879 - accuracy:
0.4792 - val_loss: 0.9277 - val_accuracy: 0.5417
Epoch 28/500
24/24 [==============================] - 0s 4ms/step - loss: 1.0079 - accuracy:
0.4609 - val_loss: 0.9229 - val_accuracy: 0.5312
Epoch 29/500
24/24 [==============================] - 0s 4ms/step - loss: 0.9564 - accuracy:
0.5052 - val_loss: 0.9177 - val_accuracy: 0.5729
Epoch 30/500
24/24 [==============================] - 0s 4ms/step - loss: 0.9858 - accuracy:
0.4896 - val_loss: 0.9125 - val_accuracy: 0.5833
Epoch 31/500
24/24 [==============================] - 0s 4ms/step - loss: 0.9597 - accuracy:
0.4974 - val_loss: 0.9075 - val_accuracy: 0.5833
Epoch 32/500
24/24 [==============================] - 0s 4ms/step - loss: 0.9341 - accuracy:
0.5026 - val_loss: 0.9029 - val_accuracy: 0.5833
Epoch 33/500
24/24 [==============================] - 0s 5ms/step - loss: 0.9094 - accuracy:
0.5443 - val_loss: 0.8979 - val_accuracy: 0.5938
Epoch 34/500
24/24 [==============================] - 0s 5ms/step - loss: 0.9530 - accuracy:
0.5234 - val_loss: 0.8930 - val_accuracy: 0.5938
Epoch 35/500
24/24 [==============================] - 0s 5ms/step - loss: 0.9363 - accuracy:
0.5417 - val_loss: 0.8879 - val_accuracy: 0.5833
Epoch 36/500
24/24 [==============================] - 0s 3ms/step - loss: 0.9134 - accuracy:
0.5286 - val_loss: 0.8831 - val_accuracy: 0.5938
Epoch 37/500
24/24 [==============================] - 0s 4ms/step - loss: 0.9360 - accuracy:
0.4922 - val_loss: 0.8780 - val_accuracy: 0.6146
Epoch 38/500
24/24 [==============================] - 0s 4ms/step - loss: 0.9338 - accuracy:
0.5208 - val_loss: 0.8733 - val_accuracy: 0.6146
Epoch 39/500
24/24 [==============================] - 0s 4ms/step - loss: 0.9075 - accuracy:
0.5521 - val_loss: 0.8689 - val_accuracy: 0.6042
Epoch 40/500
24/24 [==============================] - 0s 4ms/step - loss: 0.9214 - accuracy:
0.5391 - val_loss: 0.8646 - val_accuracy: 0.6042
Epoch 41/500
```

```
24/24 [==============================] - 0s 4ms/step - loss: 0.9200 - accuracy:
0.5260 - val_loss: 0.8599 - val_accuracy: 0.6146
Epoch 42/500
24/24 [==============================] - 0s 4ms/step - loss: 0.9040 - accuracy:
0.5443 - val_loss: 0.8553 - val_accuracy: 0.5938
Epoch 43/500
24/24 [==============================] - 0s 5ms/step - loss: 0.8798 - accuracy:
0.5703 - val_loss: 0.8511 - val_accuracy: 0.5938
Epoch 44/500
24/24 [==============================] - 0s 5ms/step - loss: 0.8706 - accuracy:
0.5573 - val_loss: 0.8467 - val_accuracy: 0.5938
Epoch 45/500
24/24 [==============================] - 0s 4ms/step - loss: 0.8693 - accuracy:
0.5573 - val_loss: 0.8424 - val_accuracy: 0.6042
Epoch 46/500
24/24 [==============================] - 0s 5ms/step - loss: 0.8687 - accuracy:
0.5651 - val_loss: 0.8379 - val_accuracy: 0.6042
Epoch 47/500
24/24 [==============================] - 0s 4ms/step - loss: 0.8375 - accuracy:
0.5807 - val_loss: 0.8336 - val_accuracy: 0.6250
Epoch 48/500
24/24 [==============================] - 0s 5ms/step - loss: 0.8382 - accuracy:
0.6016 - val_loss: 0.8298 - val_accuracy: 0.6250
Epoch 49/500
24/24 [==============================] - 0s 4ms/step - loss: 0.8625 - accuracy:
0.5625 - val_loss: 0.8260 - val_accuracy: 0.6146
Epoch 50/500
24/24 [==============================] - 0s 5ms/step - loss: 0.8294 - accuracy:
0.6068 - val_loss: 0.8219 - val_accuracy: 0.6250
Epoch 51/500
24/24 [==============================] - 0s 5ms/step - loss: 0.8245 - accuracy:
0.6146 - val_loss: 0.8178 - val_accuracy: 0.6250
Epoch 52/500
24/24 [==============================] - 0s 5ms/step - loss: 0.8350 - accuracy:
0.5938 - val_loss: 0.8138 - val_accuracy: 0.6250
Epoch 53/500
24/24 [==============================] - 0s 5ms/step - loss: 0.8371 - accuracy:
0.5859 - val_loss: 0.8098 - val_accuracy: 0.6354
Epoch 54/500
24/24 [==============================] - 0s 5ms/step - loss: 0.8623 - accuracy:
0.5651 - val_loss: 0.8064 - val_accuracy: 0.6458
Epoch 55/500
24/24 [==============================] - 0s 4ms/step - loss: 0.8605 - accuracy:
0.5443 - val_loss: 0.8030 - val_accuracy: 0.6354
Epoch 56/500
24/24 [==============================] - 0s 5ms/step - loss: 0.8056 - accuracy:
0.6224 - val_loss: 0.7996 - val_accuracy: 0.6458
Epoch 57/500
24/24 [==============================] - 0s 4ms/step - loss: 0.8321 - accuracy:
0.5599 - val_loss: 0.7961 - val_accuracy: 0.6458
Epoch 58/500
24/24 [==============================] - 0s 4ms/step - loss: 0.7941 - accuracy:
0.6224 - val_loss: 0.7923 - val_accuracy: 0.6458
Epoch 59/500
24/24 [==============================] - 0s 5ms/step - loss: 0.7802 - accuracy:
0.6094 - val_loss: 0.7887 - val_accuracy: 0.6771
Epoch 60/500
24/24 [==============================] - 0s 4ms/step - loss: 0.7949 - accuracy:
0.6198 - val_loss: 0.7857 - val_accuracy: 0.6562
Epoch 61/500
24/24 [==============================] - 0s 5ms/step - loss: 0.7922 - accuracy:
0.6146 - val_loss: 0.7827 - val_accuracy: 0.6667
Epoch 62/500
24/24 [==============================] - 0s 5ms/step - loss: 0.8103 - accuracy:
0.5938 - val_loss: 0.7790 - val_accuracy: 0.6458
Epoch 63/500
24/24 [==============================] - 0s 5ms/step - loss: 0.7768 - accuracy:
0.6224 - val_loss: 0.7753 - val_accuracy: 0.6250
Epoch 64/500
24/24 [==============================] - 0s 5ms/step - loss: 0.7883 - accuracy:
0.6016 - val_loss: 0.7725 - val_accuracy: 0.6354
Epoch 65/500
```

```
24/24 [==============================] - 0s 5ms/step - loss: 0.7859 - accuracy:
0.6354 - val_loss: 0.7694 - val_accuracy: 0.6354
Epoch 66/500
24/24 [==============================] - 0s 4ms/step - loss: 0.7695 - accuracy:
0.6224 - val_loss: 0.7663 - val_accuracy: 0.6562
Epoch 67/500
24/24 [==============================] - 0s 4ms/step - loss: 0.7738 - accuracy:
0.6068 - val_loss: 0.7631 - val_accuracy: 0.6562
Epoch 68/500
24/24 [==============================] - 0s 5ms/step - loss: 0.7604 - accuracy:
0.6458 - val_loss: 0.7602 - val_accuracy: 0.6458
Epoch 69/500
24/24 [==============================] - 0s 4ms/step - loss: 0.7512 - accuracy:
0.6406 - val_loss: 0.7574 - val_accuracy: 0.6562
Epoch 70/500
24/24 [==============================] - 0s 4ms/step - loss: 0.7630 - accuracy:
0.6146 - val_loss: 0.7546 - val_accuracy: 0.6458
Epoch 71/500
24/24 [==============================] - 0s 5ms/step - loss: 0.7473 - accuracy:
0.6276 - val_loss: 0.7519 - val_accuracy: 0.6354
Epoch 72/500
24/24 [==============================] - 0s 4ms/step - loss: 0.7513 - accuracy:
0.6250 - val_loss: 0.7493 - val_accuracy: 0.6354
Epoch 73/500
24/24 [==============================] - 0s 4ms/step - loss: 0.7345 - accuracy:
0.6562 - val_loss: 0.7465 - val_accuracy: 0.6354
Epoch 74/500
24/24 [==============================] - 0s 4ms/step - loss: 0.7197 - accuracy:
0.6745 - val_loss: 0.7440 - val_accuracy: 0.6354
Epoch 75/500
24/24 [==============================] - 0s 4ms/step - loss: 0.7311 - accuracy:
0.6693 - val_loss: 0.7415 - val_accuracy: 0.6354
Epoch 76/500
24/24 [==============================] - 0s 4ms/step - loss: 0.7361 - accuracy:
0.6484 - val_loss: 0.7393 - val_accuracy: 0.6354
Epoch 77/500
24/24 [==============================] - 0s 5ms/step - loss: 0.7592 - accuracy:
0.6250 - val_loss: 0.7372 - val_accuracy: 0.6354
Epoch 78/500
24/24 [==============================] - 0s 4ms/step - loss: 0.7172 - accuracy:
0.6823 - val_loss: 0.7348 - val_accuracy: 0.6354
Epoch 79/500
24/24 [==============================] - 0s 4ms/step - loss: 0.7220 - accuracy:
0.6432 - val_loss: 0.7322 - val_accuracy: 0.6354
Epoch 80/500
24/24 [==============================] - 0s 4ms/step - loss: 0.7044 - accuracy:
0.6849 - val_loss: 0.7299 - val_accuracy: 0.6354
Epoch 81/500
24/24 [==============================] - 0s 4ms/step - loss: 0.7133 - accuracy:
0.6719 - val_loss: 0.7273 - val_accuracy: 0.6562
Epoch 82/500
24/24 [==============================] - 0s 5ms/step - loss: 0.7100 - accuracy:
0.6797 - val_loss: 0.7252 - val_accuracy: 0.6562
Epoch 83/500
24/24 [==============================] - 0s 5ms/step - loss: 0.6899 - accuracy:
0.6979 - val_loss: 0.7229 - val_accuracy: 0.6562
Epoch 84/500
24/24 [==============================] - 0s 4ms/step - loss: 0.7127 - accuracy:
0.6797 - val_loss: 0.7209 - val_accuracy: 0.6667
Epoch 85/500
24/24 [==============================] - 0s 4ms/step - loss: 0.7301 - accuracy:
0.6719 - val_loss: 0.7187 - val_accuracy: 0.6667
Epoch 86/500
24/24 [==============================] - 0s 5ms/step - loss: 0.6909 - accuracy:
0.6849 - val_loss: 0.7169 - val_accuracy: 0.6667
Epoch 87/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6901 - accuracy:
0.6823 - val_loss: 0.7145 - val_accuracy: 0.6667
Epoch 88/500
24/24 [==============================] - 0s 4ms/step - loss: 0.7284 - accuracy:
0.6484 - val_loss: 0.7127 - val_accuracy: 0.6667
Epoch 89/500
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24/24 [==============================] - 0s 4ms/step - loss: 0.6949 - accuracy:
0.6849 - val_loss: 0.7111 - val_accuracy: 0.6562
Epoch 90/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6996 - accuracy:
0.6536 - val_loss: 0.7087 - val_accuracy: 0.6667
Epoch 91/500
24/24 [==============================] - 0s 5ms/step - loss: 0.6676 - accuracy:
0.6927 - val_loss: 0.7068 - val_accuracy: 0.6667
Epoch 92/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6897 - accuracy:
0.6849 - val_loss: 0.7046 - val_accuracy: 0.6667
Epoch 93/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6961 - accuracy:
0.6771 - val_loss: 0.7023 - val_accuracy: 0.6667
Epoch 94/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6945 - accuracy:
0.6953 - val_loss: 0.7002 - val_accuracy: 0.6667
Epoch 95/500
24/24 [==============================] - 0s 5ms/step - loss: 0.7255 - accuracy:
0.6536 - val_loss: 0.6986 - val_accuracy: 0.6667
Epoch 96/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6729 - accuracy:
0.6823 - val_loss: 0.6967 - val_accuracy: 0.6667
Epoch 97/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6901 - accuracy:
0.6745 - val_loss: 0.6951 - val_accuracy: 0.6667
Epoch 98/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6824 - accuracy:
0.7083 - val_loss: 0.6931 - val_accuracy: 0.6667
Epoch 99/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6805 - accuracy:
0.6797 - val_loss: 0.6917 - val_accuracy: 0.6667
Epoch 100/500
24/24 [==============================] - 0s 5ms/step - loss: 0.6888 - accuracy:
0.6719 - val_loss: 0.6898 - val_accuracy: 0.6771
Epoch 101/500
24/24 [==============================] - 0s 5ms/step - loss: 0.6605 - accuracy:
0.7109 - val_loss: 0.6882 - val_accuracy: 0.6771
Epoch 102/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6668 - accuracy:
0.6823 - val_loss: 0.6869 - val_accuracy: 0.6771
Epoch 103/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6806 - accuracy:
0.6771 - val_loss: 0.6849 - val_accuracy: 0.6771
Epoch 104/500
24/24 [==============================] - 0s 6ms/step - loss: 0.6612 - accuracy:
0.7005 - val_loss: 0.6830 - val_accuracy: 0.6771
Epoch 105/500
24/24 [==============================] - 0s 5ms/step - loss: 0.6589 - accuracy:
0.7214 - val_loss: 0.6815 - val_accuracy: 0.6771
Epoch 106/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6375 - accuracy:
0.7188 - val_loss: 0.6801 - val_accuracy: 0.6771
Epoch 107/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6553 - accuracy:
0.7135 - val_loss: 0.6789 - val_accuracy: 0.6771
Epoch 108/500
24/24 [==============================] - 0s 5ms/step - loss: 0.6535 - accuracy:
0.6953 - val_loss: 0.6770 - val_accuracy: 0.6771
Epoch 109/500
24/24 [==============================] - 0s 5ms/step - loss: 0.6560 - accuracy:
0.6979 - val_loss: 0.6760 - val_accuracy: 0.6771
Epoch 110/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6716 - accuracy:
0.6849 - val_loss: 0.6743 - val_accuracy: 0.6771
Epoch 111/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6491 - accuracy:
0.7031 - val_loss: 0.6731 - val_accuracy: 0.6771
Epoch 112/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6492 - accuracy:
0.6927 - val_loss: 0.6714 - val_accuracy: 0.6771
Epoch 113/500
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24/24 [==============================] - 0s 5ms/step - loss: 0.6125 - accuracy:
0.7500 - val_loss: 0.6697 - val_accuracy: 0.6771
Epoch 114/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6466 - accuracy:
0.6927 - val_loss: 0.6683 - val_accuracy: 0.6771
Epoch 115/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6325 - accuracy:
0.7292 - val_loss: 0.6667 - val_accuracy: 0.6771
Epoch 116/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6340 - accuracy:
0.7057 - val_loss: 0.6656 - val_accuracy: 0.6771
Epoch 117/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6468 - accuracy:
0.7135 - val_loss: 0.6645 - val_accuracy: 0.6771
Epoch 118/500
24/24 [==============================] - 0s 5ms/step - loss: 0.6370 - accuracy:
0.7474 - val_loss: 0.6628 - val_accuracy: 0.6875
Epoch 119/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6313 - accuracy:
0.7161 - val_loss: 0.6612 - val_accuracy: 0.6875
Epoch 120/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6312 - accuracy:
0.7240 - val_loss: 0.6601 - val_accuracy: 0.6875
Epoch 121/500
24/24 [==============================] - 0s 5ms/step - loss: 0.6619 - accuracy:
0.6927 - val_loss: 0.6590 - val_accuracy: 0.6771
Epoch 122/500
24/24 [==============================] - 0s 5ms/step - loss: 0.6165 - accuracy:
0.7161 - val_loss: 0.6576 - val_accuracy: 0.6875
Epoch 123/500
24/24 [==============================] - 0s 5ms/step - loss: 0.6684 - accuracy:
0.6797 - val_loss: 0.6562 - val_accuracy: 0.6875
Epoch 124/500
24/24 [==============================] - 0s 5ms/step - loss: 0.6274 - accuracy:
0.7135 - val_loss: 0.6548 - val_accuracy: 0.6875
Epoch 125/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6203 - accuracy:
0.7318 - val_loss: 0.6542 - val_accuracy: 0.6875
Epoch 126/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6226 - accuracy:
0.7266 - val_loss: 0.6531 - val_accuracy: 0.6875
Epoch 127/500
24/24 [==============================] - 0s 5ms/step - loss: 0.6117 - accuracy:
0.7448 - val_loss: 0.6518 - val_accuracy: 0.6875
Epoch 128/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6101 - accuracy:
0.7266 - val_loss: 0.6506 - val_accuracy: 0.6875
Epoch 129/500
24/24 [==============================] - 0s 3ms/step - loss: 0.6102 - accuracy:
0.7604 - val_loss: 0.6497 - val_accuracy: 0.6771
Epoch 130/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6373 - accuracy:
0.7057 - val_loss: 0.6486 - val_accuracy: 0.6875
Epoch 131/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6066 - accuracy:
0.7318 - val_loss: 0.6475 - val_accuracy: 0.6875
Epoch 132/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6220 - accuracy:
0.7188 - val_loss: 0.6466 - val_accuracy: 0.6875
Epoch 133/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6256 - accuracy:
0.7266 - val_loss: 0.6458 - val_accuracy: 0.6875
Epoch 134/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6089 - accuracy:
0.7240 - val_loss: 0.6447 - val_accuracy: 0.6875
Epoch 135/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6207 - accuracy:
0.7396 - val_loss: 0.6439 - val_accuracy: 0.6771
Epoch 136/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6187 - accuracy:
0.7161 - val_loss: 0.6427 - val_accuracy: 0.6875
Epoch 137/500
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24/24 [==============================] - 0s 4ms/step - loss: 0.5846 - accuracy:
0.7552 - val_loss: 0.6419 - val_accuracy: 0.6875
Epoch 138/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6069 - accuracy:
0.7240 - val_loss: 0.6407 - val_accuracy: 0.6875
Epoch 139/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5994 - accuracy:
0.7370 - val_loss: 0.6393 - val_accuracy: 0.6875
Epoch 140/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6147 - accuracy:
0.7448 - val_loss: 0.6387 - val_accuracy: 0.6875
Epoch 141/500
24/24 [==============================] - 0s 5ms/step - loss: 0.6018 - accuracy:
0.7396 - val_loss: 0.6381 - val_accuracy: 0.6771
Epoch 142/500
24/24 [==============================] - 0s 3ms/step - loss: 0.5745 - accuracy:
0.7474 - val_loss: 0.6370 - val_accuracy: 0.6771
Epoch 143/500
24/24 [==============================] - 0s 5ms/step - loss: 0.6000 - accuracy:
0.7083 - val_loss: 0.6356 - val_accuracy: 0.6771
Epoch 144/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6042 - accuracy:
0.7214 - val_loss: 0.6347 - val_accuracy: 0.6875
Epoch 145/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5930 - accuracy:
0.7604 - val_loss: 0.6342 - val_accuracy: 0.6771
Epoch 146/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6001 - accuracy:
0.7396 - val_loss: 0.6331 - val_accuracy: 0.6771
Epoch 147/500
24/24 [==============================] - 0s 4ms/step - loss: 0.6039 - accuracy:
0.7188 - val_loss: 0.6318 - val_accuracy: 0.6979
Epoch 148/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5839 - accuracy:
0.7604 - val_loss: 0.6316 - val_accuracy: 0.6979
Epoch 149/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5688 - accuracy:
0.7448 - val_loss: 0.6304 - val_accuracy: 0.6979
Epoch 150/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5822 - accuracy:
0.7708 - val_loss: 0.6293 - val_accuracy: 0.6979
Epoch 151/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5627 - accuracy:
0.7734 - val_loss: 0.6280 - val_accuracy: 0.6875
Epoch 152/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5714 - accuracy:
0.7656 - val_loss: 0.6273 - val_accuracy: 0.6979
Epoch 153/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5744 - accuracy:
0.7656 - val_loss: 0.6262 - val_accuracy: 0.6875
Epoch 154/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5700 - accuracy:
0.7630 - val_loss: 0.6255 - val_accuracy: 0.6875
Epoch 155/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5784 - accuracy:
0.7344 - val_loss: 0.6251 - val_accuracy: 0.6875
Epoch 156/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5987 - accuracy:
0.7266 - val_loss: 0.6244 - val_accuracy: 0.6875
Epoch 157/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5815 - accuracy:
0.7422 - val_loss: 0.6237 - val_accuracy: 0.6875
Epoch 158/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5816 - accuracy:
0.7578 - val_loss: 0.6230 - val_accuracy: 0.6875
Epoch 159/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5701 - accuracy:
0.7422 - val_loss: 0.6221 - val_accuracy: 0.6875
Epoch 160/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5854 - accuracy:
0.7396 - val_loss: 0.6213 - val_accuracy: 0.6875
Epoch 161/500
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24/24 [==============================] - 0s 4ms/step - loss: 0.5754 - accuracy:
0.7578 - val_loss: 0.6209 - val_accuracy: 0.6875
Epoch 162/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5722 - accuracy:
0.7578 - val_loss: 0.6202 - val_accuracy: 0.6979
Epoch 163/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5595 - accuracy:
0.7734 - val_loss: 0.6192 - val_accuracy: 0.6875
Epoch 164/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5538 - accuracy:
0.7760 - val_loss: 0.6187 - val_accuracy: 0.6979
Epoch 165/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5655 - accuracy:
0.7422 - val_loss: 0.6180 - val_accuracy: 0.7083
Epoch 166/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5587 - accuracy:
0.7604 - val_loss: 0.6173 - val_accuracy: 0.7083
Epoch 167/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5709 - accuracy:
0.7578 - val_loss: 0.6168 - val_accuracy: 0.7188
Epoch 168/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5576 - accuracy:
0.7370 - val_loss: 0.6161 - val_accuracy: 0.7188
Epoch 169/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5690 - accuracy:
0.7266 - val_loss: 0.6155 - val_accuracy: 0.7083
Epoch 170/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5553 - accuracy:
0.7786 - val_loss: 0.6148 - val_accuracy: 0.7083
Epoch 171/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5658 - accuracy:
0.7500 - val_loss: 0.6140 - val_accuracy: 0.7083
Epoch 172/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5676 - accuracy:
0.7891 - val_loss: 0.6130 - val_accuracy: 0.7083
Epoch 173/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5679 - accuracy:
0.7630 - val_loss: 0.6128 - val_accuracy: 0.7188
Epoch 174/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5364 - accuracy:
0.7943 - val_loss: 0.6121 - val_accuracy: 0.7188
Epoch 175/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5612 - accuracy:
0.7500 - val_loss: 0.6111 - val_accuracy: 0.7188
Epoch 176/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5676 - accuracy:
0.7526 - val_loss: 0.6106 - val_accuracy: 0.7188
Epoch 177/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5859 - accuracy:
0.7135 - val_loss: 0.6100 - val_accuracy: 0.7188
Epoch 178/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5621 - accuracy:
0.7656 - val_loss: 0.6093 - val_accuracy: 0.7188
Epoch 179/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5630 - accuracy:
0.7552 - val_loss: 0.6087 - val_accuracy: 0.7188
Epoch 180/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5394 - accuracy:
0.7578 - val_loss: 0.6084 - val_accuracy: 0.7188
Epoch 181/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5812 - accuracy:
0.7552 - val_loss: 0.6079 - val_accuracy: 0.7188
Epoch 182/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5269 - accuracy:
0.7786 - val_loss: 0.6075 - val_accuracy: 0.7188
Epoch 183/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5383 - accuracy:
0.7708 - val_loss: 0.6070 - val_accuracy: 0.7188
Epoch 184/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5648 - accuracy:
0.7474 - val_loss: 0.6064 - val_accuracy: 0.7188
Epoch 185/500
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24/24 [==============================] - 0s 5ms/step - loss: 0.5730 - accuracy:
0.7396 - val_loss: 0.6056 - val_accuracy: 0.7188
Epoch 186/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5493 - accuracy:
0.7604 - val_loss: 0.6054 - val_accuracy: 0.7188
Epoch 187/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5475 - accuracy:
0.7708 - val_loss: 0.6050 - val_accuracy: 0.7188
Epoch 188/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5647 - accuracy:
0.7578 - val_loss: 0.6047 - val_accuracy: 0.7188
Epoch 189/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5556 - accuracy:
0.7630 - val_loss: 0.6037 - val_accuracy: 0.7188
Epoch 190/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5285 - accuracy:
0.7865 - val_loss: 0.6033 - val_accuracy: 0.7188
Epoch 191/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5696 - accuracy:
0.7734 - val_loss: 0.6035 - val_accuracy: 0.7188
Epoch 192/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5187 - accuracy:
0.7682 - val_loss: 0.6034 - val_accuracy: 0.7188
Epoch 193/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5303 - accuracy:
0.8021 - val_loss: 0.6029 - val_accuracy: 0.7188
Epoch 194/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5448 - accuracy:
0.7656 - val_loss: 0.6027 - val_accuracy: 0.7188
Epoch 195/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5276 - accuracy:
0.7839 - val_loss: 0.6027 - val_accuracy: 0.7188
Epoch 196/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5128 - accuracy:
0.7917 - val_loss: 0.6019 - val_accuracy: 0.7188
Epoch 197/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5217 - accuracy:
0.7943 - val_loss: 0.6015 - val_accuracy: 0.7188
Epoch 198/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5244 - accuracy:
0.8021 - val_loss: 0.6010 - val_accuracy: 0.7188
Epoch 199/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5498 - accuracy:
0.7865 - val_loss: 0.6006 - val_accuracy: 0.7188
Epoch 200/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5614 - accuracy:
0.7734 - val_loss: 0.6004 - val_accuracy: 0.7188
Epoch 201/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5340 - accuracy:
0.7734 - val_loss: 0.5996 - val_accuracy: 0.7188
Epoch 202/500
24/24 [==============================] - 0s 6ms/step - loss: 0.5106 - accuracy:
0.7682 - val_loss: 0.5989 - val_accuracy: 0.7188
Epoch 203/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5236 - accuracy:
0.7969 - val_loss: 0.5984 - val_accuracy: 0.7188
Epoch 204/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5185 - accuracy:
0.7865 - val_loss: 0.5981 - val_accuracy: 0.7188
Epoch 205/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5589 - accuracy:
0.7448 - val_loss: 0.5979 - val_accuracy: 0.7188
Epoch 206/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5281 - accuracy:
0.7734 - val_loss: 0.5978 - val_accuracy: 0.7188
Epoch 207/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5285 - accuracy:
0.7760 - val_loss: 0.5969 - val_accuracy: 0.7083
Epoch 208/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5566 - accuracy:
0.7526 - val_loss: 0.5966 - val_accuracy: 0.7083
Epoch 209/500
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24/24 [==============================] - 0s 5ms/step - loss: 0.5349 - accuracy:
0.7656 - val_loss: 0.5964 - val_accuracy: 0.7083
Epoch 210/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5248 - accuracy:
0.7708 - val_loss: 0.5960 - val_accuracy: 0.7188
Epoch 211/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5403 - accuracy:
0.7760 - val_loss: 0.5960 - val_accuracy: 0.7083
Epoch 212/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5431 - accuracy:
0.7734 - val_loss: 0.5954 - val_accuracy: 0.7083
Epoch 213/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5310 - accuracy:
0.7708 - val_loss: 0.5950 - val_accuracy: 0.7188
Epoch 214/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5425 - accuracy:
0.7474 - val_loss: 0.5944 - val_accuracy: 0.7188
Epoch 215/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5131 - accuracy:
0.7917 - val_loss: 0.5942 - val_accuracy: 0.7083
Epoch 216/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5259 - accuracy:
0.7891 - val_loss: 0.5941 - val_accuracy: 0.7083
Epoch 217/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5240 - accuracy:
0.8047 - val_loss: 0.5944 - val_accuracy: 0.7188
Epoch 218/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5523 - accuracy:
0.7760 - val_loss: 0.5939 - val_accuracy: 0.7188
Epoch 219/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5140 - accuracy:
0.7708 - val_loss: 0.5932 - val_accuracy: 0.7188
Epoch 220/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5287 - accuracy:
0.7604 - val_loss: 0.5930 - val_accuracy: 0.7188
Epoch 221/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5181 - accuracy:
0.7682 - val_loss: 0.5923 - val_accuracy: 0.7188
Epoch 222/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4972 - accuracy:
0.7943 - val_loss: 0.5915 - val_accuracy: 0.7188
Epoch 223/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5026 - accuracy:
0.8021 - val_loss: 0.5910 - val_accuracy: 0.7292
Epoch 224/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4905 - accuracy:
0.8125 - val_loss: 0.5911 - val_accuracy: 0.7292
Epoch 225/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5131 - accuracy:
0.8073 - val_loss: 0.5908 - val_accuracy: 0.7292
Epoch 226/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5189 - accuracy:
0.7812 - val_loss: 0.5902 - val_accuracy: 0.7292
Epoch 227/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5231 - accuracy:
0.7630 - val_loss: 0.5897 - val_accuracy: 0.7292
Epoch 228/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5026 - accuracy:
0.7812 - val_loss: 0.5893 - val_accuracy: 0.7292
Epoch 229/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5101 - accuracy:
0.7865 - val_loss: 0.5887 - val_accuracy: 0.7292
Epoch 230/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5060 - accuracy:
0.7917 - val_loss: 0.5882 - val_accuracy: 0.7292
Epoch 231/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4985 - accuracy:
0.7995 - val_loss: 0.5882 - val_accuracy: 0.7292
Epoch 232/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5051 - accuracy:
0.7917 - val_loss: 0.5883 - val_accuracy: 0.7396
Epoch 233/500
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24/24 [==============================] - 0s 4ms/step - loss: 0.4937 - accuracy:
0.8021 - val_loss: 0.5882 - val_accuracy: 0.7292
Epoch 234/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5235 - accuracy:
0.7917 - val_loss: 0.5885 - val_accuracy: 0.7292
Epoch 235/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5033 - accuracy:
0.7969 - val_loss: 0.5886 - val_accuracy: 0.7292
Epoch 236/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5192 - accuracy:
0.7682 - val_loss: 0.5885 - val_accuracy: 0.7292
Epoch 237/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4876 - accuracy:
0.8151 - val_loss: 0.5881 - val_accuracy: 0.7292
Epoch 238/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5037 - accuracy:
0.7995 - val_loss: 0.5876 - val_accuracy: 0.7292
Epoch 239/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5023 - accuracy:
0.7917 - val_loss: 0.5877 - val_accuracy: 0.7396
Epoch 240/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4895 - accuracy:
0.7995 - val_loss: 0.5876 - val_accuracy: 0.7396
Epoch 241/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5212 - accuracy:
0.7839 - val_loss: 0.5878 - val_accuracy: 0.7292
Epoch 242/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5139 - accuracy:
0.7969 - val_loss: 0.5877 - val_accuracy: 0.7292
Epoch 243/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5198 - accuracy:
0.7917 - val_loss: 0.5871 - val_accuracy: 0.7292
Epoch 244/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5056 - accuracy:
0.7760 - val_loss: 0.5865 - val_accuracy: 0.7396
Epoch 245/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5038 - accuracy:
0.8073 - val_loss: 0.5864 - val_accuracy: 0.7396
Epoch 246/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5195 - accuracy:
0.7786 - val_loss: 0.5863 - val_accuracy: 0.7396
Epoch 247/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5213 - accuracy:
0.7682 - val_loss: 0.5859 - val_accuracy: 0.7396
Epoch 248/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4898 - accuracy:
0.7917 - val_loss: 0.5855 - val_accuracy: 0.7396
Epoch 249/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5309 - accuracy:
0.7578 - val_loss: 0.5859 - val_accuracy: 0.7396
Epoch 250/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4984 - accuracy:
0.8307 - val_loss: 0.5857 - val_accuracy: 0.7396
Epoch 251/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5128 - accuracy:
0.7891 - val_loss: 0.5858 - val_accuracy: 0.7396
Epoch 252/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5061 - accuracy:
0.7734 - val_loss: 0.5858 - val_accuracy: 0.7396
Epoch 253/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4966 - accuracy:
0.8073 - val_loss: 0.5852 - val_accuracy: 0.7396
Epoch 254/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4988 - accuracy:
0.8099 - val_loss: 0.5851 - val_accuracy: 0.7396
Epoch 255/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5184 - accuracy:
0.8021 - val_loss: 0.5847 - val_accuracy: 0.7396
Epoch 256/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4877 - accuracy:
0.8021 - val_loss: 0.5846 - val_accuracy: 0.7396
Epoch 257/500
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24/24 [==============================] - 0s 4ms/step - loss: 0.5235 - accuracy:
0.7943 - val_loss: 0.5847 - val_accuracy: 0.7396
Epoch 258/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5039 - accuracy:
0.7917 - val_loss: 0.5844 - val_accuracy: 0.7396
Epoch 259/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5015 - accuracy:
0.7734 - val_loss: 0.5850 - val_accuracy: 0.7396
Epoch 260/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4742 - accuracy:
0.8099 - val_loss: 0.5850 - val_accuracy: 0.7396
Epoch 261/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4658 - accuracy:
0.8359 - val_loss: 0.5849 - val_accuracy: 0.7396
Epoch 262/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4886 - accuracy:
0.7865 - val_loss: 0.5841 - val_accuracy: 0.7396
Epoch 263/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5041 - accuracy:
0.7995 - val_loss: 0.5835 - val_accuracy: 0.7396
Epoch 264/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4898 - accuracy:
0.7865 - val_loss: 0.5834 - val_accuracy: 0.7292
Epoch 265/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4892 - accuracy:
0.8151 - val_loss: 0.5830 - val_accuracy: 0.7292
Epoch 266/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4742 - accuracy:
0.8073 - val_loss: 0.5831 - val_accuracy: 0.7292
Epoch 267/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5190 - accuracy:
0.7656 - val_loss: 0.5826 - val_accuracy: 0.7292
Epoch 268/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4719 - accuracy:
0.8099 - val_loss: 0.5825 - val_accuracy: 0.7292
Epoch 269/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4988 - accuracy:
0.8073 - val_loss: 0.5820 - val_accuracy: 0.7292
Epoch 270/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4998 - accuracy:
0.7865 - val_loss: 0.5815 - val_accuracy: 0.7292
Epoch 271/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5263 - accuracy:
0.7734 - val_loss: 0.5814 - val_accuracy: 0.7292
Epoch 272/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4879 - accuracy:
0.8177 - val_loss: 0.5809 - val_accuracy: 0.7292
Epoch 273/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4695 - accuracy:
0.8099 - val_loss: 0.5805 - val_accuracy: 0.7292
Epoch 274/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4796 - accuracy:
0.8099 - val_loss: 0.5805 - val_accuracy: 0.7292
Epoch 275/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4917 - accuracy:
0.7839 - val_loss: 0.5800 - val_accuracy: 0.7292
Epoch 276/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4717 - accuracy:
0.7891 - val_loss: 0.5804 - val_accuracy: 0.7292
Epoch 277/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4837 - accuracy:
0.7839 - val_loss: 0.5803 - val_accuracy: 0.7292
Epoch 278/500
24/24 [==============================] - 0s 5ms/step - loss: 0.5132 - accuracy:
0.7839 - val_loss: 0.5798 - val_accuracy: 0.7292
Epoch 279/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4670 - accuracy:
0.8151 - val_loss: 0.5797 - val_accuracy: 0.7292
Epoch 280/500
24/24 [==============================] - 0s 4ms/step - loss: 0.5079 - accuracy:
0.7943 - val_loss: 0.5798 - val_accuracy: 0.7292
Epoch 281/500
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24/24 [==============================] - 0s 5ms/step - loss: 0.4848 - accuracy:
0.8307 - val_loss: 0.5801 - val_accuracy: 0.7292
Epoch 282/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4917 - accuracy:
0.8021 - val_loss: 0.5803 - val_accuracy: 0.7292
Epoch 283/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4806 - accuracy:
0.8125 - val_loss: 0.5801 - val_accuracy: 0.7292
Epoch 284/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4881 - accuracy:
0.8151 - val_loss: 0.5799 - val_accuracy: 0.7292
Epoch 285/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4670 - accuracy:
0.8125 - val_loss: 0.5802 - val_accuracy: 0.7292
Epoch 286/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4427 - accuracy:
0.8385 - val_loss: 0.5806 - val_accuracy: 0.7292
Epoch 287/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4794 - accuracy:
0.8125 - val_loss: 0.5812 - val_accuracy: 0.7396
Epoch 288/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4703 - accuracy:
0.8125 - val_loss: 0.5804 - val_accuracy: 0.7396
Epoch 289/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4936 - accuracy:
0.8203 - val_loss: 0.5801 - val_accuracy: 0.7396
Epoch 290/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4549 - accuracy:
0.8385 - val_loss: 0.5802 - val_accuracy: 0.7396
Epoch 291/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4731 - accuracy:
0.7969 - val_loss: 0.5804 - val_accuracy: 0.7396
Epoch 292/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4799 - accuracy:
0.8255 - val_loss: 0.5801 - val_accuracy: 0.7396
Epoch 293/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4754 - accuracy:
0.8099 - val_loss: 0.5796 - val_accuracy: 0.7396
Epoch 294/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4774 - accuracy:
0.8151 - val_loss: 0.5796 - val_accuracy: 0.7396
Epoch 295/500
24/24 [==============================] - 0s 6ms/step - loss: 0.4988 - accuracy:
0.8099 - val_loss: 0.5798 - val_accuracy: 0.7396
Epoch 296/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4477 - accuracy:
0.8411 - val_loss: 0.5800 - val_accuracy: 0.7396
Epoch 297/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4655 - accuracy:
0.8151 - val_loss: 0.5801 - val_accuracy: 0.7396
Epoch 298/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4619 - accuracy:
0.8151 - val_loss: 0.5799 - val_accuracy: 0.7396
Epoch 299/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4930 - accuracy:
0.8307 - val_loss: 0.5802 - val_accuracy: 0.7396
Epoch 300/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4535 - accuracy:
0.8411 - val_loss: 0.5801 - val_accuracy: 0.7396
Epoch 301/500
24/24 [==============================] - 0s 6ms/step - loss: 0.4767 - accuracy:
0.7995 - val_loss: 0.5806 - val_accuracy: 0.7396
Epoch 302/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4775 - accuracy:
0.7708 - val_loss: 0.5808 - val_accuracy: 0.7396
Epoch 303/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4770 - accuracy:
0.8099 - val_loss: 0.5807 - val_accuracy: 0.7396
Epoch 304/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4632 - accuracy:
0.8229 - val_loss: 0.5811 - val_accuracy: 0.7396
Epoch 305/500
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24/24 [==============================] - 0s 5ms/step - loss: 0.4610 - accuracy:
0.8281 - val_loss: 0.5816 - val_accuracy: 0.7396
Epoch 306/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4629 - accuracy:
0.8281 - val_loss: 0.5817 - val_accuracy: 0.7396
Epoch 307/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4771 - accuracy:
0.7969 - val_loss: 0.5819 - val_accuracy: 0.7396
Epoch 308/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4330 - accuracy:
0.8385 - val_loss: 0.5817 - val_accuracy: 0.7396
Epoch 309/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4620 - accuracy:
0.8099 - val_loss: 0.5819 - val_accuracy: 0.7396
Epoch 310/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4673 - accuracy:
0.8099 - val_loss: 0.5820 - val_accuracy: 0.7396
Epoch 311/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4645 - accuracy:
0.8333 - val_loss: 0.5824 - val_accuracy: 0.7500
Epoch 312/500
24/24 [==============================] - 0s 6ms/step - loss: 0.4703 - accuracy:
0.8151 - val_loss: 0.5822 - val_accuracy: 0.7396
Epoch 313/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4251 - accuracy:
0.8594 - val_loss: 0.5818 - val_accuracy: 0.7396
Epoch 314/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4765 - accuracy:
0.8125 - val_loss: 0.5820 - val_accuracy: 0.7500
Epoch 315/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4710 - accuracy:
0.7943 - val_loss: 0.5821 - val_accuracy: 0.7396
Epoch 316/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4793 - accuracy:
0.8151 - val_loss: 0.5817 - val_accuracy: 0.7396
Epoch 317/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4819 - accuracy:
0.7760 - val_loss: 0.5818 - val_accuracy: 0.7396
Epoch 318/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4881 - accuracy:
0.8047 - val_loss: 0.5816 - val_accuracy: 0.7500
Epoch 319/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4634 - accuracy:
0.8073 - val_loss: 0.5817 - val_accuracy: 0.7396
Epoch 320/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4446 - accuracy:
0.8307 - val_loss: 0.5821 - val_accuracy: 0.7396
Epoch 321/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4435 - accuracy:
0.8229 - val_loss: 0.5823 - val_accuracy: 0.7396
Epoch 322/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4432 - accuracy:
0.8333 - val_loss: 0.5825 - val_accuracy: 0.7396
Epoch 323/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4597 - accuracy:
0.8021 - val_loss: 0.5825 - val_accuracy: 0.7396
Epoch 324/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4389 - accuracy:
0.8333 - val_loss: 0.5825 - val_accuracy: 0.7396
Epoch 325/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4296 - accuracy:
0.8385 - val_loss: 0.5821 - val_accuracy: 0.7396
Epoch 326/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4646 - accuracy:
0.8177 - val_loss: 0.5820 - val_accuracy: 0.7396
Epoch 327/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4769 - accuracy:
0.8255 - val_loss: 0.5825 - val_accuracy: 0.7396
Epoch 328/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4354 - accuracy:
0.8385 - val_loss: 0.5825 - val_accuracy: 0.7396
Epoch 329/500
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24/24 [==============================] - 0s 5ms/step - loss: 0.4506 - accuracy:
0.8281 - val_loss: 0.5823 - val_accuracy: 0.7396
Epoch 330/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4534 - accuracy:
0.8047 - val_loss: 0.5820 - val_accuracy: 0.7396
Epoch 331/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4874 - accuracy:
0.8047 - val_loss: 0.5825 - val_accuracy: 0.7396
Epoch 332/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4709 - accuracy:
0.7917 - val_loss: 0.5826 - val_accuracy: 0.7396
Epoch 333/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4299 - accuracy:
0.8385 - val_loss: 0.5834 - val_accuracy: 0.7396
Epoch 334/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4582 - accuracy:
0.8021 - val_loss: 0.5832 - val_accuracy: 0.7396
Epoch 335/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4451 - accuracy:
0.8281 - val_loss: 0.5833 - val_accuracy: 0.7396
Epoch 336/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4373 - accuracy:
0.8151 - val_loss: 0.5832 - val_accuracy: 0.7396
Epoch 337/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4515 - accuracy:
0.8281 - val_loss: 0.5829 - val_accuracy: 0.7396
Epoch 338/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4626 - accuracy:
0.8151 - val_loss: 0.5833 - val_accuracy: 0.7396
Epoch 339/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4366 - accuracy:
0.8359 - val_loss: 0.5841 - val_accuracy: 0.7292
Epoch 340/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4463 - accuracy:
0.8307 - val_loss: 0.5841 - val_accuracy: 0.7292
Epoch 341/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4519 - accuracy:
0.8203 - val_loss: 0.5841 - val_accuracy: 0.7292
Epoch 342/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4580 - accuracy:
0.8073 - val_loss: 0.5845 - val_accuracy: 0.7292
Epoch 343/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4299 - accuracy:
0.8411 - val_loss: 0.5841 - val_accuracy: 0.7292
Epoch 344/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4409 - accuracy:
0.8307 - val_loss: 0.5845 - val_accuracy: 0.7292
Epoch 345/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4397 - accuracy:
0.8516 - val_loss: 0.5849 - val_accuracy: 0.7292
Epoch 346/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4551 - accuracy:
0.8359 - val_loss: 0.5852 - val_accuracy: 0.7292
Epoch 347/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4417 - accuracy:
0.8307 - val_loss: 0.5847 - val_accuracy: 0.7292
Epoch 348/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4250 - accuracy:
0.8464 - val_loss: 0.5855 - val_accuracy: 0.7292
Epoch 349/500
24/24 [==============================] - 0s 3ms/step - loss: 0.4419 - accuracy:
0.8490 - val_loss: 0.5856 - val_accuracy: 0.7292
Epoch 350/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4529 - accuracy:
0.8255 - val_loss: 0.5858 - val_accuracy: 0.7292
Epoch 351/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4455 - accuracy:
0.8411 - val_loss: 0.5860 - val_accuracy: 0.7292
Epoch 352/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4298 - accuracy:
0.8333 - val_loss: 0.5857 - val_accuracy: 0.7292
Epoch 353/500
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24/24 [==============================] - 0s 5ms/step - loss: 0.4570 - accuracy:
0.8203 - val_loss: 0.5859 - val_accuracy: 0.7292
Epoch 354/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4506 - accuracy:
0.8333 - val_loss: 0.5857 - val_accuracy: 0.7292
Epoch 355/500
24/24 [==============================] - 0s 6ms/step - loss: 0.4165 - accuracy:
0.8333 - val_loss: 0.5860 - val_accuracy: 0.7292
Epoch 356/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4506 - accuracy:
0.8333 - val_loss: 0.5859 - val_accuracy: 0.7292
Epoch 357/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4163 - accuracy:
0.8307 - val_loss: 0.5856 - val_accuracy: 0.7292
Epoch 358/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4680 - accuracy:
0.8151 - val_loss: 0.5854 - val_accuracy: 0.7292
Epoch 359/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4099 - accuracy:
0.8542 - val_loss: 0.5858 - val_accuracy: 0.7292
Epoch 360/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4700 - accuracy:
0.8047 - val_loss: 0.5859 - val_accuracy: 0.7292
Epoch 361/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4573 - accuracy:
0.8385 - val_loss: 0.5858 - val_accuracy: 0.7292
Epoch 362/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4429 - accuracy:
0.8203 - val_loss: 0.5859 - val_accuracy: 0.7292
Epoch 363/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4370 - accuracy:
0.8151 - val_loss: 0.5856 - val_accuracy: 0.7292
Epoch 364/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4252 - accuracy:
0.8255 - val_loss: 0.5856 - val_accuracy: 0.7292
Epoch 365/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4500 - accuracy:
0.8281 - val_loss: 0.5857 - val_accuracy: 0.7292
Epoch 366/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4601 - accuracy:
0.8281 - val_loss: 0.5860 - val_accuracy: 0.7396
Epoch 367/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4524 - accuracy:
0.8099 - val_loss: 0.5862 - val_accuracy: 0.7292
Epoch 368/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4209 - accuracy:
0.8542 - val_loss: 0.5864 - val_accuracy: 0.7292
Epoch 369/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4411 - accuracy:
0.8047 - val_loss: 0.5870 - val_accuracy: 0.7396
Epoch 370/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4300 - accuracy:
0.8359 - val_loss: 0.5878 - val_accuracy: 0.7396
Epoch 371/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4541 - accuracy:
0.8203 - val_loss: 0.5877 - val_accuracy: 0.7396
Epoch 372/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4280 - accuracy:
0.8255 - val_loss: 0.5878 - val_accuracy: 0.7396
Epoch 373/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4217 - accuracy:
0.8385 - val_loss: 0.5887 - val_accuracy: 0.7396
Epoch 374/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4366 - accuracy:
0.8411 - val_loss: 0.5890 - val_accuracy: 0.7396
Epoch 375/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4276 - accuracy:
0.8229 - val_loss: 0.5894 - val_accuracy: 0.7396
Epoch 376/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4395 - accuracy:
0.8307 - val_loss: 0.5892 - val_accuracy: 0.7396
Epoch 377/500
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24/24 [==============================] - 0s 5ms/step - loss: 0.4382 - accuracy:
0.8542 - val_loss: 0.5893 - val_accuracy: 0.7396
Epoch 378/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4532 - accuracy:
0.8333 - val_loss: 0.5894 - val_accuracy: 0.7396
Epoch 379/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4137 - accuracy:
0.8359 - val_loss: 0.5899 - val_accuracy: 0.7396
Epoch 380/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4454 - accuracy:
0.8307 - val_loss: 0.5900 - val_accuracy: 0.7396
Epoch 381/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4085 - accuracy:
0.8464 - val_loss: 0.5896 - val_accuracy: 0.7396
Epoch 382/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4244 - accuracy:
0.8307 - val_loss: 0.5899 - val_accuracy: 0.7396
Epoch 383/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4133 - accuracy:
0.8438 - val_loss: 0.5899 - val_accuracy: 0.7396
Epoch 384/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4311 - accuracy:
0.8359 - val_loss: 0.5903 - val_accuracy: 0.7396
Epoch 385/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4292 - accuracy:
0.8333 - val_loss: 0.5908 - val_accuracy: 0.7396
Epoch 386/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4545 - accuracy:
0.8281 - val_loss: 0.5906 - val_accuracy: 0.7396
Epoch 387/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4327 - accuracy:
0.8385 - val_loss: 0.5903 - val_accuracy: 0.7396
Epoch 388/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4226 - accuracy:
0.8516 - val_loss: 0.5904 - val_accuracy: 0.7396
Epoch 389/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4420 - accuracy:
0.8438 - val_loss: 0.5904 - val_accuracy: 0.7396
Epoch 390/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4211 - accuracy:
0.8542 - val_loss: 0.5903 - val_accuracy: 0.7396
Epoch 391/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4458 - accuracy:
0.8177 - val_loss: 0.5900 - val_accuracy: 0.7396
Epoch 392/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4424 - accuracy:
0.8333 - val_loss: 0.5900 - val_accuracy: 0.7396
Epoch 393/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4345 - accuracy:
0.8281 - val_loss: 0.5905 - val_accuracy: 0.7396
Epoch 394/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4188 - accuracy:
0.8490 - val_loss: 0.5905 - val_accuracy: 0.7500
Epoch 395/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4161 - accuracy:
0.8411 - val_loss: 0.5907 - val_accuracy: 0.7500
Epoch 396/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4252 - accuracy:
0.8203 - val_loss: 0.5906 - val_accuracy: 0.7500
Epoch 397/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4149 - accuracy:
0.8307 - val_loss: 0.5910 - val_accuracy: 0.7396
Epoch 398/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4007 - accuracy:
0.8516 - val_loss: 0.5911 - val_accuracy: 0.7500
Epoch 399/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4364 - accuracy:
0.8359 - val_loss: 0.5913 - val_accuracy: 0.7396
Epoch 400/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4478 - accuracy:
0.8281 - val_loss: 0.5918 - val_accuracy: 0.7396
Epoch 401/500
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24/24 [==============================] - 0s 5ms/step - loss: 0.4308 - accuracy:
0.8359 - val_loss: 0.5920 - val_accuracy: 0.7396
Epoch 402/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4135 - accuracy:
0.8385 - val_loss: 0.5916 - val_accuracy: 0.7500
Epoch 403/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4145 - accuracy:
0.8359 - val_loss: 0.5927 - val_accuracy: 0.7396
Epoch 404/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4232 - accuracy:
0.8464 - val_loss: 0.5933 - val_accuracy: 0.7396
Epoch 405/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4388 - accuracy:
0.8568 - val_loss: 0.5935 - val_accuracy: 0.7396
Epoch 406/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4217 - accuracy:
0.8333 - val_loss: 0.5938 - val_accuracy: 0.7396
Epoch 407/500
24/24 [==============================] - 0s 5ms/step - loss: 0.3979 - accuracy:
0.8438 - val_loss: 0.5944 - val_accuracy: 0.7396
Epoch 408/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4466 - accuracy:
0.8307 - val_loss: 0.5949 - val_accuracy: 0.7396
Epoch 409/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4137 - accuracy:
0.8490 - val_loss: 0.5950 - val_accuracy: 0.7396
Epoch 410/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4496 - accuracy:
0.8177 - val_loss: 0.5946 - val_accuracy: 0.7396
Epoch 411/500
24/24 [==============================] - 0s 6ms/step - loss: 0.3931 - accuracy:
0.8464 - val_loss: 0.5949 - val_accuracy: 0.7396
Epoch 412/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4268 - accuracy:
0.8281 - val_loss: 0.5946 - val_accuracy: 0.7396
Epoch 413/500
24/24 [==============================] - 0s 6ms/step - loss: 0.4074 - accuracy:
0.8385 - val_loss: 0.5947 - val_accuracy: 0.7396
Epoch 414/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4360 - accuracy:
0.8281 - val_loss: 0.5949 - val_accuracy: 0.7292
Epoch 415/500
24/24 [==============================] - 0s 5ms/step - loss: 0.3968 - accuracy:
0.8438 - val_loss: 0.5955 - val_accuracy: 0.7396
Epoch 416/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4487 - accuracy:
0.8151 - val_loss: 0.5962 - val_accuracy: 0.7396
Epoch 417/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4107 - accuracy:
0.8568 - val_loss: 0.5964 - val_accuracy: 0.7396
Epoch 418/500
24/24 [==============================] - 0s 6ms/step - loss: 0.4104 - accuracy:
0.8438 - val_loss: 0.5968 - val_accuracy: 0.7396
Epoch 419/500
24/24 [==============================] - 0s 6ms/step - loss: 0.4066 - accuracy:
0.8411 - val_loss: 0.5969 - val_accuracy: 0.7292
Epoch 420/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4294 - accuracy:
0.8438 - val_loss: 0.5961 - val_accuracy: 0.7292
Epoch 421/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4119 - accuracy:
0.8385 - val_loss: 0.5970 - val_accuracy: 0.7292
Epoch 422/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4231 - accuracy:
0.8542 - val_loss: 0.5972 - val_accuracy: 0.7292
Epoch 423/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4125 - accuracy:
0.8438 - val_loss: 0.5964 - val_accuracy: 0.7396
Epoch 424/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4244 - accuracy:
0.8333 - val_loss: 0.5964 - val_accuracy: 0.7500
Epoch 425/500
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24/24 [==============================] - 0s 5ms/step - loss: 0.4294 - accuracy:
0.8203 - val_loss: 0.5966 - val_accuracy: 0.7500
Epoch 426/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4295 - accuracy:
0.8359 - val_loss: 0.5969 - val_accuracy: 0.7396
Epoch 427/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4021 - accuracy:
0.8542 - val_loss: 0.5962 - val_accuracy: 0.7396
Epoch 428/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4095 - accuracy:
0.8620 - val_loss: 0.5960 - val_accuracy: 0.7396
Epoch 429/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4289 - accuracy:
0.8490 - val_loss: 0.5960 - val_accuracy: 0.7500
Epoch 430/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4198 - accuracy:
0.8490 - val_loss: 0.5959 - val_accuracy: 0.7500
Epoch 431/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4038 - accuracy:
0.8672 - val_loss: 0.5961 - val_accuracy: 0.7500
Epoch 432/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4186 - accuracy:
0.8646 - val_loss: 0.5963 - val_accuracy: 0.7500
Epoch 433/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4445 - accuracy:
0.8281 - val_loss: 0.5965 - val_accuracy: 0.7500
Epoch 434/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4084 - accuracy:
0.8438 - val_loss: 0.5966 - val_accuracy: 0.7500
Epoch 435/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4090 - accuracy:
0.8411 - val_loss: 0.5975 - val_accuracy: 0.7396
Epoch 436/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4200 - accuracy:
0.8464 - val_loss: 0.5986 - val_accuracy: 0.7396
Epoch 437/500
24/24 [==============================] - 0s 6ms/step - loss: 0.3903 - accuracy:
0.8568 - val_loss: 0.5980 - val_accuracy: 0.7500
Epoch 438/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4092 - accuracy:
0.8255 - val_loss: 0.5980 - val_accuracy: 0.7396
Epoch 439/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4313 - accuracy:
0.8281 - val_loss: 0.5984 - val_accuracy: 0.7396
Epoch 440/500
24/24 [==============================] - 0s 6ms/step - loss: 0.4192 - accuracy:
0.8385 - val_loss: 0.5989 - val_accuracy: 0.7396
Epoch 441/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4433 - accuracy:
0.8125 - val_loss: 0.5986 - val_accuracy: 0.7396
Epoch 442/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4006 - accuracy:
0.8542 - val_loss: 0.5988 - val_accuracy: 0.7396
Epoch 443/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4355 - accuracy:
0.8438 - val_loss: 0.5988 - val_accuracy: 0.7396
Epoch 444/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4117 - accuracy:
0.8411 - val_loss: 0.5988 - val_accuracy: 0.7396
Epoch 445/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4098 - accuracy:
0.8464 - val_loss: 0.5986 - val_accuracy: 0.7396
Epoch 446/500
24/24 [==============================] - 0s 6ms/step - loss: 0.4141 - accuracy:
0.8281 - val_loss: 0.5993 - val_accuracy: 0.7396
Epoch 447/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4122 - accuracy:
0.8516 - val_loss: 0.5997 - val_accuracy: 0.7396
Epoch 448/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4226 - accuracy:
0.8438 - val_loss: 0.5997 - val_accuracy: 0.7396
Epoch 449/500
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24/24 [==============================] - 0s 5ms/step - loss: 0.4056 - accuracy:
0.8464 - val_loss: 0.5995 - val_accuracy: 0.7396
Epoch 450/500
24/24 [==============================] - 0s 5ms/step - loss: 0.3911 - accuracy:
0.8646 - val_loss: 0.6000 - val_accuracy: 0.7396
Epoch 451/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4485 - accuracy:
0.8385 - val_loss: 0.5997 - val_accuracy: 0.7396
Epoch 452/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4046 - accuracy:
0.8490 - val_loss: 0.5995 - val_accuracy: 0.7396
Epoch 453/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4077 - accuracy:
0.8385 - val_loss: 0.6005 - val_accuracy: 0.7396
Epoch 454/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4212 - accuracy:
0.8047 - val_loss: 0.6012 - val_accuracy: 0.7396
Epoch 455/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4269 - accuracy:
0.8359 - val_loss: 0.6014 - val_accuracy: 0.7396
Epoch 456/500
24/24 [==============================] - 0s 5ms/step - loss: 0.3989 - accuracy:
0.8411 - val_loss: 0.6018 - val_accuracy: 0.7396
Epoch 457/500
24/24 [==============================] - 0s 5ms/step - loss: 0.3931 - accuracy:
0.8464 - val_loss: 0.6025 - val_accuracy: 0.7396
Epoch 458/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4346 - accuracy:
0.8359 - val_loss: 0.6029 - val_accuracy: 0.7396
Epoch 459/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4238 - accuracy:
0.8307 - val_loss: 0.6025 - val_accuracy: 0.7396
Epoch 460/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4313 - accuracy:
0.8359 - val_loss: 0.6021 - val_accuracy: 0.7396
Epoch 461/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4167 - accuracy:
0.8516 - val_loss: 0.6020 - val_accuracy: 0.7396
Epoch 462/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4124 - accuracy:
0.8307 - val_loss: 0.6024 - val_accuracy: 0.7396
Epoch 463/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4134 - accuracy:
0.8516 - val_loss: 0.6020 - val_accuracy: 0.7396
Epoch 464/500
24/24 [==============================] - 0s 5ms/step - loss: 0.3959 - accuracy:
0.8516 - val_loss: 0.6025 - val_accuracy: 0.7396
Epoch 465/500
24/24 [==============================] - 0s 5ms/step - loss: 0.3908 - accuracy:
0.8776 - val_loss: 0.6020 - val_accuracy: 0.7396
Epoch 466/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4407 - accuracy:
0.8281 - val_loss: 0.6024 - val_accuracy: 0.7396
Epoch 467/500
24/24 [==============================] - 0s 5ms/step - loss: 0.3990 - accuracy:
0.8490 - val_loss: 0.6027 - val_accuracy: 0.7396
Epoch 468/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4159 - accuracy:
0.8411 - val_loss: 0.6029 - val_accuracy: 0.7396
Epoch 469/500
24/24 [==============================] - 0s 6ms/step - loss: 0.3892 - accuracy:
0.8568 - val_loss: 0.6030 - val_accuracy: 0.7396
Epoch 470/500
24/24 [==============================] - 0s 5ms/step - loss: 0.3941 - accuracy:
0.8646 - val_loss: 0.6031 - val_accuracy: 0.7396
Epoch 471/500
24/24 [==============================] - 0s 5ms/step - loss: 0.3957 - accuracy:
0.8542 - val_loss: 0.6034 - val_accuracy: 0.7396
Epoch 472/500
24/24 [==============================] - 0s 6ms/step - loss: 0.4072 - accuracy:
0.8385 - val_loss: 0.6037 - val_accuracy: 0.7396
Epoch 473/500
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24/24 [==============================] - 0s 6ms/step - loss: 0.4258 - accuracy:
0.8385 - val_loss: 0.6043 - val_accuracy: 0.7396
Epoch 474/500
24/24 [==============================] - 0s 6ms/step - loss: 0.4200 - accuracy:
0.8385 - val_loss: 0.6045 - val_accuracy: 0.7396
Epoch 475/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4237 - accuracy:
0.8385 - val_loss: 0.6043 - val_accuracy: 0.7396
Epoch 476/500
24/24 [==============================] - 0s 4ms/step - loss: 0.3897 - accuracy:
0.8620 - val_loss: 0.6047 - val_accuracy: 0.7396
Epoch 477/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4091 - accuracy:
0.8568 - val_loss: 0.6050 - val_accuracy: 0.7396
Epoch 478/500
24/24 [==============================] - 0s 5ms/step - loss: 0.3961 - accuracy:
0.8490 - val_loss: 0.6053 - val_accuracy: 0.7396
Epoch 479/500
24/24 [==============================] - 0s 5ms/step - loss: 0.3995 - accuracy:
0.8490 - val_loss: 0.6059 - val_accuracy: 0.7396
Epoch 480/500
24/24 [==============================] - 0s 5ms/step - loss: 0.3982 - accuracy:
0.8464 - val_loss: 0.6060 - val_accuracy: 0.7396
Epoch 481/500
24/24 [==============================] - 0s 5ms/step - loss: 0.3980 - accuracy:
0.8464 - val_loss: 0.6058 - val_accuracy: 0.7396
Epoch 482/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4138 - accuracy:
0.8464 - val_loss: 0.6059 - val_accuracy: 0.7396
Epoch 483/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4155 - accuracy:
0.8438 - val_loss: 0.6060 - val_accuracy: 0.7396
Epoch 484/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4414 - accuracy:
0.8307 - val_loss: 0.6057 - val_accuracy: 0.7396
Epoch 485/500
24/24 [==============================] - 0s 5ms/step - loss: 0.3934 - accuracy:
0.8672 - val_loss: 0.6061 - val_accuracy: 0.7396
Epoch 486/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4094 - accuracy:
0.8359 - val_loss: 0.6057 - val_accuracy: 0.7396
Epoch 487/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4027 - accuracy:
0.8594 - val_loss: 0.6061 - val_accuracy: 0.7396
Epoch 488/500
24/24 [==============================] - 0s 5ms/step - loss: 0.3759 - accuracy:
0.8411 - val_loss: 0.6063 - val_accuracy: 0.7396
Epoch 489/500
24/24 [==============================] - 0s 5ms/step - loss: 0.3963 - accuracy:
0.8385 - val_loss: 0.6068 - val_accuracy: 0.7396
Epoch 490/500
24/24 [==============================] - 0s 5ms/step - loss: 0.3956 - accuracy:
0.8594 - val_loss: 0.6072 - val_accuracy: 0.7396
Epoch 491/500
24/24 [==============================] - 0s 5ms/step - loss: 0.3916 - accuracy:
0.8542 - val_loss: 0.6079 - val_accuracy: 0.7396
Epoch 492/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4106 - accuracy:
0.8490 - val_loss: 0.6079 - val_accuracy: 0.7396
Epoch 493/500
24/24 [==============================] - 0s 5ms/step - loss: 0.3925 - accuracy:
0.8646 - val_loss: 0.6079 - val_accuracy: 0.7396
Epoch 494/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4040 - accuracy:
0.8594 - val_loss: 0.6080 - val_accuracy: 0.7396
Epoch 495/500
24/24 [==============================] - 0s 5ms/step - loss: 0.4060 - accuracy:
0.8594 - val_loss: 0.6082 - val_accuracy: 0.7396
Epoch 496/500
24/24 [==============================] - 0s 5ms/step - loss: 0.3988 - accuracy:
0.8490 - val_loss: 0.6085 - val_accuracy: 0.7396
Epoch 497/500
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24/24 [==============================] - 0s 5ms/step - loss: 0.3964 - accuracy:
0.8646 - val_loss: 0.6088 - val_accuracy: 0.7396
Epoch 498/500
24/24 [==============================] - 0s 6ms/step - loss: 0.4098 - accuracy:
0.8490 - val_loss: 0.6091 - val_accuracy: 0.7396
Epoch 499/500
24/24 [==============================] - 0s 5ms/step - loss: 0.3945 - accuracy:
0.8542 - val_loss: 0.6093 - val_accuracy: 0.7396
Epoch 500/500
24/24 [==============================] - 0s 4ms/step - loss: 0.4054 -
accuracy: 0.8724 - val_loss: 0.6100 - val_accuracy: 0.7396
```
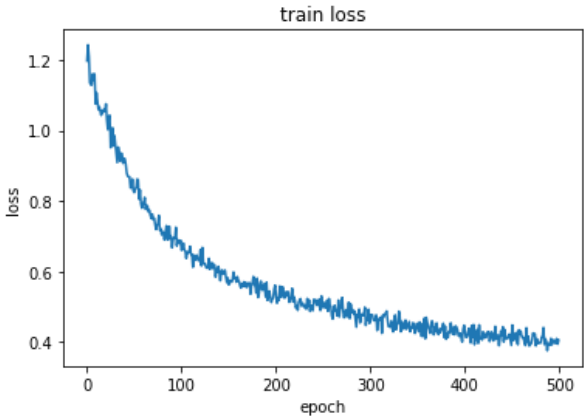
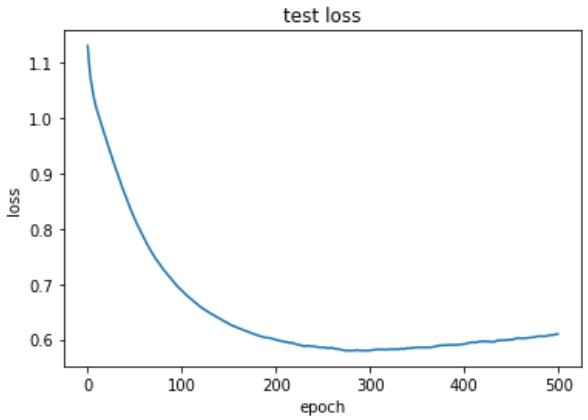
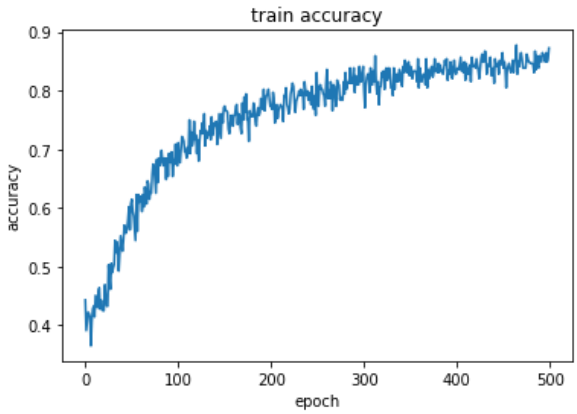

- **نمودار تغییر Loss مجموعه آموزش**



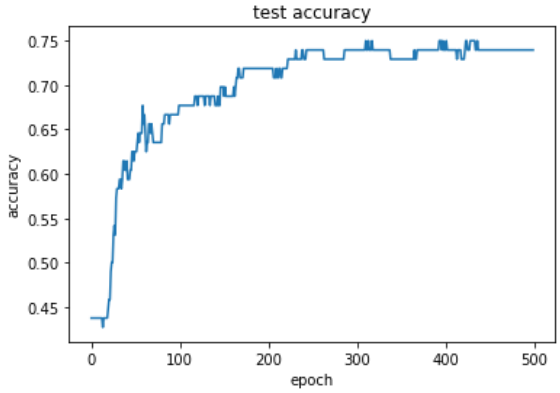
- **نمودار تغییر Loss مجموعه ارزیابی**



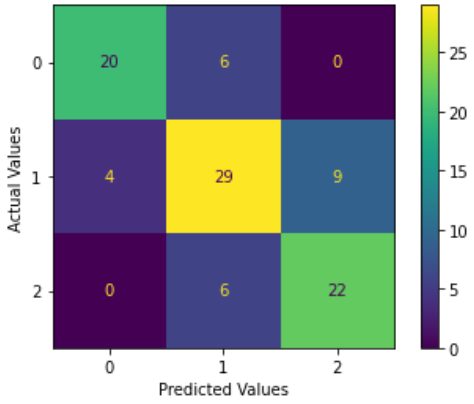
- **نمودار تغییر Accuracy مجموعه آموزش**

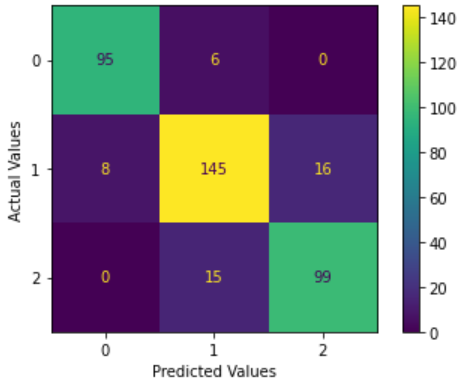


- **نمودار تغییر Accuracy مجموعه ارزیابی**



- **بررسی بیش برازش**
- Overfittingدارد. می توان epochرا کم کرد یا learning rate را کم کنیم.
- **Confusion Matrix برای بهترین مدل (بر اساس بیشترین Accuracy)**





- **نتایج بهبود مدل و استفاده از تکنیک های مهندسی ویژگی (نمره مثبت)**
- من از تکنیک get dummies برای جدا کردن x و y استفاده کردم. و برای استفاده برای مدل ها با استفاده از tf.convert_to_tensor آن ها را تبدیل کردم.

- **توضیحات تکمیلی**

- در colabبرای هر مدل سه لایه همه ی activation functionها با استفاده از تک تک optimizerها تست شده است و اینجا بهترین مدل از هر کدام قرار داده شده است. در قسمت بالا فقط برای بهترین مدل قرار داده شده است.

- **در نظر گرفتن Batch Normalization در مدل**
  - **نتایج مدل و معیارهای ارزیابی**

هایپرپارامترها:epoch 100, learning rate 0.001				
توابع فعال سازی:Relu, softmax				
Optimizer مورد استفاده و جزییات آن:SGD				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.5071	val_loss: 0.7147	accuracy: 0.8073	val_accuracy: 0.6562
4	loss: 0.5289	val_loss: 0.8011	accuracy: 0.7917	val_accuracy: 0.6875
5	loss: 0.5715	val_loss: 0.7768	accuracy: 0.7656	val_accuracy: 0.6042

هایپرپارامترها:epoch 100, learning rate 0.0001				
توابع فعال سازی:Relu, softmax				
Optimizer مورد استفاده و جزییات آن:Adam				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.3356	val_loss: 0.7986	accuracy: 0.8854	val_accuracy: 0.6562
4	loss: 0.3726	val_loss: 0.7493	accuracy: 0.8672	val_accuracy: 0.7292
5	loss: 0.5284	val_loss: 0.6591	accuracy: 0.8177	val_accuracy: 0.6771

هایپرپارامترها:epoch 100, learning rate 0.0001				
توابع فعال سازی:Relu, softmax				
Optimizer مورد استفاده و جزییات آن:RMSprop				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.3237	val_loss: 0.7532	accuracy: 0.8906	val_accuracy: 0.7083
4	loss: 0.3542	val_loss: 0.6582	accuracy: 0.8828	val_accuracy: 0.7188
5	loss: 0.5023	val_loss: 0.7774	accuracy: 0.7969	val_accuracy: 0.6562

هایپرپارامترها:epoch 100, learnin rate 0.001				
توابع فعال سازی:tanh, softmax				
Optimizer مورد استفاده و جزییات آن:SGD				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.5364	val_loss: 0.7078	accuracy: 0.8099	val_accuracy: 0.5938
4	loss: 0.4670	val_loss: 0.7024	accuracy: 0.8359	val_accuracy: 0.6354
5	loss: 0.5892	accuracy: 0.7396	val_loss: 0.7142	val_accuracy: 0.6354

هایپرپارامترها:epoch 100, learning rate 0.0001				
توابع فعال سازی:tanh, softmax				
Optimizer مورد استفاده و جزییات آن:Adam				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.2986	val_loss: 0.6061	accuracy: 0.9115	val_accuracy: 0.7188
4	loss: 0.3433	val_loss: 0.6192	accuracy: 0.8880	val_accuracy: 0.7708
5	loss: 0.4027	val_loss: 0.6855	accuracy: 0.8698	val_accuracy: 0.7292

هایپرپارامترها:epoch 100, learning rate 0.0001				
توابع فعال سازی:tanh, softmax				
Optimizer مورد استفاده و جزییات آن:RMSprop				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.3586	val_loss: 0.6197	accuracy: 0.8854	val_accuracy: 0.7292
4	loss: 0.3109	accuracy: 0.9010	val_loss: 0.6598	val_accuracy: 0.7083
5	loss: 0.4031	val_loss: 0.6713	accuracy: 0.8411	val_accuracy: 0.6667

هایپرپارامترها:epoch 100, learning rate 0.001				
توابع فعال سازی:sigmoid, softmax				
Optimizer مورد استفاده و جزییات آن:SGD				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.5495	val_loss: 0.6762	accuracy: 0.7604	val_accuracy: 0.6562
4	loss: 0.5868	accuracy: 0.7604	val_loss: 0.6219	val_accuracy: 0.7396
5	loss: 0.5994	val_loss: 0.6541	accuracy: 0.7578	val_accuracy: 0.7083

هایپرپارامترها:epoch 100, learning rate 0.0001				
توابع فعال سازی:sigmoid, softmax				
Optimizer مورد استفاده و جزییات آن:Adam				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.4591	val_loss: 0.6187	accuracy: 0.8229	val_accuracy: 0.6875
4	loss: 0.4612	val_loss: 0.6063	accuracy: 0.8255	val_accuracy: 0.6875
5	loss: 0.4488	val_loss: 0.6790	accuracy: 0.8438	val_accuracy: 0.6667

هایپرپارامترها:epoch 100, learning rate 0.0001				
توابع فعال سازی:sigmoid, softmax				
Optimizer مورد استفاده و جزییات آن:RMSprop				
تعداد لایه	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس کمترین Loss) - مجموعه ارزیابی	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه آموزش	Loss و Accuracy بهترین مدل (بر اساس بیشترین Accuracy) - مجموعه ارزیابی
3	loss: 0.4299	val_loss: 0.6124	accuracy: 0.8594	val_accuracy: 0.6771
4	loss: 0.4554	val_loss: 0.6455	accuracy: 0.8229	val_accuracy: 0.6875
5	loss: 0.4487	val_loss: 0.6514	accuracy: 0.8438	val_accuracy: 0.6771

از بین مدل های قرار داده شده 4لایه که tanh activation function دارد از همه بهتر است.(با رنگ آبی مشخص شده است). در سایر قسمت ها فقط این مدل قرار داده شده است.

- **سایر معیارهای ارزیابی:**

```
Accuracy: 0.770833
precision: 0.8002525252525251
recall; 0.7603785103785103
F1_score: 0.7749907097733185
confusion_matrix test:
[[20  6  0]
 [ 2 35  5]
 [ 0  9 19]]
confusion_matrix train:
[[ 99   1   1]
 [  6 159   4]
 [  0   6 108]]
```

- **شکل خروجی کد مجموعه آموزش در قسمت پایین قرار داده می شود.**

- **شکل خروجی کد مجموعه ارزیابی**

```
Epoch 1/100
24/24 [==============================] - 1s 11ms/step - loss: 1.4489 -
accuracy: 0.3307 - val_loss: 1.1289 - val_accuracy: 0.3542
Epoch 2/100
24/24 [==============================] - 0s 4ms/step - loss: 1.3115 -
accuracy: 0.3464 - val_loss: 1.1002 - val_accuracy: 0.3646
Epoch 3/100
24/24 [==============================] - 0s 3ms/step - loss: 1.2306 -
accuracy: 0.3932 - val_loss: 1.0690 - val_accuracy: 0.3958
Epoch 4/100
24/24 [==============================] - 0s 4ms/step - loss: 1.1728 -
accuracy: 0.4349 - val_loss: 1.0356 - val_accuracy: 0.4896
Epoch 5/100
24/24 [==============================] - 0s 4ms/step - loss: 1.0796 -
accuracy: 0.4453 - val_loss: 1.0076 - val_accuracy: 0.5000
Epoch 6/100
24/24 [==============================] - 0s 4ms/step - loss: 1.0784 -
accuracy: 0.4401 - val_loss: 0.9826 - val_accuracy: 0.5000
Epoch 7/100
24/24 [==============================] - 0s 4ms/step - loss: 0.9810 -
accuracy: 0.5078 - val_loss: 0.9578 - val_accuracy: 0.5000
Epoch 8/100
24/24 [==============================] - 0s 4ms/step - loss: 0.9650 -
accuracy: 0.5495 - val_loss: 0.9348 - val_accuracy: 0.5104
Epoch 9/100
24/24 [==============================] - 0s 4ms/step - loss: 0.9472 -
accuracy: 0.5365 - val_loss: 0.9119 - val_accuracy: 0.5208
Epoch 10/100
24/24 [==============================] - 0s 4ms/step - loss: 0.8715 -
accuracy: 0.5417 - val_loss: 0.8918 - val_accuracy: 0.5312
Epoch 11/100
24/24 [==============================] - 0s 4ms/step - loss: 0.8761 -
accuracy: 0.5677 - val_loss: 0.8735 - val_accuracy: 0.5625
Epoch 12/100
24/24 [==============================] - 0s 5ms/step - loss: 0.8741 -
accuracy: 0.5885 - val_loss: 0.8577 - val_accuracy: 0.5729
Epoch 13/100
24/24 [==============================] - 0s 4ms/step - loss: 0.8296 -
accuracy: 0.5990 - val_loss: 0.8427 - val_accuracy: 0.5729
Epoch 14/100
24/24 [==============================] - 0s 4ms/step - loss: 0.8066 -
accuracy: 0.6406 - val_loss: 0.8288 - val_accuracy: 0.5833
Epoch 15/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7821 -
accuracy: 0.6380 - val_loss: 0.8156 - val_accuracy: 0.5938
Epoch 16/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7787 -
accuracy: 0.6328 - val_loss: 0.8058 - val_accuracy: 0.5938
Epoch 17/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7838 -
accuracy: 0.6198 - val_loss: 0.7953 - val_accuracy: 0.6042
Epoch 18/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7455 -
accuracy: 0.6849 - val_loss: 0.7856 - val_accuracy: 0.6146
Epoch 19/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7321 -
accuracy: 0.6979 - val_loss: 0.7755 - val_accuracy: 0.6146
Epoch 20/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7288 -
accuracy: 0.6771 - val_loss: 0.7668 - val_accuracy: 0.6354
Epoch 21/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7147 -
accuracy: 0.6745 - val_loss: 0.7589 - val_accuracy: 0.6250
```

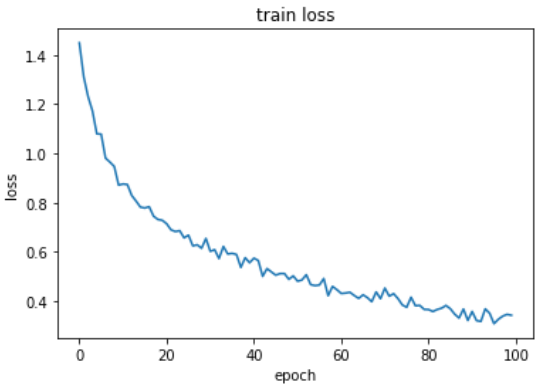
```
Epoch 22/100
24/24 [==============================] - 0s 5ms/step - loss: 0.6902 -
accuracy: 0.7083 - val_loss: 0.7539 - val_accuracy: 0.6250
Epoch 23/100
24/24 [==============================] - 0s 5ms/step - loss: 0.6832 -
accuracy: 0.7161 - val_loss: 0.7451 - val_accuracy: 0.6250
Epoch 24/100
24/24 [==============================] - 0s 5ms/step - loss: 0.6865 -
accuracy: 0.7266 - val_loss: 0.7389 - val_accuracy: 0.6354
Epoch 25/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6574 -
accuracy: 0.7344 - val_loss: 0.7337 - val_accuracy: 0.6354
Epoch 26/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6685 -
accuracy: 0.7344 - val_loss: 0.7255 - val_accuracy: 0.6354
Epoch 27/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6250 -
accuracy: 0.7812 - val_loss: 0.7195 - val_accuracy: 0.6458
Epoch 28/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6294 -
accuracy: 0.7552 - val_loss: 0.7143 - val_accuracy: 0.6458
Epoch 29/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6151 -
accuracy: 0.7500 - val_loss: 0.7107 - val_accuracy: 0.6562
Epoch 30/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6551 -
accuracy: 0.7318 - val_loss: 0.7070 - val_accuracy: 0.6667
Epoch 31/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6029 -
accuracy: 0.7448 - val_loss: 0.7029 - val_accuracy: 0.6667
Epoch 32/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6095 -
accuracy: 0.7552 - val_loss: 0.6959 - val_accuracy: 0.6771
Epoch 33/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5734 -
accuracy: 0.7891 - val_loss: 0.6926 - val_accuracy: 0.6875
Epoch 34/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6225 -
accuracy: 0.7370 - val_loss: 0.6871 - val_accuracy: 0.6875
Epoch 35/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5921 -
accuracy: 0.7682 - val_loss: 0.6831 - val_accuracy: 0.6979
Epoch 36/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5946 -
accuracy: 0.7839 - val_loss: 0.6807 - val_accuracy: 0.7083
Epoch 37/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5901 -
accuracy: 0.7370 - val_loss: 0.6747 - val_accuracy: 0.6979
Epoch 38/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5376 -
accuracy: 0.8203 - val_loss: 0.6707 - val_accuracy: 0.6875
Epoch 39/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5769 -
accuracy: 0.7786 - val_loss: 0.6675 - val_accuracy: 0.6979
Epoch 40/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5565 -
accuracy: 0.7891 - val_loss: 0.6639 - val_accuracy: 0.6979
Epoch 41/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5750 -
accuracy: 0.7708 - val_loss: 0.6614 - val_accuracy: 0.6979
Epoch 42/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5654 -
accuracy: 0.7812 - val_loss: 0.6592 - val_accuracy: 0.6979
Epoch 43/100
```

```
24/24 [==============================] - 0s 4ms/step - loss: 0.5013 -
accuracy: 0.8385 - val_loss: 0.6576 - val_accuracy: 0.6979
Epoch 44/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5328 -
accuracy: 0.8073 - val_loss: 0.6579 - val_accuracy: 0.6979
Epoch 45/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5192 -
accuracy: 0.8281 - val_loss: 0.6583 - val_accuracy: 0.6979
Epoch 46/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5061 -
accuracy: 0.8307 - val_loss: 0.6578 - val_accuracy: 0.6979
Epoch 47/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5127 -
accuracy: 0.8099 - val_loss: 0.6564 - val_accuracy: 0.6979
Epoch 48/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5125 -
accuracy: 0.8099 - val_loss: 0.6555 - val_accuracy: 0.6979
Epoch 49/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4890 -
accuracy: 0.8307 - val_loss: 0.6526 - val_accuracy: 0.7083
Epoch 50/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5032 -
accuracy: 0.8021 - val_loss: 0.6477 - val_accuracy: 0.6979
Epoch 51/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4815 -
accuracy: 0.8438 - val_loss: 0.6443 - val_accuracy: 0.6979
Epoch 52/100
24/24 [==============================] - 0s 5ms/step - loss: 0.4866 -
accuracy: 0.8021 - val_loss: 0.6425 - val_accuracy: 0.6979
Epoch 53/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5079 -
accuracy: 0.8125 - val_loss: 0.6413 - val_accuracy: 0.6979
Epoch 54/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4677 -
accuracy: 0.8359 - val_loss: 0.6408 - val_accuracy: 0.7083
Epoch 55/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4638 -
accuracy: 0.8385 - val_loss: 0.6393 - val_accuracy: 0.7083
Epoch 56/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4661 -
accuracy: 0.8333 - val_loss: 0.6363 - val_accuracy: 0.7083
Epoch 57/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4923 -
accuracy: 0.8203 - val_loss: 0.6348 - val_accuracy: 0.7083
Epoch 58/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4227 -
accuracy: 0.8646 - val_loss: 0.6356 - val_accuracy: 0.7188
Epoch 59/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4603 -
accuracy: 0.8542 - val_loss: 0.6349 - val_accuracy: 0.7396
Epoch 60/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4473 -
accuracy: 0.8229 - val_loss: 0.6345 - val_accuracy: 0.7292
Epoch 61/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4318 -
accuracy: 0.8594 - val_loss: 0.6319 - val_accuracy: 0.7292
Epoch 62/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4336 -
accuracy: 0.8516 - val_loss: 0.6307 - val_accuracy: 0.7188
Epoch 63/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4366 -
accuracy: 0.8464 - val_loss: 0.6283 - val_accuracy: 0.7188
Epoch 64/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4233 -
accuracy: 0.8542 - val_loss: 0.6291 - val_accuracy: 0.7292
```

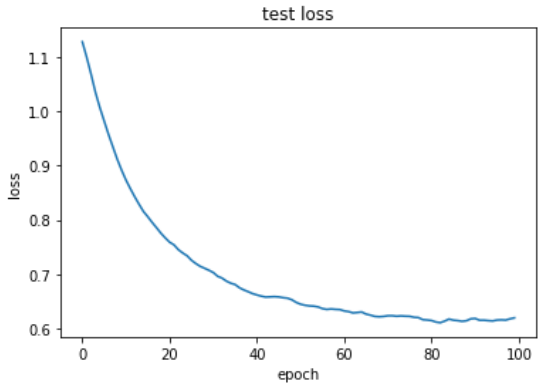
```
Epoch 65/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4119 -
accuracy: 0.8828 - val_loss: 0.6300 - val_accuracy: 0.7396
Epoch 66/100
24/24 [==============================] - 0s 5ms/step - loss: 0.4263 -
accuracy: 0.8620 - val_loss: 0.6261 - val_accuracy: 0.7292
Epoch 67/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4148 -
accuracy: 0.8646 - val_loss: 0.6242 - val_accuracy: 0.7396
Epoch 68/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3985 -
accuracy: 0.8906 - val_loss: 0.6219 - val_accuracy: 0.7396
Epoch 69/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4382 -
accuracy: 0.8411 - val_loss: 0.6213 - val_accuracy: 0.7396
Epoch 70/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4106 -
accuracy: 0.8646 - val_loss: 0.6218 - val_accuracy: 0.7188
Epoch 71/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4535 -
accuracy: 0.8490 - val_loss: 0.6231 - val_accuracy: 0.7188
Epoch 72/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4207 -
accuracy: 0.8620 - val_loss: 0.6231 - val_accuracy: 0.7292
Epoch 73/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4311 -
accuracy: 0.8620 - val_loss: 0.6222 - val_accuracy: 0.7292
Epoch 74/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4112 -
accuracy: 0.8646 - val_loss: 0.6228 - val_accuracy: 0.7292
Epoch 75/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3852 -
accuracy: 0.8750 - val_loss: 0.6223 - val_accuracy: 0.7396
Epoch 76/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3759 -
accuracy: 0.8880 - val_loss: 0.6220 - val_accuracy: 0.7292
Epoch 77/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4164 -
accuracy: 0.8698 - val_loss: 0.6202 - val_accuracy: 0.7396
Epoch 78/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3820 -
accuracy: 0.8594 - val_loss: 0.6197 - val_accuracy: 0.7500
Epoch 79/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3833 -
accuracy: 0.8776 - val_loss: 0.6158 - val_accuracy: 0.7604
Epoch 80/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3673 -
accuracy: 0.9010 - val_loss: 0.6152 - val_accuracy: 0.7604
Epoch 81/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3666 -
accuracy: 0.8880 - val_loss: 0.6142 - val_accuracy: 0.7500
Epoch 82/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3586 -
accuracy: 0.9036 - val_loss: 0.6115 - val_accuracy: 0.7604
Epoch 83/100
24/24 [==============================] - 0s 5ms/step - loss: 0.3668 -
accuracy: 0.8984 - val_loss: 0.6103 - val_accuracy: 0.7500
Epoch 84/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3722 -
accuracy: 0.8750 - val_loss: 0.6131 - val_accuracy: 0.7500
Epoch 85/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3831 -
accuracy: 0.8880 - val_loss: 0.6169 - val_accuracy: 0.7500
Epoch 86/100
```

```
24/24 [==============================] - 0s 3ms/step - loss: 0.3697 -
accuracy: 0.8854 - val_loss: 0.6149 - val_accuracy: 0.7604
Epoch 87/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3478 -
accuracy: 0.8802 - val_loss: 0.6141 - val_accuracy: 0.7604
Epoch 88/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3322 -
accuracy: 0.8906 - val_loss: 0.6128 - val_accuracy: 0.7500
Epoch 89/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3687 -
accuracy: 0.8646 - val_loss: 0.6138 - val_accuracy: 0.7708
Epoch 90/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3223 -
accuracy: 0.9115 - val_loss: 0.6174 - val_accuracy: 0.7708
Epoch 91/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3587 -
accuracy: 0.8984 - val_loss: 0.6180 - val_accuracy: 0.7708
Epoch 92/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3217 -
accuracy: 0.9036 - val_loss: 0.6148 - val_accuracy: 0.7604
Epoch 93/100
24/24 [==============================] - 0s 5ms/step - loss: 0.3185 -
accuracy: 0.9167 - val_loss: 0.6148 - val_accuracy: 0.7604
Epoch 94/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3694 -
accuracy: 0.8880 - val_loss: 0.6141 - val_accuracy: 0.7708
Epoch 95/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3515 -
accuracy: 0.8854 - val_loss: 0.6135 - val_accuracy: 0.7708
Epoch 96/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3092 -
accuracy: 0.9219 - val_loss: 0.6151 - val_accuracy: 0.7708
Epoch 97/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3270 -
accuracy: 0.9219 - val_loss: 0.6155 - val_accuracy: 0.7708
Epoch 98/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3398 -
accuracy: 0.9062 - val_loss: 0.6150 - val_accuracy: 0.7604
Epoch 99/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3470 -
accuracy: 0.9062 - val_loss: 0.6174 - val_accuracy: 0.7604
Epoch 100/100
24/24 [==============================] - 0s 4ms/step - loss:
 0.3433 - accuracy: 0.8880 - val_loss: 0.6192 - val_accuracy:
                                                    0.7708
```

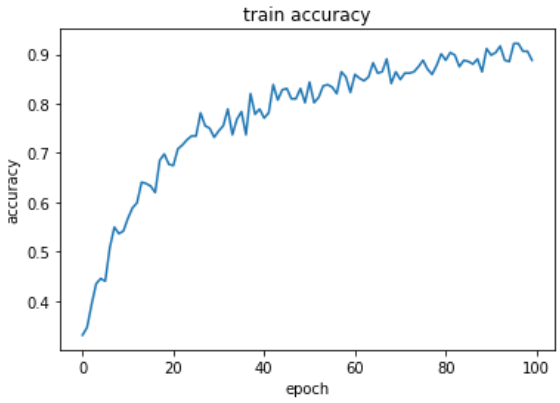
- **نمودار تغییر Loss مجموعه آموزش**



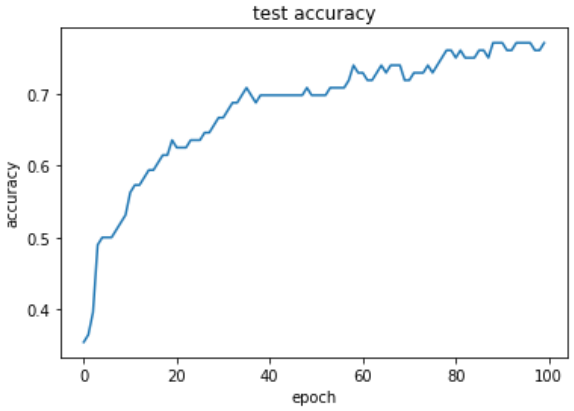
- **نمودار تغییر Loss مجموعه ارزیابی**



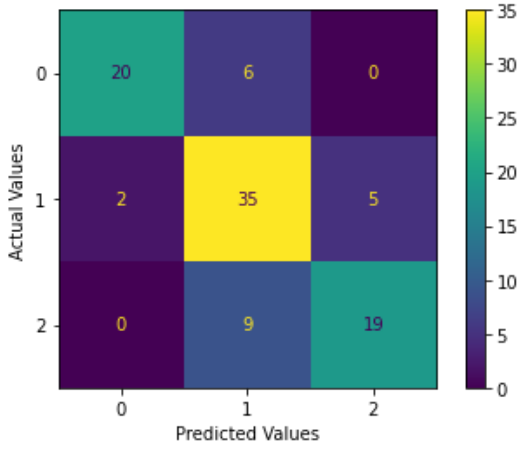
- **نمودار تغییر Accuracy مجموعه آموزش**

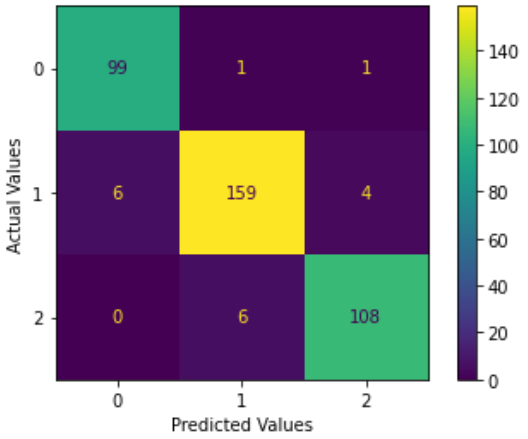


- **نمودار تغییر Accuracy مجموعه ارزیابی**



- **بررسی بیش برازش**
- **این مدل overfittingندارد.**
- **Confusion Matrix برای بهترین مدل (بر اساس بیشترین Accuracy)**





- **نتایج بهبود مدل و استفاده از تکنیک های مهندسی ویژگی (نمره مثبت)**

- من از تکنیک get dummies برای جدا کردن x و y استفاده کردم. و برای استفاده برای مدل ها با استفاده از tf.convert_to_tensor آن ها را تبدیل کردم.

- **توضیحات تکمیلی**

- در colabبرای هر مدل سه لایه همه ی activation functionها با استفاده از تک تک optimizerها تست شده است و اینجا بهترین مدل از هر کدام قرار داده شده است . در قسمت بالا فقط برای بهترین مدل قرار داده شده است.

- **اعلام سه مدل از بین مدل هایی که بیشترین دقت را داشته اند**
- سه مدل انتخابی سه لایه Reluبا SGD optimizer
- مدل دوم ۴ لایه Reluبا optimizer RMS
- مدل سوم ۵ لایه Reluبا optimizer SGD

- **نتایج اجرای k fold cross validation با k=5 روی این سه مدل**
- **مدل اول:**
  - **معیارهای ارزیابی**

```
Fold:1
Epoch 1/100
24/24 [==============================] - 0s 7ms/step - loss: 4.3674 - accuracy:
0.4271 - val_loss: 1.0641 - val_accuracy: 0.4792
Epoch 2/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9117 - accuracy:
0.4818 - val_loss: 1.0161 - val_accuracy: 0.4688
Epoch 3/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8871 - accuracy:
0.5026 - val_loss: 0.9678 - val_accuracy: 0.5417
Epoch 4/100
24/24 [==============================] - 0s 2ms/step - loss: 0.8800 - accuracy:
0.4922 - val_loss: 0.9406 - val_accuracy: 0.5312
Epoch 5/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8453 - accuracy:
0.5391 - val_loss: 0.9173 - val_accuracy: 0.5729
Epoch 6/100
24/24 [==============================] - 0s 2ms/step - loss: 0.8449 - accuracy:
0.5443 - val_loss: 0.9192 - val_accuracy: 0.5417
Epoch 7/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8306 - accuracy:
0.5443 - val_loss: 0.8877 - val_accuracy: 0.5938
Epoch 8/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8284 - accuracy:
0.5625 - val_loss: 0.8742 - val_accuracy: 0.5729
Epoch 9/100
24/24 [==============================] - 0s 2ms/step - loss: 0.8190 - accuracy:
0.5703 - val_loss: 0.8854 - val_accuracy: 0.5833
Epoch 10/100
24/24 [==============================] - 0s 4ms/step - loss: 0.8143 - accuracy:
0.5755 - val_loss: 0.8637 - val_accuracy: 0.6458
Epoch 11/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7999 - accuracy:
0.5964 - val_loss: 0.9160 - val_accuracy: 0.5938
Epoch 12/100
24/24 [==============================] - 0s 2ms/step - loss: 0.8061 - accuracy:
0.5651 - val_loss: 0.8886 - val_accuracy: 0.5833
Epoch 13/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7961 - accuracy:
0.5755 - val_loss: 0.9099 - val_accuracy: 0.6250
Epoch 14/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7824 - accuracy:
0.6198 - val_loss: 0.9252 - val_accuracy: 0.5833
Epoch 15/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7845 - accuracy:
0.5859 - val_loss: 0.8896 - val_accuracy: 0.5833
Epoch 16/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7823 - accuracy:
0.6016 - val_loss: 0.8925 - val_accuracy: 0.6354
Epoch 17/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7770 - accuracy:
0.6172 - val_loss: 0.9066 - val_accuracy: 0.6458
Epoch 18/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7671 - accuracy:
0.6120 - val_loss: 0.8951 - val_accuracy: 0.6458
Epoch 19/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7659 - accuracy:
0.6120 - val_loss: 0.8884 - val_accuracy: 0.6146
Epoch 20/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7509 - accuracy:
0.6380 - val_loss: 0.9229 - val_accuracy: 0.6042
Epoch 21/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7778 - accuracy:
0.5911 - val_loss: 0.9526 - val_accuracy: 0.5938
Epoch 22/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7536 - accuracy:
0.6224 - val_loss: 0.8710 - val_accuracy: 0.6562
Epoch 23/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7512 - accuracy:
0.6458 - val_loss: 0.8670 - val_accuracy: 0.6146
Epoch 24/100
```

```
24/24 [==============================] - 0s 3ms/step - loss: 0.7490 - accuracy:
0.6224 - val_loss: 1.0288 - val_accuracy: 0.6042
Epoch 25/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7633 - accuracy:
0.6094 - val_loss: 0.9010 - val_accuracy: 0.6562
Epoch 26/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7457 - accuracy:
0.6224 - val_loss: 0.9064 - val_accuracy: 0.6042
Epoch 27/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7423 - accuracy:
0.6380 - val_loss: 0.8663 - val_accuracy: 0.6354
Epoch 28/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7368 - accuracy:
0.6354 - val_loss: 0.9547 - val_accuracy: 0.6146
Epoch 29/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7281 - accuracy:
0.6641 - val_loss: 0.9007 - val_accuracy: 0.6458
Epoch 30/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7313 - accuracy:
0.6406 - val_loss: 0.9164 - val_accuracy: 0.6458
Epoch 31/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7533 - accuracy:
0.6198 - val_loss: 0.8510 - val_accuracy: 0.6875
Epoch 32/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7183 - accuracy:
0.6589 - val_loss: 0.9072 - val_accuracy: 0.6458
Epoch 33/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7242 - accuracy:
0.6641 - val_loss: 0.8864 - val_accuracy: 0.6354
Epoch 34/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7314 - accuracy:
0.6406 - val_loss: 0.9205 - val_accuracy: 0.6146
Epoch 35/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7177 - accuracy:
0.6198 - val_loss: 0.8369 - val_accuracy: 0.6979
Epoch 36/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7144 - accuracy:
0.6953 - val_loss: 0.8114 - val_accuracy: 0.6875
Epoch 37/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7209 - accuracy:
0.6589 - val_loss: 0.9520 - val_accuracy: 0.6354
Epoch 38/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7175 - accuracy:
0.6667 - val_loss: 0.8961 - val_accuracy: 0.6771
Epoch 39/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7088 - accuracy:
0.6641 - val_loss: 0.8289 - val_accuracy: 0.6979
Epoch 40/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6943 - accuracy:
0.6458 - val_loss: 0.8254 - val_accuracy: 0.6250
Epoch 41/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7055 - accuracy:
0.6536 - val_loss: 0.8397 - val_accuracy: 0.6562
Epoch 42/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6992 - accuracy:
0.6641 - val_loss: 0.8568 - val_accuracy: 0.6562
Epoch 43/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7037 - accuracy:
0.6510 - val_loss: 0.8212 - val_accuracy: 0.6562
Epoch 44/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7200 - accuracy:
0.6510 - val_loss: 0.8710 - val_accuracy: 0.6562
Epoch 45/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7259 - accuracy:
0.6641 - val_loss: 0.8075 - val_accuracy: 0.6875
Epoch 46/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6852 - accuracy:
0.6641 - val_loss: 0.8354 - val_accuracy: 0.6771
Epoch 47/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6812 - accuracy:
0.6719 - val_loss: 0.9130 - val_accuracy: 0.6354
Epoch 48/100
```

```
24/24 [==============================] - 0s 3ms/step - loss: 0.7008 - accuracy:
0.6875 - val_loss: 0.8498 - val_accuracy: 0.6250
Epoch 49/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6878 - accuracy:
0.6927 - val_loss: 0.9165 - val_accuracy: 0.6458
Epoch 50/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6765 - accuracy:
0.6719 - val_loss: 0.8512 - val_accuracy: 0.6354
Epoch 51/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6893 - accuracy:
0.6615 - val_loss: 0.8329 - val_accuracy: 0.6771
Epoch 52/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6928 - accuracy:
0.6771 - val_loss: 0.7963 - val_accuracy: 0.7188
Epoch 53/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6823 - accuracy:
0.6823 - val_loss: 0.8737 - val_accuracy: 0.6250
Epoch 54/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6986 - accuracy:
0.6406 - val_loss: 0.8724 - val_accuracy: 0.6354
Epoch 55/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6910 - accuracy:
0.6875 - val_loss: 0.8163 - val_accuracy: 0.6771
Epoch 56/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6904 - accuracy:
0.6562 - val_loss: 0.8651 - val_accuracy: 0.6250
Epoch 57/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6912 - accuracy:
0.6589 - val_loss: 0.8447 - val_accuracy: 0.6458
Epoch 58/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6653 - accuracy:
0.7005 - val_loss: 0.8907 - val_accuracy: 0.6250
Epoch 59/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6859 - accuracy:
0.6771 - val_loss: 0.9127 - val_accuracy: 0.6354
Epoch 60/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6763 - accuracy:
0.6849 - val_loss: 0.8706 - val_accuracy: 0.6146
Epoch 61/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6455 - accuracy:
0.7188 - val_loss: 0.8467 - val_accuracy: 0.6875
Epoch 62/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6896 - accuracy:
0.6797 - val_loss: 0.8629 - val_accuracy: 0.6667
Epoch 63/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6470 - accuracy:
0.6953 - val_loss: 0.8793 - val_accuracy: 0.6354
Epoch 64/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6664 - accuracy:
0.6979 - val_loss: 0.8356 - val_accuracy: 0.6458
Epoch 65/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6607 - accuracy:
0.6927 - val_loss: 0.8517 - val_accuracy: 0.6875
Epoch 66/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6629 - accuracy:
0.6927 - val_loss: 0.8279 - val_accuracy: 0.6875
Epoch 67/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6669 - accuracy:
0.6484 - val_loss: 0.8332 - val_accuracy: 0.6562
Epoch 68/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6517 - accuracy:
0.6719 - val_loss: 0.8247 - val_accuracy: 0.6354
Epoch 69/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6463 - accuracy:
0.6927 - val_loss: 0.8212 - val_accuracy: 0.7188
Epoch 70/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6733 - accuracy:
0.6771 - val_loss: 0.8466 - val_accuracy: 0.6667
Epoch 71/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6586 - accuracy:
0.6745 - val_loss: 0.9930 - val_accuracy: 0.5833
Epoch 72/100
```

```
24/24 [==============================] - 0s 3ms/step - loss: 0.6718 - accuracy:
0.6458 - val_loss: 0.7963 - val_accuracy: 0.6875
Epoch 73/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6583 - accuracy:
0.6927 - val_loss: 0.8413 - val_accuracy: 0.6667
Epoch 74/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6401 - accuracy:
0.7161 - val_loss: 0.8940 - val_accuracy: 0.6250
Epoch 75/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6303 - accuracy:
0.7083 - val_loss: 0.9481 - val_accuracy: 0.6250
Epoch 76/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6460 - accuracy:
0.6901 - val_loss: 1.0814 - val_accuracy: 0.5625
Epoch 77/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6482 - accuracy:
0.6901 - val_loss: 0.9017 - val_accuracy: 0.6146
Epoch 78/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6475 - accuracy:
0.7031 - val_loss: 0.8313 - val_accuracy: 0.6562
Epoch 79/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6574 - accuracy:
0.6693 - val_loss: 0.8695 - val_accuracy: 0.6458
Epoch 80/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6646 - accuracy:
0.6771 - val_loss: 0.8690 - val_accuracy: 0.6250
Epoch 81/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6587 - accuracy:
0.6745 - val_loss: 0.8913 - val_accuracy: 0.6146
Epoch 82/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6468 - accuracy:
0.6901 - val_loss: 0.8291 - val_accuracy: 0.6875
Epoch 83/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6306 - accuracy:
0.6797 - val_loss: 0.7451 - val_accuracy: 0.7083
Epoch 84/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6245 - accuracy:
0.7109 - val_loss: 0.8399 - val_accuracy: 0.6875
Epoch 85/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6056 - accuracy:
0.7318 - val_loss: 0.8141 - val_accuracy: 0.6979
Epoch 86/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6552 - accuracy:
0.6979 - val_loss: 0.8642 - val_accuracy: 0.6250
Epoch 87/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6706 - accuracy:
0.6823 - val_loss: 0.8304 - val_accuracy: 0.6562
Epoch 88/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6641 - accuracy:
0.6927 - val_loss: 0.8548 - val_accuracy: 0.6250
Epoch 89/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6119 - accuracy:
0.7266 - val_loss: 0.8498 - val_accuracy: 0.6354
Epoch 90/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6276 - accuracy:
0.7214 - val_loss: 0.8304 - val_accuracy: 0.6667
Epoch 91/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6313 - accuracy:
0.6771 - val_loss: 0.7842 - val_accuracy: 0.7188
Epoch 92/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6105 - accuracy:
0.7422 - val_loss: 0.8578 - val_accuracy: 0.6458
Epoch 93/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6254 - accuracy:
0.7214 - val_loss: 0.7584 - val_accuracy: 0.6979
Epoch 94/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6237 - accuracy:
0.7135 - val_loss: 0.8657 - val_accuracy: 0.6667
Epoch 95/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6125 - accuracy:
0.7031 - val_loss: 0.9622 - val_accuracy: 0.6042
Epoch 96/100
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24/24 [==============================] - 0s 3ms/step - loss: 0.6649 - accuracy:
0.6979 - val_loss: 0.8245 - val_accuracy: 0.6771
Epoch 97/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6553 - accuracy:
0.6901 - val_loss: 0.8012 - val_accuracy: 0.6250
Epoch 98/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6391 - accuracy:
0.6719 - val_loss: 0.7944 - val_accuracy: 0.6458
Epoch 99/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6212 - accuracy:
0.7109 - val_loss: 0.8337 - val_accuracy: 0.6354
Epoch 100/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6414 - accuracy:
0.6745 - val_loss: 0.8233 - val_accuracy: 0.6250
Fold:2
Epoch 1/100
24/24 [==============================] - 0s 8ms/step - loss: 2.7884 - accuracy:
0.4557 - val_loss: 1.1345 - val_accuracy: 0.4896
Epoch 2/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8970 - accuracy:
0.5234 - val_loss: 1.0553 - val_accuracy: 0.4792
Epoch 3/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8837 - accuracy:
0.5599 - val_loss: 1.0189 - val_accuracy: 0.4896
Epoch 4/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8585 - accuracy:
0.5391 - val_loss: 1.0033 - val_accuracy: 0.5104
Epoch 5/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8277 - accuracy:
0.5964 - val_loss: 0.9931 - val_accuracy: 0.5104
Epoch 6/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8222 - accuracy:
0.5938 - val_loss: 1.0075 - val_accuracy: 0.5208
Epoch 7/100
24/24 [==============================] - 0s 2ms/step - loss: 0.8247 - accuracy:
0.5807 - val_loss: 0.9744 - val_accuracy: 0.5208
Epoch 8/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7785 - accuracy:
0.6172 - val_loss: 0.9591 - val_accuracy: 0.5208
Epoch 9/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8010 - accuracy:
0.5990 - val_loss: 0.9896 - val_accuracy: 0.4792
Epoch 10/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7808 - accuracy:
0.6146 - val_loss: 0.9747 - val_accuracy: 0.5208
Epoch 11/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7699 - accuracy:
0.5911 - val_loss: 0.9851 - val_accuracy: 0.4792
Epoch 12/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7827 - accuracy:
0.6250 - val_loss: 0.9790 - val_accuracy: 0.5521
Epoch 13/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7569 - accuracy:
0.6328 - val_loss: 1.0005 - val_accuracy: 0.4479
Epoch 14/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7698 - accuracy:
0.6250 - val_loss: 1.0535 - val_accuracy: 0.4688
Epoch 15/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7502 - accuracy:
0.6302 - val_loss: 0.9994 - val_accuracy: 0.5000
Epoch 16/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7389 - accuracy:
0.6745 - val_loss: 1.0305 - val_accuracy: 0.4583
Epoch 17/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7462 - accuracy:
0.6276 - val_loss: 1.0242 - val_accuracy: 0.4479
Epoch 18/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7546 - accuracy:
0.6510 - val_loss: 0.9964 - val_accuracy: 0.5104
Epoch 19/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7663 - accuracy:
0.6250 - val_loss: 1.0067 - val_accuracy: 0.5000
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Epoch 20/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7209 - accuracy:
0.6589 - val_loss: 0.9741 - val_accuracy: 0.4792
Epoch 21/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7159 - accuracy:
0.6354 - val_loss: 0.9262 - val_accuracy: 0.5417
Epoch 22/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7236 - accuracy:
0.6432 - val_loss: 0.9663 - val_accuracy: 0.5312
Epoch 23/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7170 - accuracy:
0.6406 - val_loss: 1.0170 - val_accuracy: 0.5104
Epoch 24/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7110 - accuracy:
0.6536 - val_loss: 1.0277 - val_accuracy: 0.4896
Epoch 25/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6879 - accuracy:
0.6719 - val_loss: 1.0490 - val_accuracy: 0.4896
Epoch 26/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7067 - accuracy:
0.6615 - val_loss: 1.0151 - val_accuracy: 0.4479
Epoch 27/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7018 - accuracy:
0.6615 - val_loss: 0.9671 - val_accuracy: 0.5104
Epoch 28/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7071 - accuracy:
0.6536 - val_loss: 1.0663 - val_accuracy: 0.4896
Epoch 29/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7022 - accuracy:
0.6589 - val_loss: 0.9625 - val_accuracy: 0.5312
Epoch 30/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7080 - accuracy:
0.6667 - val_loss: 1.0305 - val_accuracy: 0.5104
Epoch 31/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7074 - accuracy:
0.6823 - val_loss: 0.9831 - val_accuracy: 0.5104
Epoch 32/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6679 - accuracy:
0.6979 - val_loss: 1.1319 - val_accuracy: 0.5312
Epoch 33/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6973 - accuracy:
0.6667 - val_loss: 0.9875 - val_accuracy: 0.5208
Epoch 34/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6881 - accuracy:
0.6719 - val_loss: 1.0516 - val_accuracy: 0.4896
Epoch 35/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6850 - accuracy:
0.6849 - val_loss: 0.9726 - val_accuracy: 0.5104
Epoch 36/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6782 - accuracy:
0.7005 - val_loss: 1.0519 - val_accuracy: 0.4688
Epoch 37/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6653 - accuracy:
0.7109 - val_loss: 0.9600 - val_accuracy: 0.5208
Epoch 38/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6807 - accuracy:
0.6589 - val_loss: 0.9495 - val_accuracy: 0.5417
Epoch 39/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6604 - accuracy:
0.6875 - val_loss: 0.9568 - val_accuracy: 0.5417
Epoch 40/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6656 - accuracy:
0.6927 - val_loss: 0.9627 - val_accuracy: 0.5312
Epoch 41/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6686 - accuracy:
0.7005 - val_loss: 1.0080 - val_accuracy: 0.5208
Epoch 42/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7009 - accuracy:
0.6823 - val_loss: 1.0148 - val_accuracy: 0.5000
Epoch 43/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6443 - accuracy:
0.7214 - val_loss: 0.9619 - val_accuracy: 0.5417
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Epoch 44/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6519 - accuracy:
0.6823 - val_loss: 1.0281 - val_accuracy: 0.5000
Epoch 45/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6610 - accuracy:
0.7135 - val_loss: 1.0255 - val_accuracy: 0.5312
Epoch 46/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6458 - accuracy:
0.6927 - val_loss: 0.9613 - val_accuracy: 0.5417
Epoch 47/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6372 - accuracy:
0.7031 - val_loss: 1.4719 - val_accuracy: 0.4271
Epoch 48/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6586 - accuracy:
0.7109 - val_loss: 0.9413 - val_accuracy: 0.5625
Epoch 49/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7013 - accuracy:
0.6510 - val_loss: 1.0150 - val_accuracy: 0.5625
Epoch 50/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6456 - accuracy:
0.6615 - val_loss: 0.9899 - val_accuracy: 0.5729
Epoch 51/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6606 - accuracy:
0.6927 - val_loss: 0.9748 - val_accuracy: 0.5833
Epoch 52/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6156 - accuracy:
0.7188 - val_loss: 1.0070 - val_accuracy: 0.5312
Epoch 53/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6438 - accuracy:
0.6693 - val_loss: 0.9846 - val_accuracy: 0.5104
Epoch 54/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6192 - accuracy:
0.7188 - val_loss: 0.9862 - val_accuracy: 0.5312
Epoch 55/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6370 - accuracy:
0.7031 - val_loss: 1.0378 - val_accuracy: 0.4896
Epoch 56/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6183 - accuracy:
0.7031 - val_loss: 1.0273 - val_accuracy: 0.5000
Epoch 57/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6197 - accuracy:
0.6797 - val_loss: 1.0287 - val_accuracy: 0.5625
Epoch 58/100
24/24 [==============================] - 0s 2ms/step - loss: 0.5998 - accuracy:
0.7240 - val_loss: 1.0304 - val_accuracy: 0.5417
Epoch 59/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5930 - accuracy:
0.7214 - val_loss: 0.9892 - val_accuracy: 0.6250
Epoch 60/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6281 - accuracy:
0.7005 - val_loss: 0.9631 - val_accuracy: 0.5625
Epoch 61/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6210 - accuracy:
0.6849 - val_loss: 0.9348 - val_accuracy: 0.5729
Epoch 62/100
24/24 [==============================] - 0s 2ms/step - loss: 0.5969 - accuracy:
0.7161 - val_loss: 1.1241 - val_accuracy: 0.5521
Epoch 63/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6258 - accuracy:
0.7318 - val_loss: 1.0906 - val_accuracy: 0.5000
Epoch 64/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6286 - accuracy:
0.7031 - val_loss: 0.9377 - val_accuracy: 0.5833
Epoch 65/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6405 - accuracy:
0.6901 - val_loss: 1.0093 - val_accuracy: 0.5521
Epoch 66/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5818 - accuracy:
0.7240 - val_loss: 1.0538 - val_accuracy: 0.5729
Epoch 67/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6257 - accuracy:
0.7005 - val_loss: 0.9650 - val_accuracy: 0.5833
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Epoch 68/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5683 - accuracy:
0.7474 - val_loss: 1.0978 - val_accuracy: 0.4792
Epoch 69/100
24/24 [==============================] - 0s 2ms/step - loss: 0.5749 - accuracy:
0.7344 - val_loss: 1.0263 - val_accuracy: 0.5312
Epoch 70/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5839 - accuracy:
0.7422 - val_loss: 0.9993 - val_accuracy: 0.5729
Epoch 71/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5822 - accuracy:
0.7292 - val_loss: 0.9973 - val_accuracy: 0.5833
Epoch 72/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6362 - accuracy:
0.7188 - val_loss: 1.0198 - val_accuracy: 0.5521
Epoch 73/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6020 - accuracy:
0.7344 - val_loss: 0.9938 - val_accuracy: 0.5833
Epoch 74/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5661 - accuracy:
0.7448 - val_loss: 1.0277 - val_accuracy: 0.5417
Epoch 75/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6646 - accuracy:
0.6901 - val_loss: 1.0748 - val_accuracy: 0.5729
Epoch 76/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5921 - accuracy:
0.7370 - val_loss: 0.9838 - val_accuracy: 0.5417
Epoch 77/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6067 - accuracy:
0.6953 - val_loss: 1.0163 - val_accuracy: 0.5521
Epoch 78/100
24/24 [==============================] - 0s 2ms/step - loss: 0.5647 - accuracy:
0.7292 - val_loss: 1.0655 - val_accuracy: 0.5625
Epoch 79/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5736 - accuracy:
0.7292 - val_loss: 1.0621 - val_accuracy: 0.5625
Epoch 80/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6002 - accuracy:
0.7344 - val_loss: 1.0826 - val_accuracy: 0.5729
Epoch 81/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5757 - accuracy:
0.7266 - val_loss: 1.0029 - val_accuracy: 0.5938
Epoch 82/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5477 - accuracy:
0.7474 - val_loss: 1.0577 - val_accuracy: 0.5417
Epoch 83/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6098 - accuracy:
0.6823 - val_loss: 1.1103 - val_accuracy: 0.5312
Epoch 84/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6337 - accuracy:
0.7057 - val_loss: 1.0327 - val_accuracy: 0.5625
Epoch 85/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5630 - accuracy:
0.7578 - val_loss: 1.0244 - val_accuracy: 0.5521
Epoch 86/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5933 - accuracy:
0.7188 - val_loss: 1.0127 - val_accuracy: 0.5521
Epoch 87/100
24/24 [==============================] - 0s 2ms/step - loss: 0.5529 - accuracy:
0.7422 - val_loss: 1.0182 - val_accuracy: 0.6146
Epoch 88/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5733 - accuracy:
0.7526 - val_loss: 1.0360 - val_accuracy: 0.5417
Epoch 89/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7389 - accuracy:
0.6667 - val_loss: 1.0034 - val_accuracy: 0.5625
Epoch 90/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6064 - accuracy:
0.7083 - val_loss: 1.0242 - val_accuracy: 0.5938
Epoch 91/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5648 - accuracy:
0.7526 - val_loss: 1.0238 - val_accuracy: 0.5417
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Epoch 92/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5347 - accuracy:
0.7500 - val_loss: 1.0216 - val_accuracy: 0.5104
Epoch 93/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5394 - accuracy:
0.7656 - val_loss: 1.0901 - val_accuracy: 0.5208
Epoch 94/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5576 - accuracy:
0.7318 - val_loss: 1.0984 - val_accuracy: 0.5208
Epoch 95/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5549 - accuracy:
0.7031 - val_loss: 1.0003 - val_accuracy: 0.5312
Epoch 96/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5278 - accuracy:
0.7682 - val_loss: 0.9890 - val_accuracy: 0.6042
Epoch 97/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6979 - accuracy:
0.6797 - val_loss: 0.9819 - val_accuracy: 0.5729
Epoch 98/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5486 - accuracy:
0.7734 - val_loss: 1.0005 - val_accuracy: 0.5625
Epoch 99/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5468 - accuracy:
0.7552 - val_loss: 1.0840 - val_accuracy: 0.5729
Epoch 100/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5812 - accuracy:
0.7214 - val_loss: 1.0483 - val_accuracy: 0.5625
Fold:3
Epoch 1/100
24/24 [==============================] - 0s 9ms/step - loss: 3.7383 - accuracy:
0.4453 - val_loss: 1.0122 - val_accuracy: 0.4167
Epoch 2/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9614 - accuracy:
0.4870 - val_loss: 0.9546 - val_accuracy: 0.3958
Epoch 3/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8809 - accuracy:
0.5547 - val_loss: 0.8907 - val_accuracy: 0.5312
Epoch 4/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8965 - accuracy:
0.5260 - val_loss: 0.9673 - val_accuracy: 0.5000
Epoch 5/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8459 - accuracy:
0.5807 - val_loss: 0.8995 - val_accuracy: 0.4375
Epoch 6/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8236 - accuracy:
0.5990 - val_loss: 0.9607 - val_accuracy: 0.5000
Epoch 7/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8400 - accuracy:
0.5833 - val_loss: 0.9644 - val_accuracy: 0.4375
Epoch 8/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8092 - accuracy:
0.5807 - val_loss: 0.9359 - val_accuracy: 0.5312
Epoch 9/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8046 - accuracy:
0.6172 - val_loss: 0.9507 - val_accuracy: 0.4375
Epoch 10/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8027 - accuracy:
0.6224 - val_loss: 0.8928 - val_accuracy: 0.5000
Epoch 11/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7764 - accuracy:
0.6406 - val_loss: 0.9114 - val_accuracy: 0.5000
Epoch 12/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7926 - accuracy:
0.6224 - val_loss: 0.9177 - val_accuracy: 0.5104
Epoch 13/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7773 - accuracy:
0.6276 - val_loss: 0.8567 - val_accuracy: 0.5833
Epoch 14/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7449 - accuracy:
0.6406 - val_loss: 0.8644 - val_accuracy: 0.5833
Epoch 15/100
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24/24 [==============================] - 0s 3ms/step - loss: 0.7492 - accuracy:
0.6510 - val_loss: 0.9027 - val_accuracy: 0.5000
Epoch 16/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7459 - accuracy:
0.6823 - val_loss: 0.8987 - val_accuracy: 0.5104
Epoch 17/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7378 - accuracy:
0.6589 - val_loss: 0.8923 - val_accuracy: 0.5208
Epoch 18/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7392 - accuracy:
0.6562 - val_loss: 0.9071 - val_accuracy: 0.5208
Epoch 19/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7339 - accuracy:
0.6484 - val_loss: 0.8778 - val_accuracy: 0.5312
Epoch 20/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7311 - accuracy:
0.6484 - val_loss: 0.8958 - val_accuracy: 0.5312
Epoch 21/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7369 - accuracy:
0.6510 - val_loss: 0.9004 - val_accuracy: 0.4896
Epoch 22/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7213 - accuracy:
0.6719 - val_loss: 0.9020 - val_accuracy: 0.5208
Epoch 23/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7195 - accuracy:
0.6615 - val_loss: 0.9198 - val_accuracy: 0.5104
Epoch 24/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7011 - accuracy:
0.6693 - val_loss: 0.8878 - val_accuracy: 0.5625
Epoch 25/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7301 - accuracy:
0.6380 - val_loss: 0.9730 - val_accuracy: 0.4688
Epoch 26/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6918 - accuracy:
0.6849 - val_loss: 0.9368 - val_accuracy: 0.5000
Epoch 27/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7059 - accuracy:
0.6667 - val_loss: 0.9135 - val_accuracy: 0.5625
Epoch 28/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6933 - accuracy:
0.6771 - val_loss: 0.9273 - val_accuracy: 0.5104
Epoch 29/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6757 - accuracy:
0.7005 - val_loss: 0.8792 - val_accuracy: 0.5729
Epoch 30/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6923 - accuracy:
0.6771 - val_loss: 0.9050 - val_accuracy: 0.5104
Epoch 31/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6962 - accuracy:
0.6745 - val_loss: 1.0364 - val_accuracy: 0.4271
Epoch 32/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7306 - accuracy:
0.6719 - val_loss: 0.8903 - val_accuracy: 0.5521
Epoch 33/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6874 - accuracy:
0.6927 - val_loss: 0.9269 - val_accuracy: 0.5208
Epoch 34/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6667 - accuracy:
0.6927 - val_loss: 0.9124 - val_accuracy: 0.5208
Epoch 35/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6544 - accuracy:
0.6849 - val_loss: 0.8919 - val_accuracy: 0.5521
Epoch 36/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6675 - accuracy:
0.7057 - val_loss: 0.9499 - val_accuracy: 0.4896
Epoch 37/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6729 - accuracy:
0.6823 - val_loss: 0.8998 - val_accuracy: 0.5521
Epoch 38/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6626 - accuracy:
0.7083 - val_loss: 0.9138 - val_accuracy: 0.5104
Epoch 39/100
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24/24 [==============================] - 0s 2ms/step - loss: 0.6600 - accuracy:
0.6823 - val_loss: 0.9578 - val_accuracy: 0.5104
Epoch 40/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6498 - accuracy:
0.6927 - val_loss: 0.9031 - val_accuracy: 0.6042
Epoch 41/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6605 - accuracy:
0.6849 - val_loss: 1.0219 - val_accuracy: 0.5000
Epoch 42/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6812 - accuracy:
0.6771 - val_loss: 0.9226 - val_accuracy: 0.5208
Epoch 43/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6653 - accuracy:
0.6745 - val_loss: 0.8963 - val_accuracy: 0.5208
Epoch 44/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6517 - accuracy:
0.7031 - val_loss: 0.9885 - val_accuracy: 0.5104
Epoch 45/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6619 - accuracy:
0.6745 - val_loss: 0.9990 - val_accuracy: 0.4792
Epoch 46/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6480 - accuracy:
0.7057 - val_loss: 1.0359 - val_accuracy: 0.4688
Epoch 47/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6594 - accuracy:
0.6693 - val_loss: 0.9524 - val_accuracy: 0.4792
Epoch 48/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6338 - accuracy:
0.7188 - val_loss: 0.8939 - val_accuracy: 0.5625
Epoch 49/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6615 - accuracy:
0.6797 - val_loss: 0.9488 - val_accuracy: 0.5312
Epoch 50/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6399 - accuracy:
0.6901 - val_loss: 0.8596 - val_accuracy: 0.6042
Epoch 51/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6742 - accuracy:
0.6849 - val_loss: 0.8587 - val_accuracy: 0.5833
Epoch 52/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6288 - accuracy:
0.6849 - val_loss: 0.8580 - val_accuracy: 0.6146
Epoch 53/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6461 - accuracy:
0.6875 - val_loss: 0.8998 - val_accuracy: 0.5521
Epoch 54/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6063 - accuracy:
0.7057 - val_loss: 0.9100 - val_accuracy: 0.5521
Epoch 55/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6739 - accuracy:
0.6797 - val_loss: 0.9699 - val_accuracy: 0.4896
Epoch 56/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6286 - accuracy:
0.7005 - val_loss: 0.9055 - val_accuracy: 0.4896
Epoch 57/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6204 - accuracy:
0.7031 - val_loss: 0.9174 - val_accuracy: 0.5417
Epoch 58/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6141 - accuracy:
0.7214 - val_loss: 1.0067 - val_accuracy: 0.4896
Epoch 59/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6139 - accuracy:
0.7135 - val_loss: 0.9446 - val_accuracy: 0.5833
Epoch 60/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6293 - accuracy:
0.6849 - val_loss: 0.9827 - val_accuracy: 0.5312
Epoch 61/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6050 - accuracy:
0.6901 - val_loss: 0.9862 - val_accuracy: 0.5938
Epoch 62/100
24/24 [==============================] - 0s 2ms/step - loss: 0.5852 - accuracy:
0.7318 - val_loss: 0.9669 - val_accuracy: 0.5417
Epoch 63/100
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24/24 [==============================] - 0s 3ms/step - loss: 0.6091 - accuracy:
0.7266 - val_loss: 1.3251 - val_accuracy: 0.4167
Epoch 64/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6485 - accuracy:
0.7005 - val_loss: 1.0109 - val_accuracy: 0.5521
Epoch 65/100
24/24 [==============================] - 0s 2ms/step - loss: 0.5939 - accuracy:
0.7109 - val_loss: 0.9216 - val_accuracy: 0.4896
Epoch 66/100
24/24 [==============================] - 0s 2ms/step - loss: 0.5882 - accuracy:
0.7318 - val_loss: 0.9995 - val_accuracy: 0.5312
Epoch 67/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6095 - accuracy:
0.6901 - val_loss: 0.9152 - val_accuracy: 0.5521
Epoch 68/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6008 - accuracy:
0.7422 - val_loss: 0.8651 - val_accuracy: 0.5938
Epoch 69/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6044 - accuracy:
0.7083 - val_loss: 1.0723 - val_accuracy: 0.5417
Epoch 70/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6395 - accuracy:
0.6875 - val_loss: 0.9092 - val_accuracy: 0.5833
Epoch 71/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6310 - accuracy:
0.7135 - val_loss: 0.9348 - val_accuracy: 0.4896
Epoch 72/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6090 - accuracy:
0.7188 - val_loss: 0.9975 - val_accuracy: 0.5417
Epoch 73/100
24/24 [==============================] - 0s 2ms/step - loss: 0.5902 - accuracy:
0.7135 - val_loss: 0.9572 - val_accuracy: 0.5729
Epoch 74/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5849 - accuracy:
0.7188 - val_loss: 0.9086 - val_accuracy: 0.5417
Epoch 75/100
24/24 [==============================] - 0s 2ms/step - loss: 0.5772 - accuracy:
0.7318 - val_loss: 0.9988 - val_accuracy: 0.5000
Epoch 76/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5900 - accuracy:
0.7240 - val_loss: 0.8986 - val_accuracy: 0.5833
Epoch 77/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5745 - accuracy:
0.7318 - val_loss: 0.9513 - val_accuracy: 0.4896
Epoch 78/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6362 - accuracy:
0.7083 - val_loss: 0.9664 - val_accuracy: 0.5729
Epoch 79/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6115 - accuracy:
0.7031 - val_loss: 0.9656 - val_accuracy: 0.5312
Epoch 80/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5864 - accuracy:
0.7109 - val_loss: 1.0248 - val_accuracy: 0.5417
Epoch 81/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5973 - accuracy:
0.7083 - val_loss: 0.9400 - val_accuracy: 0.5833
Epoch 82/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5482 - accuracy:
0.7552 - val_loss: 0.9983 - val_accuracy: 0.5208
Epoch 83/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6115 - accuracy:
0.7161 - val_loss: 0.9778 - val_accuracy: 0.5521
Epoch 84/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5660 - accuracy:
0.7292 - val_loss: 0.9958 - val_accuracy: 0.5625
Epoch 85/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5828 - accuracy:
0.7109 - val_loss: 0.9527 - val_accuracy: 0.5208
Epoch 86/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5958 - accuracy:
0.6979 - val_loss: 0.9837 - val_accuracy: 0.5208
Epoch 87/100
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24/24 [==============================] - 0s 3ms/step - loss: 0.5770 - accuracy:
0.7057 - val_loss: 0.9585 - val_accuracy: 0.5833
Epoch 88/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5682 - accuracy:
0.7188 - val_loss: 0.9203 - val_accuracy: 0.5521
Epoch 89/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5443 - accuracy:
0.7500 - val_loss: 1.0024 - val_accuracy: 0.4896
Epoch 90/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5871 - accuracy:
0.7161 - val_loss: 1.0240 - val_accuracy: 0.5625
Epoch 91/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5580 - accuracy:
0.7240 - val_loss: 0.9571 - val_accuracy: 0.5104
Epoch 92/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5562 - accuracy:
0.7396 - val_loss: 1.0501 - val_accuracy: 0.5625
Epoch 93/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5587 - accuracy:
0.7292 - val_loss: 0.9554 - val_accuracy: 0.5625
Epoch 94/100
24/24 [==============================] - 0s 2ms/step - loss: 0.5902 - accuracy:
0.7214 - val_loss: 0.9521 - val_accuracy: 0.5104
Epoch 95/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5288 - accuracy:
0.7448 - val_loss: 1.0048 - val_accuracy: 0.5521
Epoch 96/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5414 - accuracy:
0.7552 - val_loss: 0.9648 - val_accuracy: 0.5417
Epoch 97/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5503 - accuracy:
0.7526 - val_loss: 0.9068 - val_accuracy: 0.6042
Epoch 98/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5711 - accuracy:
0.7292 - val_loss: 1.0915 - val_accuracy: 0.5000
Epoch 99/100
24/24 [==============================] - 0s 2ms/step - loss: 0.5749 - accuracy:
0.7240 - val_loss: 0.9779 - val_accuracy: 0.5104
Epoch 100/100
24/24 [==============================] - 0s 2ms/step - loss: 0.5423 - accuracy:
0.7344 - val_loss: 0.9516 - val_accuracy: 0.5417
Fold:4
Epoch 1/100
24/24 [==============================] - 0s 7ms/step - loss: 2.5247 - accuracy:
0.3880 - val_loss: 0.9015 - val_accuracy: 0.4375
Epoch 2/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9352 - accuracy:
0.4922 - val_loss: 0.8802 - val_accuracy: 0.4792
Epoch 3/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8899 - accuracy:
0.5417 - val_loss: 0.9501 - val_accuracy: 0.4792
Epoch 4/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8911 - accuracy:
0.5286 - val_loss: 0.9544 - val_accuracy: 0.4062
Epoch 5/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8690 - accuracy:
0.5286 - val_loss: 0.9959 - val_accuracy: 0.4479
Epoch 6/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8844 - accuracy:
0.5469 - val_loss: 0.9247 - val_accuracy: 0.5104
Epoch 7/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8532 - accuracy:
0.5755 - val_loss: 0.9201 - val_accuracy: 0.5312
Epoch 8/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8521 - accuracy:
0.5469 - val_loss: 0.8895 - val_accuracy: 0.5208
Epoch 9/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8256 - accuracy:
0.5938 - val_loss: 0.9825 - val_accuracy: 0.4896
Epoch 10/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8139 - accuracy:
0.6120 - val_loss: 0.9004 - val_accuracy: 0.5938
```

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Epoch 11/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8699 - accuracy:
0.5729 - val_loss: 0.8439 - val_accuracy: 0.5000
Epoch 12/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8384 - accuracy:
0.5495 - val_loss: 0.8493 - val_accuracy: 0.5938
Epoch 13/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8110 - accuracy:
0.6146 - val_loss: 0.8549 - val_accuracy: 0.6042
Epoch 14/100
24/24 [==============================] - 0s 2ms/step - loss: 0.8006 - accuracy:
0.6094 - val_loss: 0.8390 - val_accuracy: 0.6354
Epoch 15/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8070 - accuracy:
0.6068 - val_loss: 0.8295 - val_accuracy: 0.5833
Epoch 16/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8099 - accuracy:
0.5859 - val_loss: 0.8596 - val_accuracy: 0.6250
Epoch 17/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8032 - accuracy:
0.6094 - val_loss: 0.8251 - val_accuracy: 0.6354
Epoch 18/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8007 - accuracy:
0.6094 - val_loss: 0.8448 - val_accuracy: 0.6875
Epoch 19/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7795 - accuracy:
0.6380 - val_loss: 0.8656 - val_accuracy: 0.6458
Epoch 20/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7837 - accuracy:
0.6120 - val_loss: 0.8405 - val_accuracy: 0.6771
Epoch 21/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7841 - accuracy:
0.6328 - val_loss: 0.8762 - val_accuracy: 0.6458
Epoch 22/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7729 - accuracy:
0.6328 - val_loss: 0.8560 - val_accuracy: 0.6875
Epoch 23/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7784 - accuracy:
0.5964 - val_loss: 0.8171 - val_accuracy: 0.6250
Epoch 24/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7741 - accuracy:
0.6146 - val_loss: 0.8259 - val_accuracy: 0.6354
Epoch 25/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7595 - accuracy:
0.6328 - val_loss: 0.8747 - val_accuracy: 0.6146
Epoch 26/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7524 - accuracy:
0.6406 - val_loss: 0.8473 - val_accuracy: 0.6979
Epoch 27/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7514 - accuracy:
0.6432 - val_loss: 0.8441 - val_accuracy: 0.5625
Epoch 28/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7365 - accuracy:
0.6641 - val_loss: 0.8424 - val_accuracy: 0.6771
Epoch 29/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7502 - accuracy:
0.6380 - val_loss: 0.8128 - val_accuracy: 0.7083
Epoch 30/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7502 - accuracy:
0.6458 - val_loss: 0.8335 - val_accuracy: 0.6875
Epoch 31/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7525 - accuracy:
0.6589 - val_loss: 0.8248 - val_accuracy: 0.6458
Epoch 32/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7584 - accuracy:
0.5990 - val_loss: 0.8285 - val_accuracy: 0.7083
Epoch 33/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7364 - accuracy:
0.6224 - val_loss: 0.8646 - val_accuracy: 0.6458
Epoch 34/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7379 - accuracy:
0.6510 - val_loss: 0.8359 - val_accuracy: 0.6458
```

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Epoch 35/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7350 - accuracy:
0.6589 - val_loss: 0.8521 - val_accuracy: 0.5625
Epoch 36/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7251 - accuracy:
0.6458 - val_loss: 0.8372 - val_accuracy: 0.6250
Epoch 37/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7183 - accuracy:
0.6667 - val_loss: 0.9006 - val_accuracy: 0.5729
Epoch 38/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7177 - accuracy:
0.6562 - val_loss: 0.8885 - val_accuracy: 0.5729
Epoch 39/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7112 - accuracy:
0.6536 - val_loss: 0.8265 - val_accuracy: 0.6667
Epoch 40/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7301 - accuracy:
0.6458 - val_loss: 0.8044 - val_accuracy: 0.6667
Epoch 41/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7156 - accuracy:
0.6510 - val_loss: 0.8635 - val_accuracy: 0.6354
Epoch 42/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7254 - accuracy:
0.6693 - val_loss: 0.8411 - val_accuracy: 0.6354
Epoch 43/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7132 - accuracy:
0.6562 - val_loss: 0.8185 - val_accuracy: 0.6875
Epoch 44/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6975 - accuracy:
0.6875 - val_loss: 0.9179 - val_accuracy: 0.6354
Epoch 45/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7091 - accuracy:
0.6536 - val_loss: 0.8104 - val_accuracy: 0.6771
Epoch 46/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7073 - accuracy:
0.6276 - val_loss: 0.8232 - val_accuracy: 0.6979
Epoch 47/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7127 - accuracy:
0.6432 - val_loss: 0.8389 - val_accuracy: 0.6562
Epoch 48/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6883 - accuracy:
0.6536 - val_loss: 0.9205 - val_accuracy: 0.6771
Epoch 49/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6888 - accuracy:
0.6432 - val_loss: 0.8173 - val_accuracy: 0.6146
Epoch 50/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7059 - accuracy:
0.6693 - val_loss: 0.8631 - val_accuracy: 0.5729
Epoch 51/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6836 - accuracy:
0.6719 - val_loss: 0.8417 - val_accuracy: 0.6250
Epoch 52/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6861 - accuracy:
0.6745 - val_loss: 0.8193 - val_accuracy: 0.6562
Epoch 53/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6861 - accuracy:
0.6536 - val_loss: 0.8428 - val_accuracy: 0.6250
Epoch 54/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7066 - accuracy:
0.6536 - val_loss: 0.9108 - val_accuracy: 0.5833
Epoch 55/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6817 - accuracy:
0.6849 - val_loss: 0.8971 - val_accuracy: 0.6562
Epoch 56/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6788 - accuracy:
0.6536 - val_loss: 0.9050 - val_accuracy: 0.6667
Epoch 57/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6691 - accuracy:
0.6745 - val_loss: 0.7957 - val_accuracy: 0.6562
Epoch 58/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6800 - accuracy:
0.6536 - val_loss: 0.8594 - val_accuracy: 0.6667
```

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Epoch 59/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6896 - accuracy:
0.6562 - val_loss: 0.9260 - val_accuracy: 0.6562
Epoch 60/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6742 - accuracy:
0.6797 - val_loss: 0.9361 - val_accuracy: 0.5833
Epoch 61/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6714 - accuracy:
0.6797 - val_loss: 0.8743 - val_accuracy: 0.6562
Epoch 62/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6666 - accuracy:
0.6823 - val_loss: 0.8333 - val_accuracy: 0.6354
Epoch 63/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6643 - accuracy:
0.6745 - val_loss: 0.8706 - val_accuracy: 0.6667
Epoch 64/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6516 - accuracy:
0.6927 - val_loss: 0.8349 - val_accuracy: 0.6250
Epoch 65/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6647 - accuracy:
0.6641 - val_loss: 0.8023 - val_accuracy: 0.6458
Epoch 66/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6403 - accuracy:
0.6875 - val_loss: 0.9707 - val_accuracy: 0.5208
Epoch 67/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6417 - accuracy:
0.6953 - val_loss: 0.9193 - val_accuracy: 0.5833
Epoch 68/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6522 - accuracy:
0.6849 - val_loss: 0.9268 - val_accuracy: 0.5938
Epoch 69/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6459 - accuracy:
0.7005 - val_loss: 0.8816 - val_accuracy: 0.6250
Epoch 70/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6528 - accuracy:
0.6823 - val_loss: 0.9232 - val_accuracy: 0.6562
Epoch 71/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6342 - accuracy:
0.7135 - val_loss: 0.8086 - val_accuracy: 0.6458
Epoch 72/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6467 - accuracy:
0.6719 - val_loss: 0.8597 - val_accuracy: 0.6042
Epoch 73/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6616 - accuracy:
0.6589 - val_loss: 0.8622 - val_accuracy: 0.5938
Epoch 74/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6353 - accuracy:
0.6901 - val_loss: 0.8642 - val_accuracy: 0.6458
Epoch 75/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6641 - accuracy:
0.6615 - val_loss: 0.8332 - val_accuracy: 0.6146
Epoch 76/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6260 - accuracy:
0.7057 - val_loss: 0.9530 - val_accuracy: 0.6354
Epoch 77/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6369 - accuracy:
0.7292 - val_loss: 0.8950 - val_accuracy: 0.6458
Epoch 78/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6671 - accuracy:
0.6849 - val_loss: 0.9674 - val_accuracy: 0.5833
Epoch 79/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6288 - accuracy:
0.6953 - val_loss: 0.9916 - val_accuracy: 0.5833
Epoch 80/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6247 - accuracy:
0.7292 - val_loss: 0.8691 - val_accuracy: 0.6354
Epoch 81/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6318 - accuracy:
0.7109 - val_loss: 0.8531 - val_accuracy: 0.6146
Epoch 82/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6369 - accuracy:
0.6745 - val_loss: 0.8628 - val_accuracy: 0.6354
```

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Epoch 83/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6493 - accuracy:
0.7057 - val_loss: 0.9508 - val_accuracy: 0.6354
Epoch 84/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6695 - accuracy:
0.6875 - val_loss: 1.0632 - val_accuracy: 0.5208
Epoch 85/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6246 - accuracy:
0.6823 - val_loss: 0.9527 - val_accuracy: 0.6042
Epoch 86/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6538 - accuracy:
0.6953 - val_loss: 0.9026 - val_accuracy: 0.6146
Epoch 87/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6177 - accuracy:
0.6823 - val_loss: 0.9515 - val_accuracy: 0.6979
Epoch 88/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6389 - accuracy:
0.6745 - val_loss: 1.0179 - val_accuracy: 0.6250
Epoch 89/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6036 - accuracy:
0.6953 - val_loss: 0.9017 - val_accuracy: 0.6042
Epoch 90/100
24/24 [==============================] - 0s 2ms/step - loss: 0.5985 - accuracy:
0.7214 - val_loss: 0.9336 - val_accuracy: 0.5312
Epoch 91/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6252 - accuracy:
0.7005 - val_loss: 0.9070 - val_accuracy: 0.6042
Epoch 92/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6209 - accuracy:
0.6901 - val_loss: 0.9076 - val_accuracy: 0.5729
Epoch 93/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6348 - accuracy:
0.7057 - val_loss: 0.8773 - val_accuracy: 0.5833
Epoch 94/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6263 - accuracy:
0.7109 - val_loss: 0.8704 - val_accuracy: 0.6354
Epoch 95/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6095 - accuracy:
0.7161 - val_loss: 1.2308 - val_accuracy: 0.5000
Epoch 96/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6178 - accuracy:
0.6979 - val_loss: 1.0509 - val_accuracy: 0.5833
Epoch 97/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6054 - accuracy:
0.7161 - val_loss: 0.8387 - val_accuracy: 0.6354
Epoch 98/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6140 - accuracy:
0.7057 - val_loss: 0.9698 - val_accuracy: 0.6146
Epoch 99/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6175 - accuracy:
0.6953 - val_loss: 0.9379 - val_accuracy: 0.6354
Epoch 100/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5980 - accuracy:
0.7422 - val_loss: 0.8903 - val_accuracy: 0.6667
Fold:5
Epoch 1/100
24/24 [==============================] - 0s 9ms/step - loss: 2.4057 - accuracy:
0.4583 - val_loss: 0.8696 - val_accuracy: 0.4792
Epoch 2/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9015 - accuracy:
0.5260 - val_loss: 0.8696 - val_accuracy: 0.4583
Epoch 3/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8717 - accuracy:
0.5469 - val_loss: 0.8604 - val_accuracy: 0.5000
Epoch 4/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8422 - accuracy:
0.5885 - val_loss: 0.8490 - val_accuracy: 0.5417
Epoch 5/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8596 - accuracy:
0.5417 - val_loss: 0.8542 - val_accuracy: 0.4479
Epoch 6/100
```

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24/24 [==============================] - 0s 3ms/step - loss: 0.8456 - accuracy:
0.5885 - val_loss: 0.8845 - val_accuracy: 0.4792
Epoch 7/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8217 - accuracy:
0.5964 - val_loss: 0.8490 - val_accuracy: 0.5208
Epoch 8/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8121 - accuracy:
0.6276 - val_loss: 0.9052 - val_accuracy: 0.5521
Epoch 9/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8404 - accuracy:
0.5469 - val_loss: 0.7980 - val_accuracy: 0.5417
Epoch 10/100
24/24 [==============================] - 0s 4ms/step - loss: 0.8011 - accuracy:
0.5964 - val_loss: 0.8574 - val_accuracy: 0.5417
Epoch 11/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7955 - accuracy:
0.5911 - val_loss: 0.8368 - val_accuracy: 0.5000
Epoch 12/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7939 - accuracy:
0.5938 - val_loss: 0.9122 - val_accuracy: 0.4479
Epoch 13/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7834 - accuracy:
0.6120 - val_loss: 0.8433 - val_accuracy: 0.5312
Epoch 14/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7865 - accuracy:
0.5938 - val_loss: 0.8066 - val_accuracy: 0.4792
Epoch 15/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7671 - accuracy:
0.6328 - val_loss: 0.8018 - val_accuracy: 0.5000
Epoch 16/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7822 - accuracy:
0.6380 - val_loss: 0.8598 - val_accuracy: 0.5417
Epoch 17/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7748 - accuracy:
0.6068 - val_loss: 0.7877 - val_accuracy: 0.5417
Epoch 18/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7827 - accuracy:
0.6120 - val_loss: 0.8154 - val_accuracy: 0.5417
Epoch 19/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7595 - accuracy:
0.6250 - val_loss: 0.8254 - val_accuracy: 0.5521
Epoch 20/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7386 - accuracy:
0.6536 - val_loss: 0.8106 - val_accuracy: 0.4792
Epoch 21/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7481 - accuracy:
0.6328 - val_loss: 0.8549 - val_accuracy: 0.5208
Epoch 22/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7410 - accuracy:
0.6589 - val_loss: 0.9208 - val_accuracy: 0.5208
Epoch 23/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7463 - accuracy:
0.6432 - val_loss: 0.8297 - val_accuracy: 0.5521
Epoch 24/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7342 - accuracy:
0.6536 - val_loss: 0.8154 - val_accuracy: 0.5417
Epoch 25/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7403 - accuracy:
0.6536 - val_loss: 1.0505 - val_accuracy: 0.4896
Epoch 26/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7465 - accuracy:
0.6406 - val_loss: 0.8895 - val_accuracy: 0.5417
Epoch 27/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7475 - accuracy:
0.6380 - val_loss: 0.8119 - val_accuracy: 0.5521
Epoch 28/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7448 - accuracy:
0.6510 - val_loss: 0.8334 - val_accuracy: 0.5729
Epoch 29/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7348 - accuracy:
0.6432 - val_loss: 0.8249 - val_accuracy: 0.5729
Epoch 30/100
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24/24 [==============================] - 0s 3ms/step - loss: 0.7594 - accuracy:
0.6302 - val_loss: 0.7935 - val_accuracy: 0.5729
Epoch 31/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7291 - accuracy:
0.6615 - val_loss: 0.8059 - val_accuracy: 0.5833
Epoch 32/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7117 - accuracy:
0.6875 - val_loss: 0.8240 - val_accuracy: 0.6042
Epoch 33/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7158 - accuracy:
0.6615 - val_loss: 0.8859 - val_accuracy: 0.5521
Epoch 34/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7233 - accuracy:
0.6458 - val_loss: 0.9133 - val_accuracy: 0.5625
Epoch 35/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7220 - accuracy:
0.6615 - val_loss: 0.8129 - val_accuracy: 0.5729
Epoch 36/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7067 - accuracy:
0.6432 - val_loss: 0.7765 - val_accuracy: 0.6042
Epoch 37/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7269 - accuracy:
0.6693 - val_loss: 0.9060 - val_accuracy: 0.5312
Epoch 38/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7301 - accuracy:
0.6406 - val_loss: 0.7699 - val_accuracy: 0.5417
Epoch 39/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7118 - accuracy:
0.6432 - val_loss: 0.7998 - val_accuracy: 0.5625
Epoch 40/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6853 - accuracy:
0.6979 - val_loss: 0.9193 - val_accuracy: 0.5729
Epoch 41/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7364 - accuracy:
0.6562 - val_loss: 0.8772 - val_accuracy: 0.5104
Epoch 42/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6966 - accuracy:
0.6797 - val_loss: 0.8021 - val_accuracy: 0.5625
Epoch 43/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7096 - accuracy:
0.6667 - val_loss: 0.8341 - val_accuracy: 0.5312
Epoch 44/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7505 - accuracy:
0.6380 - val_loss: 0.8820 - val_accuracy: 0.5833
Epoch 45/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6873 - accuracy:
0.6849 - val_loss: 0.8499 - val_accuracy: 0.5729
Epoch 46/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6784 - accuracy:
0.6901 - val_loss: 0.8015 - val_accuracy: 0.5833
Epoch 47/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6804 - accuracy:
0.6667 - val_loss: 0.8330 - val_accuracy: 0.5312
Epoch 48/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6554 - accuracy:
0.6979 - val_loss: 0.8402 - val_accuracy: 0.5417
Epoch 49/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6896 - accuracy:
0.6901 - val_loss: 0.9218 - val_accuracy: 0.5833
Epoch 50/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6729 - accuracy:
0.6901 - val_loss: 0.8294 - val_accuracy: 0.5417
Epoch 51/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6600 - accuracy:
0.7057 - val_loss: 0.8052 - val_accuracy: 0.5625
Epoch 52/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6514 - accuracy:
0.7005 - val_loss: 0.8802 - val_accuracy: 0.5521
Epoch 53/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6834 - accuracy:
0.6875 - val_loss: 0.8185 - val_accuracy: 0.5729
Epoch 54/100
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24/24 [==============================] - 0s 3ms/step - loss: 0.6540 - accuracy:
0.6979 - val_loss: 0.9398 - val_accuracy: 0.5521
Epoch 55/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6492 - accuracy:
0.6823 - val_loss: 0.9694 - val_accuracy: 0.5729
Epoch 56/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6590 - accuracy:
0.6719 - val_loss: 0.9554 - val_accuracy: 0.5625
Epoch 57/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6487 - accuracy:
0.6745 - val_loss: 0.8888 - val_accuracy: 0.5417
Epoch 58/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6377 - accuracy:
0.6979 - val_loss: 0.8628 - val_accuracy: 0.5312
Epoch 59/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6494 - accuracy:
0.6979 - val_loss: 0.8883 - val_accuracy: 0.5729
Epoch 60/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7182 - accuracy:
0.6641 - val_loss: 0.7823 - val_accuracy: 0.5938
Epoch 61/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6416 - accuracy:
0.7370 - val_loss: 0.8919 - val_accuracy: 0.5417
Epoch 62/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6381 - accuracy:
0.7135 - val_loss: 0.8026 - val_accuracy: 0.5625
Epoch 63/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6256 - accuracy:
0.7135 - val_loss: 1.0753 - val_accuracy: 0.5000
Epoch 64/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6665 - accuracy:
0.6797 - val_loss: 0.9935 - val_accuracy: 0.5000
Epoch 65/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6544 - accuracy:
0.6823 - val_loss: 0.7467 - val_accuracy: 0.5312
Epoch 66/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6845 - accuracy:
0.6693 - val_loss: 0.7530 - val_accuracy: 0.5417
Epoch 67/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6261 - accuracy:
0.6979 - val_loss: 0.7637 - val_accuracy: 0.5521
Epoch 68/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6623 - accuracy:
0.6875 - val_loss: 0.9959 - val_accuracy: 0.5208
Epoch 69/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6453 - accuracy:
0.7135 - val_loss: 0.7462 - val_accuracy: 0.5729
Epoch 70/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6473 - accuracy:
0.6953 - val_loss: 0.9059 - val_accuracy: 0.5729
Epoch 71/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6274 - accuracy:
0.7005 - val_loss: 0.8245 - val_accuracy: 0.5729
Epoch 72/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6428 - accuracy:
0.6875 - val_loss: 0.7972 - val_accuracy: 0.5625
Epoch 73/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6274 - accuracy:
0.7031 - val_loss: 1.3141 - val_accuracy: 0.5000
Epoch 74/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6618 - accuracy:
0.7005 - val_loss: 0.8907 - val_accuracy: 0.5625
Epoch 75/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6074 - accuracy:
0.7083 - val_loss: 0.8199 - val_accuracy: 0.5938
Epoch 76/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6056 - accuracy:
0.7240 - val_loss: 0.8015 - val_accuracy: 0.5417
Epoch 77/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6212 - accuracy:
0.7083 - val_loss: 0.8585 - val_accuracy: 0.5729
Epoch 78/100
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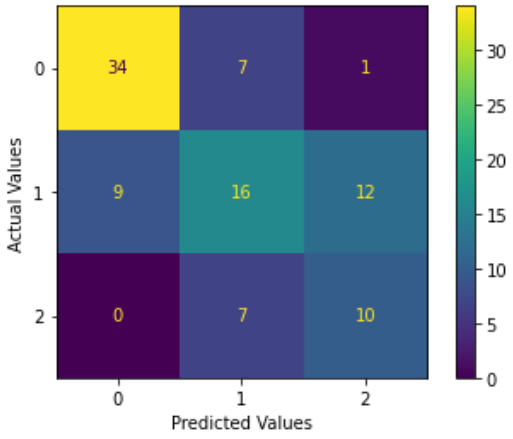
24/24 [==============================] - 0s 3ms/step - loss: 0.6294 - accuracy:
0.6875 - val_loss: 0.8332 - val_accuracy: 0.5833
Epoch 79/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5897 - accuracy:
0.7396 - val_loss: 0.8488 - val_accuracy: 0.5729
Epoch 80/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6359 - accuracy:
0.7161 - val_loss: 0.9120 - val_accuracy: 0.5521
Epoch 81/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5876 - accuracy:
0.7552 - val_loss: 0.9226 - val_accuracy: 0.5417
Epoch 82/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6058 - accuracy:
0.7552 - val_loss: 0.8074 - val_accuracy: 0.5521
Epoch 83/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5947 - accuracy:
0.7344 - val_loss: 0.8193 - val_accuracy: 0.6042
Epoch 84/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6428 - accuracy:
0.7031 - val_loss: 0.7788 - val_accuracy: 0.5000
Epoch 85/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5920 - accuracy:
0.7318 - val_loss: 0.7854 - val_accuracy: 0.6042
Epoch 86/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6076 - accuracy:
0.6979 - val_loss: 0.8627 - val_accuracy: 0.5729
Epoch 87/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5895 - accuracy:
0.7161 - val_loss: 0.7704 - val_accuracy: 0.5938
Epoch 88/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6183 - accuracy:
0.7135 - val_loss: 0.8048 - val_accuracy: 0.5521
Epoch 89/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5908 - accuracy:
0.7370 - val_loss: 0.8635 - val_accuracy: 0.5625
Epoch 90/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5866 - accuracy:
0.7161 - val_loss: 0.9957 - val_accuracy: 0.5625
Epoch 91/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6196 - accuracy:
0.7109 - val_loss: 0.7843 - val_accuracy: 0.5625
Epoch 92/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5746 - accuracy:
0.7474 - val_loss: 0.7638 - val_accuracy: 0.5833
Epoch 93/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5871 - accuracy:
0.7344 - val_loss: 0.7683 - val_accuracy: 0.5938
Epoch 94/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6094 - accuracy:
0.7135 - val_loss: 0.8506 - val_accuracy: 0.5625
Epoch 95/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6409 - accuracy:
0.7005 - val_loss: 0.8294 - val_accuracy: 0.6042
Epoch 96/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6059 - accuracy:
0.7240 - val_loss: 0.7974 - val_accuracy: 0.5729
Epoch 97/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6109 - accuracy:
0.7135 - val_loss: 1.0931 - val_accuracy: 0.5312
Epoch 98/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5664 - accuracy:
0.7396 - val_loss: 0.9824 - val_accuracy: 0.5625
Epoch 99/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5794 - accuracy:
0.7135 - val_loss: 0.7842 - val_accuracy: 0.5938
Epoch 100/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5894 - accuracy:
0.7292 - val_loss: 0.8652 - val_accuracy: 0.5729
------------------------------------------------------------------------
Score per fold
------------------------------------------------------------------------
> Fold 1 - Accuracy: 62.5%
```

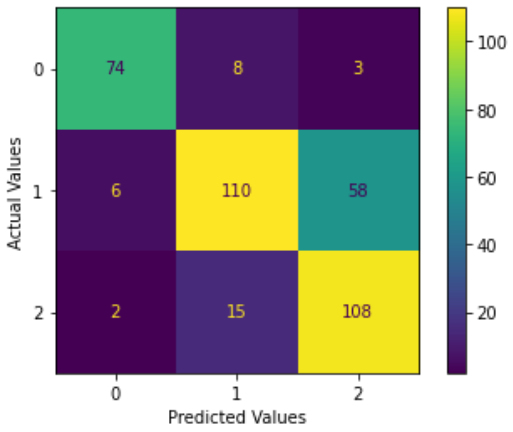
```
------------------------------------------------------------------------
> Fold 2 - Accuracy: 56.25%
------------------------------------------------------------------------
> Fold 3 - Accuracy: 54.166666666666664%
------------------------------------------------------------------------
> Fold 4 - Accuracy: 66.66666666666666%
------------------------------------------------------------------------
> Fold 5 - Accuracy: 57.291666666666664%
------------------------------------------------------------------------
```

Fold1:

```
Accuracy: 0.625000
precision: 0.58627120548253
recall; 0.610063845357963
F1_score: 0.5925373134328359
confusion_matrix test:
[[34  7  1]
 [ 9 16 12]
 [ 0  7 10]]
confusion_matrix train:
[[ 74   8   3]
 [  6 110  58]
 [  2  15 108]]
```

- **Confusion Matrix1**



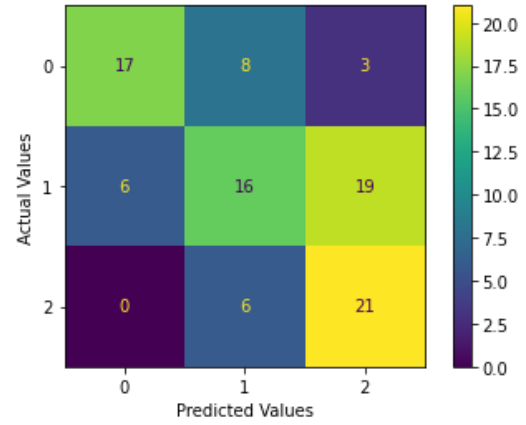


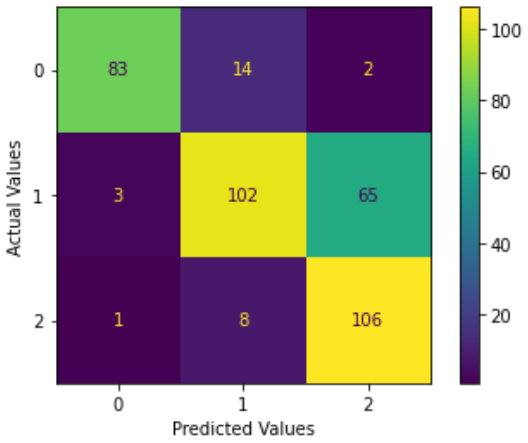
Fold2:

```
Accuracy: 0.562500
precision: 0.5869452870463993
recall; 0.5917215124532197
F1_score: 0.5724569640062598
confusion_matrix test:
[[17  8  3]
 [ 6 16 19]
```

```
 [ 0  6 21]]
confusion_matrix train:
[[ 83  14   2]
 [  3 102  65]
 [  1   8 106]]
```

- **Confusion Matrix2**

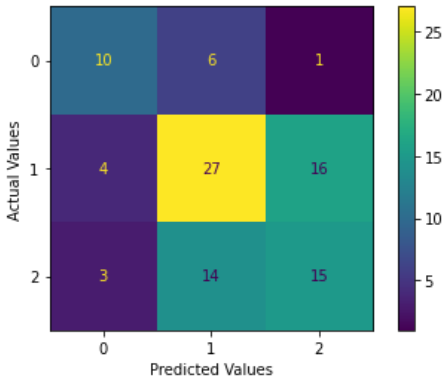


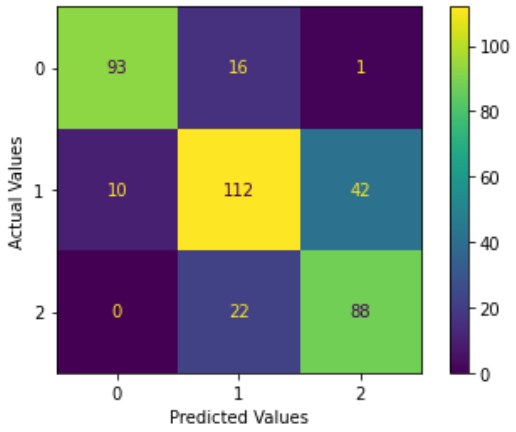
- 

Fold3:

```
Accuracy: 0.541667
precision: 0.5438177930746767
recall; 0.5438177930746767
F1_score: 0.5438177930746767
confusion_matrix test:
[[10  6  1]
 [ 4 27 16]
 [ 3 14 15]]
confusion_matrix train:
[[ 93  16   1]
 [ 10 112  42]
 [  0  22  88]]
```

- **Confusion Matrix3**

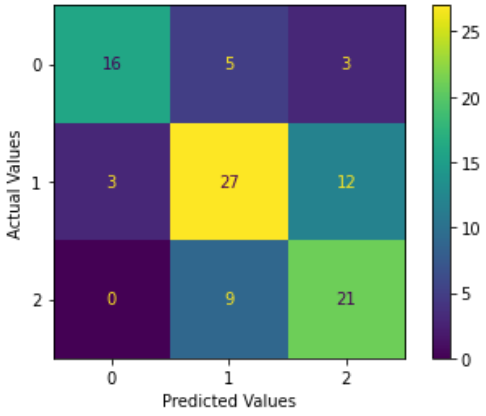


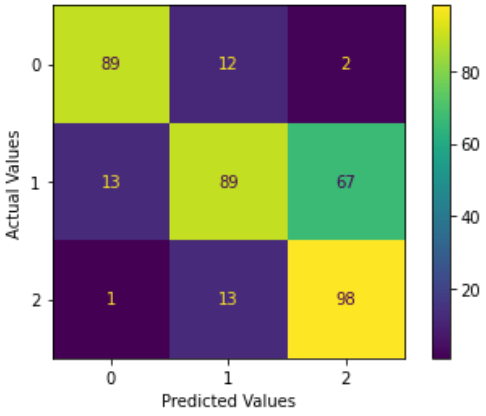


Fold4:

```
Accuracy: 0.666667
precision: 0.6946583939523606
recall; 0.6698412698412698
F1_score: 0.6770506975046061
confusion_matrix test:
[[16  5  3]
 [ 3 27 12]
 [ 0  9 21]]
confusion_matrix train:
[[89 12  2]
 [13 89 67]
 [ 1 13 98]]
```

- **Confusion Matrix4**



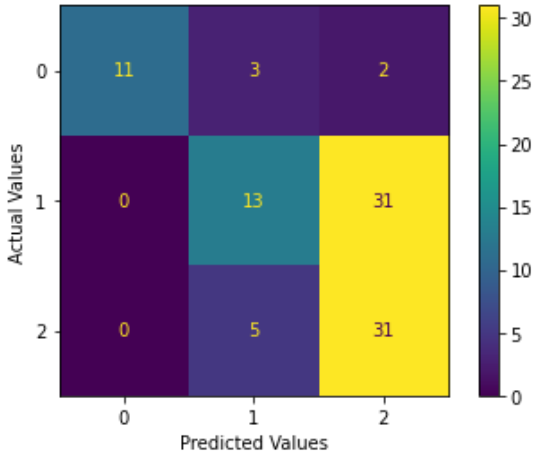


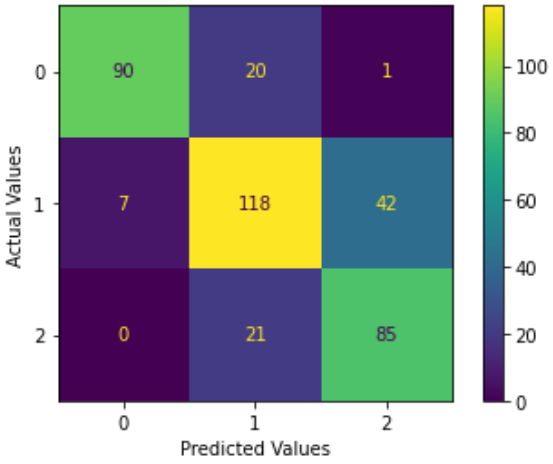
Fold5:

```
Accuracy: 0.572917
precision: 0.701140873015873
recall; 0.6146885521885522
```

```
F1_score: 0.611604938271605
confusion_matrix test:
[[11  3  2]
 [ 0 13 31]
 [ 0  5 31]]
confusion_matrix train:
[[ 90  20   1]
 [  7 118  42]
 [  0  21  85]]
```

- **Confusion Matrix5**





مدل دوم:

- **معیارهای ارزیابی**

```
Fold:1
Epoch 1/100
24/24 [==============================] - 1s 9ms/step - loss: 5.3006 - accuracy:
0.2552 - val_loss: 1.7534 - val_accuracy: 0.3958
Epoch 2/100
24/24 [==============================] - 0s 3ms/step - loss: 1.6866 - accuracy:
0.3646 - val_loss: 1.0889 - val_accuracy: 0.5104
Epoch 3/100
24/24 [==============================] - 0s 3ms/step - loss: 1.1237 - accuracy:
0.3411 - val_loss: 1.0538 - val_accuracy: 0.5521
Epoch 4/100
24/24 [==============================] - 0s 3ms/step - loss: 1.0233 - accuracy:
0.3932 - val_loss: 1.0240 - val_accuracy: 0.5938
Epoch 5/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9695 - accuracy:
0.4453 - val_loss: 0.9930 - val_accuracy: 0.5833
Epoch 6/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9332 - accuracy:
0.4661 - val_loss: 0.9750 - val_accuracy: 0.5938
Epoch 7/100
```

```
24/24 [==============================] - 0s 3ms/step - loss: 0.9132 - accuracy:
0.4453 - val_loss: 0.9670 - val_accuracy: 0.5729
Epoch 8/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8916 - accuracy:
0.5182 - val_loss: 0.9476 - val_accuracy: 0.5833
Epoch 9/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8720 - accuracy:
0.5234 - val_loss: 0.9395 - val_accuracy: 0.6042
Epoch 10/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8690 - accuracy:
0.5182 - val_loss: 0.9332 - val_accuracy: 0.6146
Epoch 11/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8512 - accuracy:
0.5026 - val_loss: 0.9634 - val_accuracy: 0.5521
Epoch 12/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8430 - accuracy:
0.5365 - val_loss: 0.9317 - val_accuracy: 0.6146
Epoch 13/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8423 - accuracy:
0.5547 - val_loss: 0.9051 - val_accuracy: 0.5938
Epoch 14/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8324 - accuracy:
0.5391 - val_loss: 0.9069 - val_accuracy: 0.6042
Epoch 15/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8157 - accuracy:
0.5625 - val_loss: 0.9198 - val_accuracy: 0.5729
Epoch 16/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8145 - accuracy:
0.5625 - val_loss: 0.9155 - val_accuracy: 0.5833
Epoch 17/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8075 - accuracy:
0.5807 - val_loss: 0.9071 - val_accuracy: 0.6042
Epoch 18/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8088 - accuracy:
0.5703 - val_loss: 0.8965 - val_accuracy: 0.6250
Epoch 19/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7942 - accuracy:
0.5807 - val_loss: 0.8954 - val_accuracy: 0.6250
Epoch 20/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7918 - accuracy:
0.5833 - val_loss: 0.8904 - val_accuracy: 0.6458
Epoch 21/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7785 - accuracy:
0.6172 - val_loss: 0.9002 - val_accuracy: 0.6042
Epoch 22/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7719 - accuracy:
0.6120 - val_loss: 0.8932 - val_accuracy: 0.6146
Epoch 23/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7648 - accuracy:
0.6172 - val_loss: 0.8909 - val_accuracy: 0.5938
Epoch 24/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7690 - accuracy:
0.5938 - val_loss: 0.8768 - val_accuracy: 0.6667
Epoch 25/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7708 - accuracy:
0.6146 - val_loss: 0.8790 - val_accuracy: 0.6250
Epoch 26/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7504 - accuracy:
0.6589 - val_loss: 0.8730 - val_accuracy: 0.6042
Epoch 27/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7490 - accuracy:
0.6562 - val_loss: 0.8654 - val_accuracy: 0.6667
Epoch 28/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7437 - accuracy:
0.6536 - val_loss: 0.8593 - val_accuracy: 0.6771
Epoch 29/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7394 - accuracy:
0.6536 - val_loss: 0.8538 - val_accuracy: 0.6771
Epoch 30/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7356 - accuracy:
0.6510 - val_loss: 0.8463 - val_accuracy: 0.6667
Epoch 31/100
```

```
24/24 [==============================] - 0s 3ms/step - loss: 0.7238 - accuracy:
0.6797 - val_loss: 0.8609 - val_accuracy: 0.6354
Epoch 32/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7168 - accuracy:
0.6797 - val_loss: 0.8614 - val_accuracy: 0.6458
Epoch 33/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7177 - accuracy:
0.6927 - val_loss: 0.8460 - val_accuracy: 0.6354
Epoch 34/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7096 - accuracy:
0.7057 - val_loss: 0.8430 - val_accuracy: 0.6354
Epoch 35/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7093 - accuracy:
0.6849 - val_loss: 0.8383 - val_accuracy: 0.6771
Epoch 36/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6976 - accuracy:
0.7031 - val_loss: 0.8326 - val_accuracy: 0.7083
Epoch 37/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6964 - accuracy:
0.7083 - val_loss: 0.8283 - val_accuracy: 0.6979
Epoch 38/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6865 - accuracy:
0.7031 - val_loss: 0.8374 - val_accuracy: 0.6771
Epoch 39/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6861 - accuracy:
0.6953 - val_loss: 0.8229 - val_accuracy: 0.6875
Epoch 40/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6733 - accuracy:
0.7135 - val_loss: 0.8330 - val_accuracy: 0.6979
Epoch 41/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6769 - accuracy:
0.7188 - val_loss: 0.8252 - val_accuracy: 0.6562
Epoch 42/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6697 - accuracy:
0.7240 - val_loss: 0.8164 - val_accuracy: 0.6979
Epoch 43/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6654 - accuracy:
0.7083 - val_loss: 0.8054 - val_accuracy: 0.7188
Epoch 44/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6537 - accuracy:
0.7292 - val_loss: 0.8081 - val_accuracy: 0.6771
Epoch 45/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6506 - accuracy:
0.7318 - val_loss: 0.8016 - val_accuracy: 0.7083
Epoch 46/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6441 - accuracy:
0.7396 - val_loss: 0.8043 - val_accuracy: 0.7083
Epoch 47/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6482 - accuracy:
0.7214 - val_loss: 0.7953 - val_accuracy: 0.6875
Epoch 48/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6457 - accuracy:
0.7292 - val_loss: 0.7914 - val_accuracy: 0.6875
Epoch 49/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6318 - accuracy:
0.7318 - val_loss: 0.8002 - val_accuracy: 0.6771
Epoch 50/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6295 - accuracy:
0.7135 - val_loss: 0.7655 - val_accuracy: 0.7188
Epoch 51/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6263 - accuracy:
0.7448 - val_loss: 0.7658 - val_accuracy: 0.7188
Epoch 52/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6217 - accuracy:
0.7552 - val_loss: 0.7712 - val_accuracy: 0.6979
Epoch 53/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6177 - accuracy:
0.7526 - val_loss: 0.7583 - val_accuracy: 0.6979
Epoch 54/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6102 - accuracy:
0.7656 - val_loss: 0.7657 - val_accuracy: 0.7188
Epoch 55/100
```

```
24/24 [==============================] - 0s 3ms/step - loss: 0.6060 - accuracy:
0.7760 - val_loss: 0.7545 - val_accuracy: 0.6979
Epoch 56/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6109 - accuracy:
0.7370 - val_loss: 0.7621 - val_accuracy: 0.6875
Epoch 57/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6008 - accuracy:
0.7526 - val_loss: 0.7478 - val_accuracy: 0.7083
Epoch 58/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6000 - accuracy:
0.7682 - val_loss: 0.7445 - val_accuracy: 0.7083
Epoch 59/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5927 - accuracy:
0.7682 - val_loss: 0.7403 - val_accuracy: 0.7188
Epoch 60/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5779 - accuracy:
0.7656 - val_loss: 0.7301 - val_accuracy: 0.7292
Epoch 61/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5843 - accuracy:
0.7630 - val_loss: 0.7520 - val_accuracy: 0.7083
Epoch 62/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5844 - accuracy:
0.7630 - val_loss: 0.7230 - val_accuracy: 0.7188
Epoch 63/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5728 - accuracy:
0.7760 - val_loss: 0.7183 - val_accuracy: 0.7500
Epoch 64/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5693 - accuracy:
0.7656 - val_loss: 0.7261 - val_accuracy: 0.6875
Epoch 65/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5696 - accuracy:
0.7708 - val_loss: 0.7165 - val_accuracy: 0.7396
Epoch 66/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5555 - accuracy:
0.7943 - val_loss: 0.7173 - val_accuracy: 0.7188
Epoch 67/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5565 - accuracy:
0.7839 - val_loss: 0.7083 - val_accuracy: 0.7396
Epoch 68/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5657 - accuracy:
0.7760 - val_loss: 0.7144 - val_accuracy: 0.7083
Epoch 69/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5456 - accuracy:
0.8073 - val_loss: 0.7081 - val_accuracy: 0.7396
Epoch 70/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5481 - accuracy:
0.7943 - val_loss: 0.7263 - val_accuracy: 0.6979
Epoch 71/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5463 - accuracy:
0.7682 - val_loss: 0.6913 - val_accuracy: 0.7396
Epoch 72/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5330 - accuracy:
0.7839 - val_loss: 0.6880 - val_accuracy: 0.7604
Epoch 73/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5365 - accuracy:
0.7943 - val_loss: 0.7066 - val_accuracy: 0.6979
Epoch 74/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5439 - accuracy:
0.7917 - val_loss: 0.6885 - val_accuracy: 0.7292
Epoch 75/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5275 - accuracy:
0.7995 - val_loss: 0.6906 - val_accuracy: 0.7292
Epoch 76/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5256 - accuracy:
0.8021 - val_loss: 0.6889 - val_accuracy: 0.7188
Epoch 77/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5256 - accuracy:
0.7969 - val_loss: 0.6835 - val_accuracy: 0.7292
Epoch 78/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5135 - accuracy:
0.7969 - val_loss: 0.6678 - val_accuracy: 0.7396
Epoch 79/100
```

```
24/24 [==============================] - 0s 3ms/step - loss: 0.5145 - accuracy:
0.8099 - val_loss: 0.6731 - val_accuracy: 0.7396
Epoch 80/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5089 - accuracy:
0.7969 - val_loss: 0.6733 - val_accuracy: 0.7292
Epoch 81/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5042 - accuracy:
0.8099 - val_loss: 0.6768 - val_accuracy: 0.7188
Epoch 82/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5082 - accuracy:
0.8047 - val_loss: 0.6594 - val_accuracy: 0.7500
Epoch 83/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5005 - accuracy:
0.8203 - val_loss: 0.6708 - val_accuracy: 0.7188
Epoch 84/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4967 - accuracy:
0.8125 - val_loss: 0.6632 - val_accuracy: 0.7188
Epoch 85/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4980 - accuracy:
0.8203 - val_loss: 0.6491 - val_accuracy: 0.7500
Epoch 86/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4888 - accuracy:
0.8177 - val_loss: 0.6569 - val_accuracy: 0.7188
Epoch 87/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4982 - accuracy:
0.8021 - val_loss: 0.6473 - val_accuracy: 0.7500
Epoch 88/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4853 - accuracy:
0.8151 - val_loss: 0.6612 - val_accuracy: 0.7500
Epoch 89/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4871 - accuracy:
0.8151 - val_loss: 0.6564 - val_accuracy: 0.7396
Epoch 90/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4812 - accuracy:
0.8359 - val_loss: 0.6400 - val_accuracy: 0.7396
Epoch 91/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4826 - accuracy:
0.8125 - val_loss: 0.6448 - val_accuracy: 0.7188
Epoch 92/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4679 - accuracy:
0.8411 - val_loss: 0.6346 - val_accuracy: 0.7500
Epoch 93/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4732 - accuracy:
0.8229 - val_loss: 0.6368 - val_accuracy: 0.7396
Epoch 94/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4622 - accuracy:
0.8411 - val_loss: 0.6450 - val_accuracy: 0.7292
Epoch 95/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4683 - accuracy:
0.8229 - val_loss: 0.6420 - val_accuracy: 0.7188
Epoch 96/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4653 - accuracy:
0.8359 - val_loss: 0.6435 - val_accuracy: 0.7604
Epoch 97/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4630 - accuracy:
0.8229 - val_loss: 0.6288 - val_accuracy: 0.7396
Epoch 98/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4638 - accuracy:
0.8203 - val_loss: 0.6215 - val_accuracy: 0.7500
Epoch 99/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4564 - accuracy:
0.8411 - val_loss: 0.6358 - val_accuracy: 0.7188
Epoch 100/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4556 - accuracy:
0.8359 - val_loss: 0.6425 - val_accuracy: 0.7500
Fold:2
Epoch 1/100
24/24 [==============================] - 1s 8ms/step - loss: 3.1668 - accuracy:
0.3594 - val_loss: 1.4188 - val_accuracy: 0.4479
Epoch 2/100
24/24 [==============================] - 0s 3ms/step - loss: 1.0943 - accuracy:
0.4948 - val_loss: 1.1326 - val_accuracy: 0.5104
```

```
Epoch 3/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9431 - accuracy:
0.5182 - val_loss: 1.0903 - val_accuracy: 0.4479
Epoch 4/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9170 - accuracy:
0.5182 - val_loss: 1.0656 - val_accuracy: 0.4688
Epoch 5/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8667 - accuracy:
0.5495 - val_loss: 1.0332 - val_accuracy: 0.4688
Epoch 6/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8601 - accuracy:
0.5703 - val_loss: 1.0084 - val_accuracy: 0.4896
Epoch 7/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8195 - accuracy:
0.5833 - val_loss: 0.9948 - val_accuracy: 0.5000
Epoch 8/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8157 - accuracy:
0.6276 - val_loss: 0.9731 - val_accuracy: 0.5104
Epoch 9/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8004 - accuracy:
0.6172 - val_loss: 0.9845 - val_accuracy: 0.5208
Epoch 10/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7822 - accuracy:
0.6198 - val_loss: 0.9657 - val_accuracy: 0.5417
Epoch 11/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7714 - accuracy:
0.6484 - val_loss: 0.9439 - val_accuracy: 0.5625
Epoch 12/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7561 - accuracy:
0.6615 - val_loss: 0.9624 - val_accuracy: 0.5521
Epoch 13/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7504 - accuracy:
0.6615 - val_loss: 0.9194 - val_accuracy: 0.5729
Epoch 14/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7333 - accuracy:
0.6849 - val_loss: 0.9245 - val_accuracy: 0.5521
Epoch 15/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7252 - accuracy:
0.6693 - val_loss: 0.9341 - val_accuracy: 0.5000
Epoch 16/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7188 - accuracy:
0.6745 - val_loss: 0.9189 - val_accuracy: 0.5417
Epoch 17/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7053 - accuracy:
0.6849 - val_loss: 0.9201 - val_accuracy: 0.5312
Epoch 18/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6996 - accuracy:
0.6771 - val_loss: 0.9324 - val_accuracy: 0.5000
Epoch 19/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6945 - accuracy:
0.7057 - val_loss: 0.9039 - val_accuracy: 0.5417
Epoch 20/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6677 - accuracy:
0.7135 - val_loss: 0.9389 - val_accuracy: 0.5729
Epoch 21/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6617 - accuracy:
0.7188 - val_loss: 0.9050 - val_accuracy: 0.5833
Epoch 22/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6584 - accuracy:
0.7214 - val_loss: 0.9405 - val_accuracy: 0.5208
Epoch 23/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6569 - accuracy:
0.7161 - val_loss: 0.9474 - val_accuracy: 0.5729
Epoch 24/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6326 - accuracy:
0.7474 - val_loss: 0.8796 - val_accuracy: 0.5000
Epoch 25/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6387 - accuracy:
0.7474 - val_loss: 0.8937 - val_accuracy: 0.5104
Epoch 26/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6312 - accuracy:
0.7474 - val_loss: 0.8815 - val_accuracy: 0.5938
```

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Epoch 27/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6211 - accuracy:
0.7500 - val_loss: 0.9009 - val_accuracy: 0.5208
Epoch 28/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6094 - accuracy:
0.7656 - val_loss: 0.8695 - val_accuracy: 0.5729
Epoch 29/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6114 - accuracy:
0.7448 - val_loss: 0.8624 - val_accuracy: 0.5833
Epoch 30/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5924 - accuracy:
0.7708 - val_loss: 0.8726 - val_accuracy: 0.5521
Epoch 31/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5975 - accuracy:
0.7552 - val_loss: 0.9001 - val_accuracy: 0.5000
Epoch 32/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5766 - accuracy:
0.7630 - val_loss: 0.8793 - val_accuracy: 0.6146
Epoch 33/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5818 - accuracy:
0.7786 - val_loss: 0.8505 - val_accuracy: 0.5625
Epoch 34/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5790 - accuracy:
0.7656 - val_loss: 0.8446 - val_accuracy: 0.5938
Epoch 35/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5724 - accuracy:
0.7812 - val_loss: 0.8621 - val_accuracy: 0.5521
Epoch 36/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5669 - accuracy:
0.7786 - val_loss: 0.8489 - val_accuracy: 0.5833
Epoch 37/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5618 - accuracy:
0.7760 - val_loss: 0.8470 - val_accuracy: 0.6250
Epoch 38/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5595 - accuracy:
0.7943 - val_loss: 0.8387 - val_accuracy: 0.5938
Epoch 39/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5464 - accuracy:
0.7734 - val_loss: 0.8657 - val_accuracy: 0.5417
Epoch 40/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5471 - accuracy:
0.7682 - val_loss: 0.8344 - val_accuracy: 0.5938
Epoch 41/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5387 - accuracy:
0.7943 - val_loss: 0.8341 - val_accuracy: 0.6146
Epoch 42/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5419 - accuracy:
0.8021 - val_loss: 0.8417 - val_accuracy: 0.5938
Epoch 43/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5266 - accuracy:
0.8021 - val_loss: 0.8418 - val_accuracy: 0.6042
Epoch 44/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5263 - accuracy:
0.8047 - val_loss: 0.8183 - val_accuracy: 0.6042
Epoch 45/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5181 - accuracy:
0.8047 - val_loss: 0.8747 - val_accuracy: 0.5729
Epoch 46/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5175 - accuracy:
0.7917 - val_loss: 0.8251 - val_accuracy: 0.6042
Epoch 47/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5081 - accuracy:
0.8125 - val_loss: 0.8330 - val_accuracy: 0.5938
Epoch 48/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5071 - accuracy:
0.8125 - val_loss: 0.8552 - val_accuracy: 0.5729
Epoch 49/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4976 - accuracy:
0.8099 - val_loss: 0.8291 - val_accuracy: 0.6250
Epoch 50/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4950 - accuracy:
0.7995 - val_loss: 0.8164 - val_accuracy: 0.6146
```

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Epoch 51/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4961 - accuracy:
0.8151 - val_loss: 0.8400 - val_accuracy: 0.6250
Epoch 52/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4958 - accuracy:
0.8203 - val_loss: 0.8217 - val_accuracy: 0.6146
Epoch 53/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4790 - accuracy:
0.8281 - val_loss: 0.8950 - val_accuracy: 0.5521
Epoch 54/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4938 - accuracy:
0.8073 - val_loss: 0.8190 - val_accuracy: 0.6354
Epoch 55/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4740 - accuracy:
0.8255 - val_loss: 0.8569 - val_accuracy: 0.5938
Epoch 56/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4855 - accuracy:
0.8047 - val_loss: 0.8132 - val_accuracy: 0.6354
Epoch 57/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4671 - accuracy:
0.8203 - val_loss: 0.8178 - val_accuracy: 0.6146
Epoch 58/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4680 - accuracy:
0.8281 - val_loss: 0.8364 - val_accuracy: 0.5938
Epoch 59/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4629 - accuracy:
0.8229 - val_loss: 0.8359 - val_accuracy: 0.5833
Epoch 60/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4613 - accuracy:
0.8177 - val_loss: 0.8291 - val_accuracy: 0.6562
Epoch 61/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4631 - accuracy:
0.8177 - val_loss: 0.8231 - val_accuracy: 0.6458
Epoch 62/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4585 - accuracy:
0.8203 - val_loss: 0.8261 - val_accuracy: 0.6146
Epoch 63/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4526 - accuracy:
0.8203 - val_loss: 0.8374 - val_accuracy: 0.6146
Epoch 64/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4511 - accuracy:
0.8385 - val_loss: 0.8236 - val_accuracy: 0.5833
Epoch 65/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4458 - accuracy:
0.8307 - val_loss: 0.8431 - val_accuracy: 0.6250
Epoch 66/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4352 - accuracy:
0.8281 - val_loss: 0.8237 - val_accuracy: 0.6042
Epoch 67/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4448 - accuracy:
0.8255 - val_loss: 0.8311 - val_accuracy: 0.6458
Epoch 68/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4206 - accuracy:
0.8568 - val_loss: 0.8235 - val_accuracy: 0.6562
Epoch 69/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4374 - accuracy:
0.8255 - val_loss: 0.8269 - val_accuracy: 0.6354
Epoch 70/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4298 - accuracy:
0.8411 - val_loss: 0.8574 - val_accuracy: 0.6042
Epoch 71/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4193 - accuracy:
0.8281 - val_loss: 0.8524 - val_accuracy: 0.5938
Epoch 72/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4211 - accuracy:
0.8438 - val_loss: 0.8111 - val_accuracy: 0.6667
Epoch 73/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4254 - accuracy:
0.8307 - val_loss: 0.8260 - val_accuracy: 0.6562
Epoch 74/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4143 - accuracy:
0.8594 - val_loss: 0.8350 - val_accuracy: 0.6354
```

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Epoch 75/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4135 - accuracy:
0.8490 - val_loss: 0.8473 - val_accuracy: 0.6250
Epoch 76/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4175 - accuracy:
0.8490 - val_loss: 0.8363 - val_accuracy: 0.6146
Epoch 77/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4103 - accuracy:
0.8516 - val_loss: 0.8276 - val_accuracy: 0.6458
Epoch 78/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4165 - accuracy:
0.8411 - val_loss: 0.8275 - val_accuracy: 0.6458
Epoch 79/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4074 - accuracy:
0.8516 - val_loss: 0.8339 - val_accuracy: 0.6458
Epoch 80/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4039 - accuracy:
0.8438 - val_loss: 0.8287 - val_accuracy: 0.6667
Epoch 81/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3995 - accuracy:
0.8490 - val_loss: 0.8385 - val_accuracy: 0.6250
Epoch 82/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3916 - accuracy:
0.8438 - val_loss: 0.8863 - val_accuracy: 0.6146
Epoch 83/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3953 - accuracy:
0.8724 - val_loss: 0.8369 - val_accuracy: 0.6354
Epoch 84/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3899 - accuracy:
0.8490 - val_loss: 0.8631 - val_accuracy: 0.6354
Epoch 85/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3927 - accuracy:
0.8438 - val_loss: 0.8957 - val_accuracy: 0.6042
Epoch 86/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3850 - accuracy:
0.8594 - val_loss: 0.8498 - val_accuracy: 0.6354
Epoch 87/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3903 - accuracy:
0.8542 - val_loss: 0.8516 - val_accuracy: 0.6667
Epoch 88/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3856 - accuracy:
0.8646 - val_loss: 0.8481 - val_accuracy: 0.6354
Epoch 89/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3765 - accuracy:
0.8750 - val_loss: 0.8471 - val_accuracy: 0.6354
Epoch 90/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3841 - accuracy:
0.8385 - val_loss: 0.8682 - val_accuracy: 0.6146
Epoch 91/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3709 - accuracy:
0.8750 - val_loss: 0.8780 - val_accuracy: 0.6146
Epoch 92/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3821 - accuracy:
0.8620 - val_loss: 0.8490 - val_accuracy: 0.6458
Epoch 93/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3703 - accuracy:
0.8776 - val_loss: 0.8867 - val_accuracy: 0.6146
Epoch 94/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3580 - accuracy:
0.8698 - val_loss: 0.9061 - val_accuracy: 0.5833
Epoch 95/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3701 - accuracy:
0.8568 - val_loss: 0.8806 - val_accuracy: 0.6042
Epoch 96/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3618 - accuracy:
0.8646 - val_loss: 0.8639 - val_accuracy: 0.6458
Epoch 97/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3600 - accuracy:
0.8594 - val_loss: 0.9448 - val_accuracy: 0.6042
Epoch 98/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3559 - accuracy:
0.8672 - val_loss: 0.8824 - val_accuracy: 0.6667
```

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Epoch 99/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3569 - accuracy:
0.8724 - val_loss: 0.8631 - val_accuracy: 0.6771
Epoch 100/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3524 - accuracy:
0.8724 - val_loss: 0.8719 - val_accuracy: 0.6458
Fold:3
Epoch 1/100
24/24 [==============================] - 1s 9ms/step - loss: 2.0852 - accuracy:
0.3255 - val_loss: 1.4599 - val_accuracy: 0.3958
Epoch 2/100
24/24 [==============================] - 0s 3ms/step - loss: 1.4434 - accuracy:
0.3750 - val_loss: 1.2117 - val_accuracy: 0.4062
Epoch 3/100
24/24 [==============================] - 0s 3ms/step - loss: 1.1366 - accuracy:
0.4375 - val_loss: 1.1034 - val_accuracy: 0.4375
Epoch 4/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9936 - accuracy:
0.4688 - val_loss: 1.0381 - val_accuracy: 0.4583
Epoch 5/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9213 - accuracy:
0.5417 - val_loss: 1.0158 - val_accuracy: 0.4271
Epoch 6/100
24/24 [==============================] - 0s 4ms/step - loss: 0.8824 - accuracy:
0.5495 - val_loss: 0.9998 - val_accuracy: 0.4375
Epoch 7/100
24/24 [==============================] - 0s 4ms/step - loss: 0.8587 - accuracy:
0.5651 - val_loss: 0.9794 - val_accuracy: 0.4896
Epoch 8/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8368 - accuracy:
0.5833 - val_loss: 0.9785 - val_accuracy: 0.5625
Epoch 9/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8225 - accuracy:
0.6042 - val_loss: 0.9658 - val_accuracy: 0.5208
Epoch 10/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8054 - accuracy:
0.6016 - val_loss: 0.9577 - val_accuracy: 0.4792
Epoch 11/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7976 - accuracy:
0.6198 - val_loss: 0.9507 - val_accuracy: 0.5000
Epoch 12/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7822 - accuracy:
0.6328 - val_loss: 0.9453 - val_accuracy: 0.4896
Epoch 13/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7689 - accuracy:
0.6224 - val_loss: 0.9347 - val_accuracy: 0.5312
Epoch 14/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7619 - accuracy:
0.6536 - val_loss: 0.9581 - val_accuracy: 0.5000
Epoch 15/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7472 - accuracy:
0.6589 - val_loss: 0.9310 - val_accuracy: 0.5208
Epoch 16/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7412 - accuracy:
0.6484 - val_loss: 0.9290 - val_accuracy: 0.5625
Epoch 17/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7288 - accuracy:
0.6797 - val_loss: 0.9337 - val_accuracy: 0.5625
Epoch 18/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7261 - accuracy:
0.6589 - val_loss: 0.9259 - val_accuracy: 0.5417
Epoch 19/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7133 - accuracy:
0.6745 - val_loss: 0.9322 - val_accuracy: 0.5104
Epoch 20/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7017 - accuracy:
0.6901 - val_loss: 0.9238 - val_accuracy: 0.5104
Epoch 21/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6962 - accuracy:
0.7005 - val_loss: 0.9268 - val_accuracy: 0.5417
Epoch 22/100
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24/24 [==============================] - 0s 3ms/step - loss: 0.6869 - accuracy:
0.7083 - val_loss: 0.9215 - val_accuracy: 0.5521
Epoch 23/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6788 - accuracy:
0.7135 - val_loss: 0.9338 - val_accuracy: 0.5104
Epoch 24/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6745 - accuracy:
0.7083 - val_loss: 0.9074 - val_accuracy: 0.5417
Epoch 25/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6696 - accuracy:
0.7109 - val_loss: 0.9162 - val_accuracy: 0.5312
Epoch 26/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6600 - accuracy:
0.7161 - val_loss: 0.9279 - val_accuracy: 0.5104
Epoch 27/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6575 - accuracy:
0.7292 - val_loss: 0.9181 - val_accuracy: 0.5208
Epoch 28/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6531 - accuracy:
0.7214 - val_loss: 0.9170 - val_accuracy: 0.5312
Epoch 29/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6378 - accuracy:
0.7344 - val_loss: 0.9206 - val_accuracy: 0.4896
Epoch 30/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6304 - accuracy:
0.7448 - val_loss: 0.9109 - val_accuracy: 0.5312
Epoch 31/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6330 - accuracy:
0.7214 - val_loss: 0.9219 - val_accuracy: 0.4896
Epoch 32/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6258 - accuracy:
0.7266 - val_loss: 0.8985 - val_accuracy: 0.5417
Epoch 33/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6167 - accuracy:
0.7422 - val_loss: 0.9092 - val_accuracy: 0.5000
Epoch 34/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6136 - accuracy:
0.7214 - val_loss: 0.9158 - val_accuracy: 0.5417
Epoch 35/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6105 - accuracy:
0.7370 - val_loss: 0.9258 - val_accuracy: 0.5208
Epoch 36/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6050 - accuracy:
0.7344 - val_loss: 0.9009 - val_accuracy: 0.5208
Epoch 37/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5929 - accuracy:
0.7474 - val_loss: 0.9158 - val_accuracy: 0.5312
Epoch 38/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5929 - accuracy:
0.7422 - val_loss: 0.8945 - val_accuracy: 0.5521
Epoch 39/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5848 - accuracy:
0.7396 - val_loss: 0.9165 - val_accuracy: 0.5729
Epoch 40/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5712 - accuracy:
0.7500 - val_loss: 0.8955 - val_accuracy: 0.5312
Epoch 41/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5715 - accuracy:
0.7656 - val_loss: 0.8856 - val_accuracy: 0.5417
Epoch 42/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5683 - accuracy:
0.7865 - val_loss: 0.8963 - val_accuracy: 0.5833
Epoch 43/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5659 - accuracy:
0.7630 - val_loss: 0.8847 - val_accuracy: 0.5625
Epoch 44/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5576 - accuracy:
0.7500 - val_loss: 0.8804 - val_accuracy: 0.5417
Epoch 45/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5542 - accuracy:
0.7630 - val_loss: 0.8691 - val_accuracy: 0.5625
Epoch 46/100
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24/24 [==============================] - 0s 3ms/step - loss: 0.5512 - accuracy:
0.7786 - val_loss: 0.8758 - val_accuracy: 0.5729
Epoch 47/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5434 - accuracy:
0.7734 - val_loss: 0.8737 - val_accuracy: 0.5729
Epoch 48/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5354 - accuracy:
0.7786 - val_loss: 0.8778 - val_accuracy: 0.5104
Epoch 49/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5318 - accuracy:
0.7865 - val_loss: 0.8697 - val_accuracy: 0.5833
Epoch 50/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5335 - accuracy:
0.7760 - val_loss: 0.8674 - val_accuracy: 0.5521
Epoch 51/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5280 - accuracy:
0.7734 - val_loss: 0.8611 - val_accuracy: 0.5521
Epoch 52/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5188 - accuracy:
0.7943 - val_loss: 0.8595 - val_accuracy: 0.5729
Epoch 53/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5169 - accuracy:
0.7734 - val_loss: 0.8543 - val_accuracy: 0.5729
Epoch 54/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5087 - accuracy:
0.7943 - val_loss: 0.8617 - val_accuracy: 0.5833
Epoch 55/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5114 - accuracy:
0.7708 - val_loss: 0.8752 - val_accuracy: 0.5729
Epoch 56/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5010 - accuracy:
0.7917 - val_loss: 0.8629 - val_accuracy: 0.5625
Epoch 57/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4986 - accuracy:
0.7760 - val_loss: 0.8569 - val_accuracy: 0.5312
Epoch 58/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4921 - accuracy:
0.7839 - val_loss: 0.8605 - val_accuracy: 0.5729
Epoch 59/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4824 - accuracy:
0.8021 - val_loss: 0.8720 - val_accuracy: 0.5833
Epoch 60/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4869 - accuracy:
0.7891 - val_loss: 0.8583 - val_accuracy: 0.5729
Epoch 61/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4770 - accuracy:
0.8073 - val_loss: 0.8654 - val_accuracy: 0.5729
Epoch 62/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4735 - accuracy:
0.7995 - val_loss: 0.8743 - val_accuracy: 0.5938
Epoch 63/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4740 - accuracy:
0.8047 - val_loss: 0.8711 - val_accuracy: 0.5729
Epoch 64/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4685 - accuracy:
0.8047 - val_loss: 0.8725 - val_accuracy: 0.5729
Epoch 65/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4619 - accuracy:
0.8151 - val_loss: 0.8585 - val_accuracy: 0.5833
Epoch 66/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4564 - accuracy:
0.8229 - val_loss: 0.8551 - val_accuracy: 0.5833
Epoch 67/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4550 - accuracy:
0.8229 - val_loss: 0.8531 - val_accuracy: 0.5625
Epoch 68/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4557 - accuracy:
0.8203 - val_loss: 0.8784 - val_accuracy: 0.5833
Epoch 69/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4524 - accuracy:
0.8203 - val_loss: 0.8653 - val_accuracy: 0.5729
Epoch 70/100
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24/24 [==============================] - 0s 3ms/step - loss: 0.4395 - accuracy:
0.8255 - val_loss: 0.8478 - val_accuracy: 0.5729
Epoch 71/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4413 - accuracy:
0.8333 - val_loss: 0.8530 - val_accuracy: 0.5833
Epoch 72/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4399 - accuracy:
0.8333 - val_loss: 0.8696 - val_accuracy: 0.5521
Epoch 73/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4242 - accuracy:
0.8516 - val_loss: 0.8901 - val_accuracy: 0.5833
Epoch 74/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4321 - accuracy:
0.8229 - val_loss: 0.8740 - val_accuracy: 0.5833
Epoch 75/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4266 - accuracy:
0.8438 - val_loss: 0.8499 - val_accuracy: 0.5833
Epoch 76/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4223 - accuracy:
0.8333 - val_loss: 0.8471 - val_accuracy: 0.5521
Epoch 77/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4216 - accuracy:
0.8203 - val_loss: 0.8698 - val_accuracy: 0.5625
Epoch 78/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4176 - accuracy:
0.8125 - val_loss: 0.8595 - val_accuracy: 0.5833
Epoch 79/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4144 - accuracy:
0.8333 - val_loss: 0.8586 - val_accuracy: 0.5938
Epoch 80/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4121 - accuracy:
0.8490 - val_loss: 0.8580 - val_accuracy: 0.5521
Epoch 81/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4120 - accuracy:
0.8438 - val_loss: 0.8656 - val_accuracy: 0.5938
Epoch 82/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4039 - accuracy:
0.8333 - val_loss: 0.8630 - val_accuracy: 0.5625
Epoch 83/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4036 - accuracy:
0.8411 - val_loss: 0.8729 - val_accuracy: 0.5521
Epoch 84/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4023 - accuracy:
0.8464 - val_loss: 0.8724 - val_accuracy: 0.5208
Epoch 85/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3977 - accuracy:
0.8464 - val_loss: 0.8461 - val_accuracy: 0.5729
Epoch 86/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3975 - accuracy:
0.8438 - val_loss: 0.8499 - val_accuracy: 0.5521
Epoch 87/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3874 - accuracy:
0.8490 - val_loss: 0.8530 - val_accuracy: 0.6146
Epoch 88/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3875 - accuracy:
0.8438 - val_loss: 0.8694 - val_accuracy: 0.5729
Epoch 89/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3830 - accuracy:
0.8568 - val_loss: 0.8341 - val_accuracy: 0.5729
Epoch 90/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3791 - accuracy:
0.8724 - val_loss: 0.8390 - val_accuracy: 0.5938
Epoch 91/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3805 - accuracy:
0.8516 - val_loss: 0.8444 - val_accuracy: 0.5833
Epoch 92/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3719 - accuracy:
0.8724 - val_loss: 0.8219 - val_accuracy: 0.5625
Epoch 93/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3731 - accuracy:
0.8646 - val_loss: 0.9041 - val_accuracy: 0.5938
Epoch 94/100
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24/24 [==============================] - 0s 3ms/step - loss: 0.3715 - accuracy:
0.8698 - val_loss: 0.8600 - val_accuracy: 0.6146
Epoch 95/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3701 - accuracy:
0.8568 - val_loss: 0.8436 - val_accuracy: 0.6458
Epoch 96/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3650 - accuracy:
0.8698 - val_loss: 0.8513 - val_accuracy: 0.6146
Epoch 97/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3573 - accuracy:
0.8828 - val_loss: 0.8439 - val_accuracy: 0.6042
Epoch 98/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3549 - accuracy:
0.8724 - val_loss: 0.8767 - val_accuracy: 0.6146
Epoch 99/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3583 - accuracy:
0.8802 - val_loss: 0.8729 - val_accuracy: 0.6250
Epoch 100/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3505 - accuracy:
0.8802 - val_loss: 0.9059 - val_accuracy: 0.6146
Fold:4
Epoch 1/100
24/24 [==============================] - 1s 9ms/step - loss: 2.0940 - accuracy:
0.3646 - val_loss: 1.5056 - val_accuracy: 0.4479
Epoch 2/100
24/24 [==============================] - 0s 4ms/step - loss: 1.1884 - accuracy:
0.4844 - val_loss: 1.1821 - val_accuracy: 0.5104
Epoch 3/100
24/24 [==============================] - 0s 4ms/step - loss: 0.9859 - accuracy:
0.5052 - val_loss: 1.0434 - val_accuracy: 0.5104
Epoch 4/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9199 - accuracy:
0.5417 - val_loss: 0.9716 - val_accuracy: 0.4896
Epoch 5/100
24/24 [==============================] - 0s 4ms/step - loss: 0.8754 - accuracy:
0.5833 - val_loss: 0.9254 - val_accuracy: 0.4896
Epoch 6/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8560 - accuracy:
0.5703 - val_loss: 0.9108 - val_accuracy: 0.5104
Epoch 7/100
24/24 [==============================] - 0s 4ms/step - loss: 0.8348 - accuracy:
0.5885 - val_loss: 0.8979 - val_accuracy: 0.5000
Epoch 8/100
24/24 [==============================] - 0s 4ms/step - loss: 0.8124 - accuracy:
0.6068 - val_loss: 0.8960 - val_accuracy: 0.5312
Epoch 9/100
24/24 [==============================] - 0s 4ms/step - loss: 0.8065 - accuracy:
0.6250 - val_loss: 0.8991 - val_accuracy: 0.5000
Epoch 10/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7865 - accuracy:
0.6484 - val_loss: 0.8697 - val_accuracy: 0.5208
Epoch 11/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7745 - accuracy:
0.6536 - val_loss: 0.8869 - val_accuracy: 0.5417
Epoch 12/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7668 - accuracy:
0.6641 - val_loss: 0.8681 - val_accuracy: 0.5104
Epoch 13/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7547 - accuracy:
0.6901 - val_loss: 0.8890 - val_accuracy: 0.5521
Epoch 14/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7592 - accuracy:
0.6693 - val_loss: 0.8658 - val_accuracy: 0.5625
Epoch 15/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7410 - accuracy:
0.6823 - val_loss: 0.8684 - val_accuracy: 0.5833
Epoch 16/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7312 - accuracy:
0.6979 - val_loss: 0.8597 - val_accuracy: 0.5312
Epoch 17/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7293 - accuracy:
0.6849 - val_loss: 0.8503 - val_accuracy: 0.5625
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Epoch 18/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7148 - accuracy:
0.7005 - val_loss: 0.8503 - val_accuracy: 0.5833
Epoch 19/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7114 - accuracy:
0.7083 - val_loss: 0.8513 - val_accuracy: 0.5625
Epoch 20/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7015 - accuracy:
0.7083 - val_loss: 0.8451 - val_accuracy: 0.5938
Epoch 21/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6973 - accuracy:
0.7214 - val_loss: 0.8380 - val_accuracy: 0.5729
Epoch 22/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6905 - accuracy:
0.7240 - val_loss: 0.8392 - val_accuracy: 0.5417
Epoch 23/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6867 - accuracy:
0.7135 - val_loss: 0.8480 - val_accuracy: 0.5938
Epoch 24/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6804 - accuracy:
0.7344 - val_loss: 0.8311 - val_accuracy: 0.5938
Epoch 25/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6719 - accuracy:
0.7057 - val_loss: 0.8308 - val_accuracy: 0.5938
Epoch 26/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6664 - accuracy:
0.7448 - val_loss: 0.8292 - val_accuracy: 0.6042
Epoch 27/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6674 - accuracy:
0.7240 - val_loss: 0.8253 - val_accuracy: 0.5938
Epoch 28/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6505 - accuracy:
0.7448 - val_loss: 0.8347 - val_accuracy: 0.6250
Epoch 29/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6436 - accuracy:
0.7318 - val_loss: 0.8221 - val_accuracy: 0.6042
Epoch 30/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6438 - accuracy:
0.7370 - val_loss: 0.8276 - val_accuracy: 0.6042
Epoch 31/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6347 - accuracy:
0.7500 - val_loss: 0.8148 - val_accuracy: 0.6146
Epoch 32/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6339 - accuracy:
0.7552 - val_loss: 0.8054 - val_accuracy: 0.6042
Epoch 33/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6305 - accuracy:
0.7448 - val_loss: 0.8169 - val_accuracy: 0.6250
Epoch 34/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6196 - accuracy:
0.7422 - val_loss: 0.8075 - val_accuracy: 0.6042
Epoch 35/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6112 - accuracy:
0.7734 - val_loss: 0.8068 - val_accuracy: 0.6042
Epoch 36/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6088 - accuracy:
0.7734 - val_loss: 0.7997 - val_accuracy: 0.6042
Epoch 37/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6052 - accuracy:
0.7448 - val_loss: 0.7989 - val_accuracy: 0.5938
Epoch 38/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6020 - accuracy:
0.7578 - val_loss: 0.7886 - val_accuracy: 0.6250
Epoch 39/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5946 - accuracy:
0.7578 - val_loss: 0.7839 - val_accuracy: 0.6354
Epoch 40/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5965 - accuracy:
0.7578 - val_loss: 0.7782 - val_accuracy: 0.6250
Epoch 41/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5914 - accuracy:
0.7734 - val_loss: 0.7806 - val_accuracy: 0.6250
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Epoch 42/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5821 - accuracy:
0.7682 - val_loss: 0.7742 - val_accuracy: 0.6250
Epoch 43/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5691 - accuracy:
0.7734 - val_loss: 0.8062 - val_accuracy: 0.6250
Epoch 44/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5836 - accuracy:
0.7812 - val_loss: 0.7717 - val_accuracy: 0.6250
Epoch 45/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5754 - accuracy:
0.7812 - val_loss: 0.7628 - val_accuracy: 0.6667
Epoch 46/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5658 - accuracy:
0.7969 - val_loss: 0.7642 - val_accuracy: 0.6667
Epoch 47/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5621 - accuracy:
0.7630 - val_loss: 0.7554 - val_accuracy: 0.6562
Epoch 48/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5565 - accuracy:
0.8047 - val_loss: 0.7675 - val_accuracy: 0.6354
Epoch 49/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5584 - accuracy:
0.7578 - val_loss: 0.7489 - val_accuracy: 0.6562
Epoch 50/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5545 - accuracy:
0.7812 - val_loss: 0.7471 - val_accuracy: 0.6562
Epoch 51/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5404 - accuracy:
0.7760 - val_loss: 0.7503 - val_accuracy: 0.6250
Epoch 52/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5421 - accuracy:
0.8047 - val_loss: 0.7806 - val_accuracy: 0.6354
Epoch 53/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5413 - accuracy:
0.8177 - val_loss: 0.7481 - val_accuracy: 0.6458
Epoch 54/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5389 - accuracy:
0.8073 - val_loss: 0.7357 - val_accuracy: 0.6667
Epoch 55/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5301 - accuracy:
0.8151 - val_loss: 0.7370 - val_accuracy: 0.6562
Epoch 56/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5316 - accuracy:
0.8151 - val_loss: 0.7342 - val_accuracy: 0.6667
Epoch 57/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5289 - accuracy:
0.7943 - val_loss: 0.7324 - val_accuracy: 0.6562
Epoch 58/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5197 - accuracy:
0.8255 - val_loss: 0.7333 - val_accuracy: 0.6250
Epoch 59/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5248 - accuracy:
0.7995 - val_loss: 0.7284 - val_accuracy: 0.6562
Epoch 60/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5195 - accuracy:
0.8021 - val_loss: 0.7212 - val_accuracy: 0.6771
Epoch 61/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5125 - accuracy:
0.8203 - val_loss: 0.7211 - val_accuracy: 0.6458
Epoch 62/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5068 - accuracy:
0.8099 - val_loss: 0.7346 - val_accuracy: 0.6250
Epoch 63/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5085 - accuracy:
0.8203 - val_loss: 0.7170 - val_accuracy: 0.6875
Epoch 64/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4977 - accuracy:
0.8281 - val_loss: 0.7263 - val_accuracy: 0.6354
Epoch 65/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5040 - accuracy:
0.8151 - val_loss: 0.7250 - val_accuracy: 0.6458
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Epoch 66/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5048 - accuracy:
0.8203 - val_loss: 0.7085 - val_accuracy: 0.6667
Epoch 67/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4926 - accuracy:
0.8073 - val_loss: 0.7045 - val_accuracy: 0.6667
Epoch 68/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4894 - accuracy:
0.8385 - val_loss: 0.6976 - val_accuracy: 0.7188
Epoch 69/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4859 - accuracy:
0.8229 - val_loss: 0.7238 - val_accuracy: 0.6250
Epoch 70/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4800 - accuracy:
0.8255 - val_loss: 0.6978 - val_accuracy: 0.6562
Epoch 71/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4828 - accuracy:
0.8281 - val_loss: 0.6949 - val_accuracy: 0.6250
Epoch 72/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4796 - accuracy:
0.8359 - val_loss: 0.7176 - val_accuracy: 0.6562
Epoch 73/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4790 - accuracy:
0.8438 - val_loss: 0.6941 - val_accuracy: 0.6562
Epoch 74/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4709 - accuracy:
0.8385 - val_loss: 0.6884 - val_accuracy: 0.6875
Epoch 75/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4740 - accuracy:
0.8125 - val_loss: 0.6935 - val_accuracy: 0.6667
Epoch 76/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4629 - accuracy:
0.8490 - val_loss: 0.6929 - val_accuracy: 0.6667
Epoch 77/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4647 - accuracy:
0.8385 - val_loss: 0.6843 - val_accuracy: 0.6979
Epoch 78/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4616 - accuracy:
0.8385 - val_loss: 0.6960 - val_accuracy: 0.6667
Epoch 79/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4606 - accuracy:
0.8359 - val_loss: 0.7223 - val_accuracy: 0.6875
Epoch 80/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4616 - accuracy:
0.8307 - val_loss: 0.6927 - val_accuracy: 0.6875
Epoch 81/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4519 - accuracy:
0.8411 - val_loss: 0.6810 - val_accuracy: 0.6979
Epoch 82/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4497 - accuracy:
0.8464 - val_loss: 0.7019 - val_accuracy: 0.6979
Epoch 83/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4530 - accuracy:
0.8411 - val_loss: 0.6796 - val_accuracy: 0.7292
Epoch 84/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4444 - accuracy:
0.8516 - val_loss: 0.6787 - val_accuracy: 0.6979
Epoch 85/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4413 - accuracy:
0.8411 - val_loss: 0.6752 - val_accuracy: 0.6875
Epoch 86/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4382 - accuracy:
0.8438 - val_loss: 0.6839 - val_accuracy: 0.6979
Epoch 87/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4380 - accuracy:
0.8620 - val_loss: 0.6684 - val_accuracy: 0.7188
Epoch 88/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4311 - accuracy:
0.8359 - val_loss: 0.6947 - val_accuracy: 0.7188
Epoch 89/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4372 - accuracy:
0.8490 - val_loss: 0.6680 - val_accuracy: 0.7083
```

```
Epoch 90/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4349 - accuracy:
0.8411 - val_loss: 0.6689 - val_accuracy: 0.6979
Epoch 91/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4231 - accuracy:
0.8620 - val_loss: 0.6782 - val_accuracy: 0.6875
Epoch 92/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4290 - accuracy:
0.8464 - val_loss: 0.6784 - val_accuracy: 0.6875
Epoch 93/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4226 - accuracy:
0.8490 - val_loss: 0.6560 - val_accuracy: 0.6979
Epoch 94/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4195 - accuracy:
0.8698 - val_loss: 0.6582 - val_accuracy: 0.7083
Epoch 95/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4119 - accuracy:
0.8672 - val_loss: 0.6708 - val_accuracy: 0.7083
Epoch 96/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4142 - accuracy:
0.8568 - val_loss: 0.6665 - val_accuracy: 0.6875
Epoch 97/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4162 - accuracy:
0.8568 - val_loss: 0.6543 - val_accuracy: 0.7083
Epoch 98/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4077 - accuracy:
0.8620 - val_loss: 0.6536 - val_accuracy: 0.7188
Epoch 99/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4055 - accuracy:
0.8698 - val_loss: 0.6513 - val_accuracy: 0.7188
Epoch 100/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4065 - accuracy:
0.8646 - val_loss: 0.6524 - val_accuracy: 0.7083
Fold:5
Epoch 1/100
24/24 [==============================] - 1s 9ms/step - loss: 3.6465 - accuracy:
0.3880 - val_loss: 2.3296 - val_accuracy: 0.3542
Epoch 2/100
24/24 [==============================] - 0s 3ms/step - loss: 2.4603 - accuracy:
0.4062 - val_loss: 1.7674 - val_accuracy: 0.3542
Epoch 3/100
24/24 [==============================] - 0s 3ms/step - loss: 1.8390 - accuracy:
0.3958 - val_loss: 1.4353 - val_accuracy: 0.4062
Epoch 4/100
24/24 [==============================] - 0s 4ms/step - loss: 1.3409 - accuracy:
0.4193 - val_loss: 1.0788 - val_accuracy: 0.4375
Epoch 5/100
24/24 [==============================] - 0s 4ms/step - loss: 0.9934 - accuracy:
0.5312 - val_loss: 1.0461 - val_accuracy: 0.4896
Epoch 6/100
24/24 [==============================] - 0s 4ms/step - loss: 0.9113 - accuracy:
0.5573 - val_loss: 0.8983 - val_accuracy: 0.5312
Epoch 7/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8453 - accuracy:
0.5964 - val_loss: 0.8181 - val_accuracy: 0.5833
Epoch 8/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8333 - accuracy:
0.5938 - val_loss: 0.8814 - val_accuracy: 0.5729
Epoch 9/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7922 - accuracy:
0.6562 - val_loss: 0.8677 - val_accuracy: 0.5729
Epoch 10/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7832 - accuracy:
0.6484 - val_loss: 0.8683 - val_accuracy: 0.5625
Epoch 11/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7615 - accuracy:
0.6797 - val_loss: 0.8763 - val_accuracy: 0.5833
Epoch 12/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7442 - accuracy:
0.6745 - val_loss: 0.9294 - val_accuracy: 0.5729
Epoch 13/100
```

```
24/24 [==============================] - 0s 4ms/step - loss: 0.7324 - accuracy:
0.6823 - val_loss: 0.8023 - val_accuracy: 0.5833
Epoch 14/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7167 - accuracy:
0.6953 - val_loss: 0.8245 - val_accuracy: 0.5521
Epoch 15/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7080 - accuracy:
0.6953 - val_loss: 0.8792 - val_accuracy: 0.5833
Epoch 16/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6934 - accuracy:
0.6901 - val_loss: 0.8528 - val_accuracy: 0.5729
Epoch 17/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6843 - accuracy:
0.7214 - val_loss: 0.8519 - val_accuracy: 0.5625
Epoch 18/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6704 - accuracy:
0.7057 - val_loss: 0.8896 - val_accuracy: 0.5625
Epoch 19/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6645 - accuracy:
0.7005 - val_loss: 0.9756 - val_accuracy: 0.5521
Epoch 20/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6643 - accuracy:
0.7135 - val_loss: 0.8944 - val_accuracy: 0.5625
Epoch 21/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6534 - accuracy:
0.7370 - val_loss: 0.8186 - val_accuracy: 0.5729
Epoch 22/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6509 - accuracy:
0.7448 - val_loss: 0.8351 - val_accuracy: 0.5625
Epoch 23/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6305 - accuracy:
0.7344 - val_loss: 0.8207 - val_accuracy: 0.5833
Epoch 24/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6110 - accuracy:
0.7422 - val_loss: 0.8159 - val_accuracy: 0.5833
Epoch 25/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6018 - accuracy:
0.7682 - val_loss: 0.8671 - val_accuracy: 0.5833
Epoch 26/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6139 - accuracy:
0.7552 - val_loss: 0.8390 - val_accuracy: 0.5938
Epoch 27/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5943 - accuracy:
0.7448 - val_loss: 0.8261 - val_accuracy: 0.5833
Epoch 28/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5984 - accuracy:
0.7344 - val_loss: 0.8400 - val_accuracy: 0.5729
Epoch 29/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5836 - accuracy:
0.7552 - val_loss: 0.9052 - val_accuracy: 0.5625
Epoch 30/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5847 - accuracy:
0.7552 - val_loss: 0.9117 - val_accuracy: 0.5625
Epoch 31/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5769 - accuracy:
0.7604 - val_loss: 0.8264 - val_accuracy: 0.5521
Epoch 32/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5626 - accuracy:
0.7552 - val_loss: 0.8772 - val_accuracy: 0.5521
Epoch 33/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5664 - accuracy:
0.7734 - val_loss: 0.8676 - val_accuracy: 0.5625
Epoch 34/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5591 - accuracy:
0.7812 - val_loss: 0.8237 - val_accuracy: 0.5938
Epoch 35/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5464 - accuracy:
0.7917 - val_loss: 0.8561 - val_accuracy: 0.5833
Epoch 36/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5467 - accuracy:
0.7734 - val_loss: 1.0363 - val_accuracy: 0.5625
Epoch 37/100
```

```
24/24 [==============================] - 0s 3ms/step - loss: 0.5399 - accuracy:
0.7760 - val_loss: 0.8674 - val_accuracy: 0.5625
Epoch 38/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5306 - accuracy:
0.8047 - val_loss: 0.8615 - val_accuracy: 0.5625
Epoch 39/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5277 - accuracy:
0.7969 - val_loss: 0.9813 - val_accuracy: 0.5521
Epoch 40/100
24/24 [==============================] - 0s 5ms/step - loss: 0.5234 - accuracy:
0.7995 - val_loss: 0.8465 - val_accuracy: 0.5521
Epoch 41/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5153 - accuracy:
0.8099 - val_loss: 0.8608 - val_accuracy: 0.5833
Epoch 42/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5105 - accuracy:
0.7943 - val_loss: 0.8309 - val_accuracy: 0.5625
Epoch 43/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5110 - accuracy:
0.8255 - val_loss: 0.8694 - val_accuracy: 0.6042
Epoch 44/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5128 - accuracy:
0.7891 - val_loss: 0.8685 - val_accuracy: 0.5938
Epoch 45/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5018 - accuracy:
0.8047 - val_loss: 0.8379 - val_accuracy: 0.5729
Epoch 46/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4959 - accuracy:
0.8307 - val_loss: 0.9510 - val_accuracy: 0.5833
Epoch 47/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4954 - accuracy:
0.7995 - val_loss: 1.0250 - val_accuracy: 0.5625
Epoch 48/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4887 - accuracy:
0.8281 - val_loss: 0.8786 - val_accuracy: 0.5833
Epoch 49/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4949 - accuracy:
0.8047 - val_loss: 0.8638 - val_accuracy: 0.5833
Epoch 50/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4783 - accuracy:
0.8359 - val_loss: 0.8466 - val_accuracy: 0.5833
Epoch 51/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4877 - accuracy:
0.8229 - val_loss: 0.9181 - val_accuracy: 0.5833
Epoch 52/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4733 - accuracy:
0.8333 - val_loss: 0.8718 - val_accuracy: 0.6042
Epoch 53/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4702 - accuracy:
0.8385 - val_loss: 0.8994 - val_accuracy: 0.6250
Epoch 54/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4757 - accuracy:
0.8203 - val_loss: 0.8333 - val_accuracy: 0.6042
Epoch 55/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4662 - accuracy:
0.8203 - val_loss: 0.8556 - val_accuracy: 0.5729
Epoch 56/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4573 - accuracy:
0.8333 - val_loss: 0.8681 - val_accuracy: 0.5521
Epoch 57/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4695 - accuracy:
0.8307 - val_loss: 0.8747 - val_accuracy: 0.6250
Epoch 58/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4473 - accuracy:
0.8307 - val_loss: 0.8895 - val_accuracy: 0.5833
Epoch 59/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4456 - accuracy:
0.8385 - val_loss: 0.8390 - val_accuracy: 0.6354
Epoch 60/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4550 - accuracy:
0.8411 - val_loss: 0.8801 - val_accuracy: 0.5625
Epoch 61/100
```

```
24/24 [==============================] - 0s 3ms/step - loss: 0.4410 - accuracy:
0.8516 - val_loss: 0.7868 - val_accuracy: 0.6146
Epoch 62/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4378 - accuracy:
0.8698 - val_loss: 0.8459 - val_accuracy: 0.6146
Epoch 63/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4470 - accuracy:
0.8385 - val_loss: 0.9550 - val_accuracy: 0.5938
Epoch 64/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4362 - accuracy:
0.8438 - val_loss: 0.9826 - val_accuracy: 0.5729
Epoch 65/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4315 - accuracy:
0.8464 - val_loss: 0.9620 - val_accuracy: 0.5729
Epoch 66/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4347 - accuracy:
0.8359 - val_loss: 0.8739 - val_accuracy: 0.5938
Epoch 67/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4218 - accuracy:
0.8464 - val_loss: 0.8812 - val_accuracy: 0.5729
Epoch 68/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4199 - accuracy:
0.8359 - val_loss: 0.8462 - val_accuracy: 0.6146
Epoch 69/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4200 - accuracy:
0.8516 - val_loss: 0.9467 - val_accuracy: 0.5833
Epoch 70/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4202 - accuracy:
0.8438 - val_loss: 0.8707 - val_accuracy: 0.6354
Epoch 71/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4084 - accuracy:
0.8490 - val_loss: 0.8368 - val_accuracy: 0.6250
Epoch 72/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4162 - accuracy:
0.8516 - val_loss: 0.8640 - val_accuracy: 0.6250
Epoch 73/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4097 - accuracy:
0.8568 - val_loss: 0.8611 - val_accuracy: 0.6042
Epoch 74/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4103 - accuracy:
0.8411 - val_loss: 0.9339 - val_accuracy: 0.6354
Epoch 75/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4051 - accuracy:
0.8672 - val_loss: 0.8428 - val_accuracy: 0.6146
Epoch 76/100
24/24 [==============================] - 0s 4ms/step - loss: 0.4075 - accuracy:
0.8438 - val_loss: 0.8881 - val_accuracy: 0.6250
Epoch 77/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3973 - accuracy:
0.8594 - val_loss: 0.9757 - val_accuracy: 0.5833
Epoch 78/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3996 - accuracy:
0.8568 - val_loss: 0.8706 - val_accuracy: 0.6458
Epoch 79/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3938 - accuracy:
0.8672 - val_loss: 0.8757 - val_accuracy: 0.6458
Epoch 80/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3850 - accuracy:
0.8750 - val_loss: 0.8264 - val_accuracy: 0.6458
Epoch 81/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3890 - accuracy:
0.8698 - val_loss: 0.8649 - val_accuracy: 0.6146
Epoch 82/100
24/24 [==============================] - 0s 3ms/step - loss: 0.4030 - accuracy:
0.8568 - val_loss: 0.9348 - val_accuracy: 0.6250
Epoch 83/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3874 - accuracy:
0.8672 - val_loss: 0.8695 - val_accuracy: 0.6354
Epoch 84/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3796 - accuracy:
0.8750 - val_loss: 0.8963 - val_accuracy: 0.6042
Epoch 85/100
```

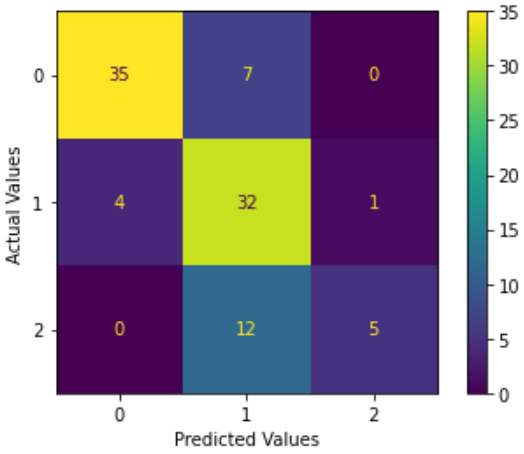
```
24/24 [==============================] - 0s 3ms/step - loss: 0.3852 - accuracy:
0.8542 - val_loss: 0.9205 - val_accuracy: 0.5938
Epoch 86/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3762 - accuracy:
0.8776 - val_loss: 0.9034 - val_accuracy: 0.6042
Epoch 87/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3765 - accuracy:
0.8646 - val_loss: 1.0037 - val_accuracy: 0.5833
Epoch 88/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3715 - accuracy:
0.8646 - val_loss: 0.8465 - val_accuracy: 0.6250
Epoch 89/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3692 - accuracy:
0.8750 - val_loss: 0.8477 - val_accuracy: 0.6354
Epoch 90/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3673 - accuracy:
0.8828 - val_loss: 0.8482 - val_accuracy: 0.6354
Epoch 91/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3677 - accuracy:
0.8802 - val_loss: 0.8899 - val_accuracy: 0.6250
Epoch 92/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3594 - accuracy:
0.8828 - val_loss: 0.8611 - val_accuracy: 0.6667
Epoch 93/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3797 - accuracy:
0.8802 - val_loss: 0.8715 - val_accuracy: 0.6250
Epoch 94/100
24/24 [==============================] - 0s 3ms/step - loss: 0.3574 - accuracy:
0.8906 - val_loss: 1.0263 - val_accuracy: 0.5833
Epoch 95/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3559 - accuracy:
0.8880 - val_loss: 0.9044 - val_accuracy: 0.6354
Epoch 96/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3533 - accuracy:
0.8672 - val_loss: 0.9147 - val_accuracy: 0.6458
Epoch 97/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3575 - accuracy:
0.8776 - val_loss: 0.8811 - val_accuracy: 0.6354
Epoch 98/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3537 - accuracy:
0.8906 - val_loss: 0.8708 - val_accuracy: 0.6667
Epoch 99/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3445 - accuracy:
0.8880 - val_loss: 0.8343 - val_accuracy: 0.6875
Epoch 100/100
24/24 [==============================] - 0s 4ms/step - loss: 0.3478 - accuracy:
0.8828 - val_loss: 0.9757 - val_accuracy: 0.6146
------------------------------------------------------------------------
Score per fold
------------------------------------------------------------------------
> Fold 1 - Accuracy: 75.0%
------------------------------------------------------------------------
> Fold 2 - Accuracy: 64.58333333333334%
------------------------------------------------------------------------
> Fold 3 - Accuracy: 61.458333333333336%
------------------------------------------------------------------------
> Fold 4 - Accuracy: 70.83333333333334%
------------------------------------------------------------------------
> Fold 5 - Accuracy: 61.458333333333336%
------------------------------------------------------------------------
                                                                  ---------
```

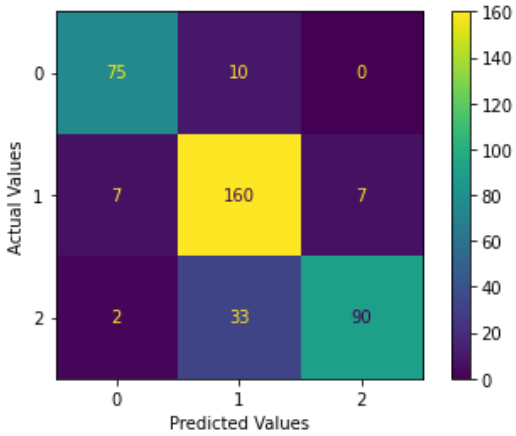
Fold1: ▪

```
Accuracy: 0.750000
precision: 0.7860734037204625
recall; 0.6641052817523406
F1_score: 0.6754176222775258
confusion_matrix test:
[[35  7  0]
 [ 4 32  1]
 [ 0 12  5]]
```

```
confusion_matrix train:
[[ 75  10   0]
 [  7 160   7]
 [  2  33  90]]
```

Confusion Matrix1

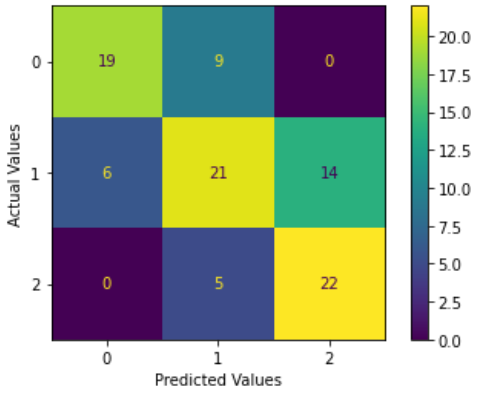


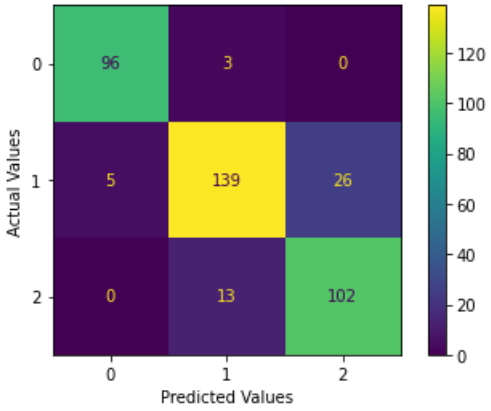


Fold2:

```
Accuracy: 0.645833
precision: 0.657037037037037
recall; 0.6685271217791543
F1_score: 0.6560084698118461
confusion_matrix test:
[[19  9  0]
 [ 6 21 14]
 [ 0  5 22]]
confusion_matrix train:
[[ 96   3   0]
 [  5 139  26]
 [  0  13 102]]
```

Confusion Matrix2

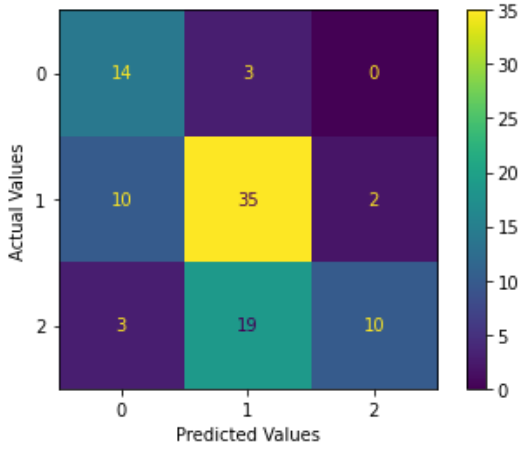


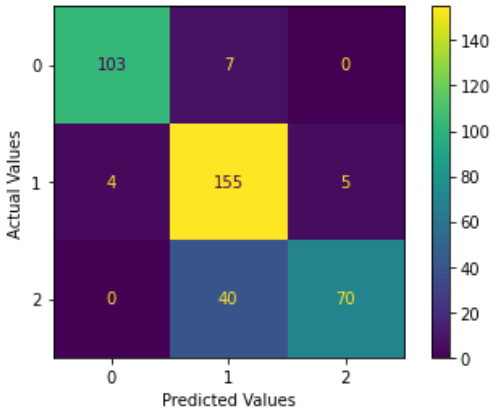


Fold3:

```
Accuracy: 0.614583
precision: 0.6552956465237166
recall; 0.6269034209428451
F1_score: 0.587995337995338
confusion_matrix test:
[[14  3  0]
 [10 35  2]
 [ 3 19 10]]
confusion_matrix train:
[[103   7   0]
 [  4 155   5]
 [  0  40  70]]
```

Confusion Matrix3

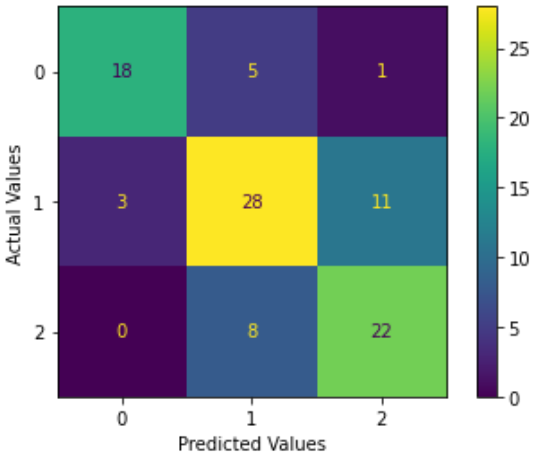


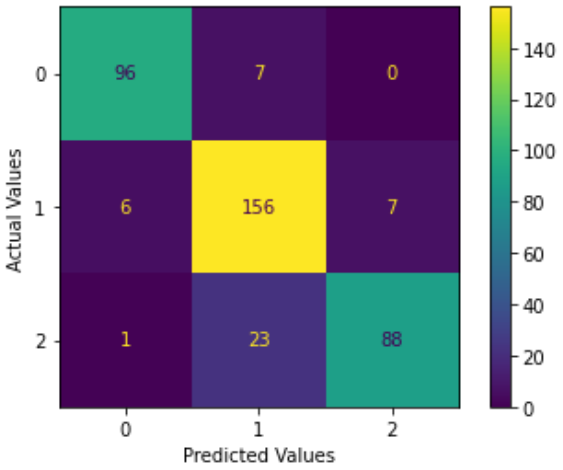


Fold4:

```
Accuracy: 0.708333
precision: 0.7290428366468539
recall; 0.7166666666666667
F1_score: 0.7207329317269077
confusion_matrix test:
[[18  5  1]
 [ 3 28 11]
 [ 0  8 22]]
confusion_matrix train:
[[ 96   7   0]
 [  6 156   7]
 [  1  23  88]]
```

Confusion Matrix4

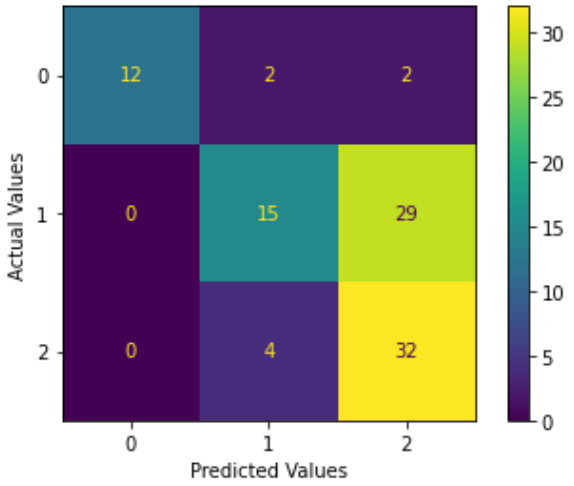


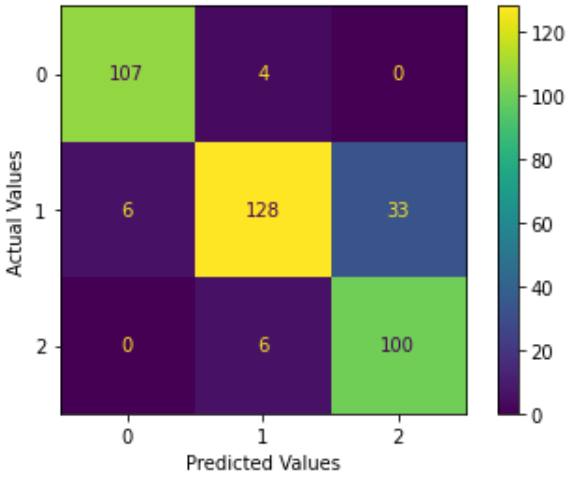


Fold5:

```
Accuracy: 0.614583
precision: 0.7407407407407408
recall; 0.6599326599326599
F1_score: 0.6550486550486551
confusion_matrix test:
[[12  2  2]
 [ 0 15 29]
 [ 0  4 32]]
confusion_matrix train:
[[107   4   0]
 [  6 128  33]
 [  0   6 100]]
```

- **Confusion Matrix5**





مدل سوم:

- **معیارهای ارزیابی**

```
Fold:1
Epoch 1/100
24/24 [==============================] - 1s 9ms/step - loss: 1.5203 -
accuracy: 0.4010 - val_loss: 0.9537 - val_accuracy: 0.4375
Epoch 2/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9240 -
accuracy: 0.4401 - val_loss: 0.9202 - val_accuracy: 0.5312
Epoch 3/100
```

```
24/24 [==============================] - 0s 3ms/step - loss: 0.8868 -
accuracy: 0.4714 - val_loss: 0.9613 - val_accuracy: 0.5000
Epoch 4/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8870 -
accuracy: 0.4766 - val_loss: 1.0050 - val_accuracy: 0.4896
Epoch 5/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8808 -
accuracy: 0.5078 - val_loss: 0.9151 - val_accuracy: 0.5521
Epoch 6/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8767 -
accuracy: 0.4948 - val_loss: 0.9152 - val_accuracy: 0.5312
Epoch 7/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8703 -
accuracy: 0.5026 - val_loss: 0.9506 - val_accuracy: 0.5312
Epoch 8/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8626 -
accuracy: 0.5104 - val_loss: 1.0749 - val_accuracy: 0.5417
Epoch 9/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8606 -
accuracy: 0.5260 - val_loss: 0.8853 - val_accuracy: 0.5417
Epoch 10/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8627 -
accuracy: 0.4844 - val_loss: 0.8702 - val_accuracy: 0.5625
Epoch 11/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8518 -
accuracy: 0.5599 - val_loss: 0.9669 - val_accuracy: 0.5521
Epoch 12/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8433 -
accuracy: 0.5547 - val_loss: 0.8761 - val_accuracy: 0.5938
Epoch 13/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8516 -
accuracy: 0.5495 - val_loss: 0.9320 - val_accuracy: 0.5833
Epoch 14/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8343 -
accuracy: 0.5651 - val_loss: 0.9803 - val_accuracy: 0.5625
Epoch 15/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8397 -
accuracy: 0.5260 - val_loss: 0.9881 - val_accuracy: 0.5521
Epoch 16/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8333 -
accuracy: 0.5547 - val_loss: 0.8749 - val_accuracy: 0.6146
Epoch 17/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8262 -
accuracy: 0.5755 - val_loss: 0.8706 - val_accuracy: 0.6146
Epoch 18/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8250 -
accuracy: 0.5391 - val_loss: 0.8305 - val_accuracy: 0.6771
Epoch 19/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8167 -
accuracy: 0.5859 - val_loss: 0.8334 - val_accuracy: 0.6354
Epoch 20/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8268 -
accuracy: 0.5573 - val_loss: 0.8406 - val_accuracy: 0.6250
Epoch 21/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8218 -
accuracy: 0.5599 - val_loss: 0.9754 - val_accuracy: 0.5729
Epoch 22/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8113 -
accuracy: 0.6302 - val_loss: 0.8307 - val_accuracy: 0.6354
Epoch 23/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8149 -
accuracy: 0.5573 - val_loss: 0.8364 - val_accuracy: 0.6354
Epoch 24/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8169 -
accuracy: 0.6016 - val_loss: 0.8162 - val_accuracy: 0.6667
```

```
Epoch 25/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8030 -
accuracy: 0.6354 - val_loss: 0.8446 - val_accuracy: 0.6146
Epoch 26/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8107 -
accuracy: 0.6068 - val_loss: 0.8548 - val_accuracy: 0.6458
Epoch 27/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8080 -
accuracy: 0.5990 - val_loss: 0.8123 - val_accuracy: 0.6250
Epoch 28/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7936 -
accuracy: 0.5964 - val_loss: 0.8787 - val_accuracy: 0.6250
Epoch 29/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8028 -
accuracy: 0.5755 - val_loss: 0.9157 - val_accuracy: 0.5833
Epoch 30/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7960 -
accuracy: 0.6016 - val_loss: 0.8021 - val_accuracy: 0.6354
Epoch 31/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7943 -
accuracy: 0.5651 - val_loss: 0.7866 - val_accuracy: 0.6875
Epoch 32/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7935 -
accuracy: 0.6068 - val_loss: 0.7885 - val_accuracy: 0.6458
Epoch 33/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7859 -
accuracy: 0.6172 - val_loss: 0.8246 - val_accuracy: 0.6042
Epoch 34/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7801 -
accuracy: 0.6250 - val_loss: 0.7862 - val_accuracy: 0.6250
Epoch 35/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7824 -
accuracy: 0.6120 - val_loss: 0.9297 - val_accuracy: 0.6562
Epoch 36/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8033 -
accuracy: 0.6198 - val_loss: 0.8204 - val_accuracy: 0.6042
Epoch 37/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7825 -
accuracy: 0.6354 - val_loss: 0.7748 - val_accuracy: 0.6354
Epoch 38/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7763 -
accuracy: 0.6510 - val_loss: 0.7716 - val_accuracy: 0.6771
Epoch 39/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7760 -
accuracy: 0.6354 - val_loss: 0.8123 - val_accuracy: 0.5938
Epoch 40/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7745 -
accuracy: 0.6146 - val_loss: 0.7634 - val_accuracy: 0.6667
Epoch 41/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7803 -
accuracy: 0.6120 - val_loss: 0.7737 - val_accuracy: 0.6562
Epoch 42/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7823 -
accuracy: 0.6094 - val_loss: 0.7652 - val_accuracy: 0.6458
Epoch 43/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7654 -
accuracy: 0.6354 - val_loss: 0.7618 - val_accuracy: 0.6562
Epoch 44/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7665 -
accuracy: 0.6354 - val_loss: 0.7897 - val_accuracy: 0.6354
Epoch 45/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7669 -
accuracy: 0.6250 - val_loss: 0.8886 - val_accuracy: 0.5938
Epoch 46/100
```

```
24/24 [==============================] - 0s 2ms/step - loss: 0.7755 -
accuracy: 0.5964 - val_loss: 0.7686 - val_accuracy: 0.6354
Epoch 47/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7560 -
accuracy: 0.6380 - val_loss: 0.7582 - val_accuracy: 0.6562
Epoch 48/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7571 -
accuracy: 0.6276 - val_loss: 0.8192 - val_accuracy: 0.6250
Epoch 49/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7618 -
accuracy: 0.6484 - val_loss: 0.7500 - val_accuracy: 0.6458
Epoch 50/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7579 -
accuracy: 0.6406 - val_loss: 0.7631 - val_accuracy: 0.6458
Epoch 51/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7768 -
accuracy: 0.5938 - val_loss: 0.7474 - val_accuracy: 0.6667
Epoch 52/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7502 -
accuracy: 0.6536 - val_loss: 0.7298 - val_accuracy: 0.6562
Epoch 53/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7544 -
accuracy: 0.6458 - val_loss: 0.8685 - val_accuracy: 0.6250
Epoch 54/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7572 -
accuracy: 0.6328 - val_loss: 0.7407 - val_accuracy: 0.6458
Epoch 55/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7441 -
accuracy: 0.6432 - val_loss: 0.7646 - val_accuracy: 0.6667
Epoch 56/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7533 -
accuracy: 0.6536 - val_loss: 0.7371 - val_accuracy: 0.6562
Epoch 57/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7357 -
accuracy: 0.6667 - val_loss: 0.9854 - val_accuracy: 0.5938
Epoch 58/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7508 -
accuracy: 0.6406 - val_loss: 0.7227 - val_accuracy: 0.6979
Epoch 59/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7549 -
accuracy: 0.6354 - val_loss: 0.7109 - val_accuracy: 0.6771
Epoch 60/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7327 -
accuracy: 0.6458 - val_loss: 0.8217 - val_accuracy: 0.6354
Epoch 61/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7363 -
accuracy: 0.6276 - val_loss: 0.7200 - val_accuracy: 0.6667
Epoch 62/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7480 -
accuracy: 0.6354 - val_loss: 0.7477 - val_accuracy: 0.6562
Epoch 63/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7052 -
accuracy: 0.6432 - val_loss: 0.7557 - val_accuracy: 0.6667
Epoch 64/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7545 -
accuracy: 0.6354 - val_loss: 0.7021 - val_accuracy: 0.6875
Epoch 65/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7287 -
accuracy: 0.6589 - val_loss: 0.7121 - val_accuracy: 0.7083
Epoch 66/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7335 -
accuracy: 0.6536 - val_loss: 0.7161 - val_accuracy: 0.6667
Epoch 67/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7243 -
accuracy: 0.6667 - val_loss: 0.6839 - val_accuracy: 0.7083
```

```
Epoch 68/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6984 -
accuracy: 0.6615 - val_loss: 0.7774 - val_accuracy: 0.6562
Epoch 69/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7191 -
accuracy: 0.6458 - val_loss: 0.6993 - val_accuracy: 0.7083
Epoch 70/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7406 -
accuracy: 0.6354 - val_loss: 0.7156 - val_accuracy: 0.6562
Epoch 71/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7295 -
accuracy: 0.6432 - val_loss: 0.8916 - val_accuracy: 0.6042
Epoch 72/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7051 -
accuracy: 0.6354 - val_loss: 0.6852 - val_accuracy: 0.6875
Epoch 73/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7111 -
accuracy: 0.6693 - val_loss: 0.7544 - val_accuracy: 0.6562
Epoch 74/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7487 -
accuracy: 0.6667 - val_loss: 0.8360 - val_accuracy: 0.6562
Epoch 75/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7073 -
accuracy: 0.6406 - val_loss: 0.7539 - val_accuracy: 0.6667
Epoch 76/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7345 -
accuracy: 0.6328 - val_loss: 0.6746 - val_accuracy: 0.7083
Epoch 77/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7104 -
accuracy: 0.6641 - val_loss: 0.6677 - val_accuracy: 0.7083
Epoch 78/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7035 -
accuracy: 0.6536 - val_loss: 0.6212 - val_accuracy: 0.7500
Epoch 79/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7331 -
accuracy: 0.6406 - val_loss: 0.6688 - val_accuracy: 0.7188
Epoch 80/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7169 -
accuracy: 0.6458 - val_loss: 0.8232 - val_accuracy: 0.6250
Epoch 81/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6892 -
accuracy: 0.6719 - val_loss: 0.6451 - val_accuracy: 0.7083
Epoch 82/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7206 -
accuracy: 0.6823 - val_loss: 0.8083 - val_accuracy: 0.5833
Epoch 83/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6976 -
accuracy: 0.6536 - val_loss: 0.7614 - val_accuracy: 0.6354
Epoch 84/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7421 -
accuracy: 0.6120 - val_loss: 0.6730 - val_accuracy: 0.6979
Epoch 85/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7096 -
accuracy: 0.6589 - val_loss: 0.6631 - val_accuracy: 0.7396
Epoch 86/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6998 -
accuracy: 0.6771 - val_loss: 0.7156 - val_accuracy: 0.6667
Epoch 87/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6807 -
accuracy: 0.6875 - val_loss: 0.6741 - val_accuracy: 0.7292
Epoch 88/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6809 -
accuracy: 0.6719 - val_loss: 0.6701 - val_accuracy: 0.6979
Epoch 89/100
```

```
24/24 [==============================] - 0s 3ms/step - loss: 0.6897 -
accuracy: 0.6719 - val_loss: 0.9206 - val_accuracy: 0.6042
Epoch 90/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7013 -
accuracy: 0.6875 - val_loss: 0.6731 - val_accuracy: 0.6875
Epoch 91/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6825 -
accuracy: 0.6719 - val_loss: 0.6349 - val_accuracy: 0.7396
Epoch 92/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6837 -
accuracy: 0.6667 - val_loss: 0.6443 - val_accuracy: 0.7292
Epoch 93/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6815 -
accuracy: 0.6745 - val_loss: 0.7591 - val_accuracy: 0.6562
Epoch 94/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6844 -
accuracy: 0.6771 - val_loss: 0.7241 - val_accuracy: 0.7188
Epoch 95/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6861 -
accuracy: 0.6849 - val_loss: 0.6689 - val_accuracy: 0.6771
Epoch 96/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6871 -
accuracy: 0.6849 - val_loss: 0.6178 - val_accuracy: 0.7396
Epoch 97/100
24/24 [==============================] - 0s 2ms/step - loss: 0.6991 -
accuracy: 0.6667 - val_loss: 0.6413 - val_accuracy: 0.7188
Epoch 98/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6971 -
accuracy: 0.6667 - val_loss: 0.6412 - val_accuracy: 0.7083
Epoch 99/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6664 -
accuracy: 0.6797 - val_loss: 0.8456 - val_accuracy: 0.6562
Epoch 100/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6806 -
accuracy: 0.6354 - val_loss: 0.6168 - val_accuracy: 0.7500
Fold:2
Epoch 1/100
24/24 [==============================] - 1s 9ms/step - loss: 2.7032 -
accuracy: 0.4141 - val_loss: 1.0187 - val_accuracy: 0.3750
Epoch 2/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8829 -
accuracy: 0.4948 - val_loss: 0.9623 - val_accuracy: 0.4688
Epoch 3/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8502 -
accuracy: 0.5729 - val_loss: 0.9896 - val_accuracy: 0.4688
Epoch 4/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8310 -
accuracy: 0.5703 - val_loss: 0.9604 - val_accuracy: 0.4583
Epoch 5/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8336 -
accuracy: 0.5755 - val_loss: 0.9869 - val_accuracy: 0.4583
Epoch 6/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8288 -
accuracy: 0.5547 - val_loss: 0.9806 - val_accuracy: 0.4688
Epoch 7/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8065 -
accuracy: 0.5859 - val_loss: 0.9417 - val_accuracy: 0.4688
Epoch 8/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7988 -
accuracy: 0.6094 - val_loss: 0.9155 - val_accuracy: 0.4688
Epoch 9/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7799 -
accuracy: 0.6094 - val_loss: 0.9251 - val_accuracy: 0.4792
Epoch 10/100
```

```
24/24 [==============================] - 0s 3ms/step - loss: 0.7870 -
accuracy: 0.6380 - val_loss: 0.9299 - val_accuracy: 0.5312
Epoch 11/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7857 -
accuracy: 0.6120 - val_loss: 0.9154 - val_accuracy: 0.5312
Epoch 12/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7927 -
accuracy: 0.6302 - val_loss: 0.9106 - val_accuracy: 0.5521
Epoch 13/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7604 -
accuracy: 0.6354 - val_loss: 0.9487 - val_accuracy: 0.5208
Epoch 14/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7617 -
accuracy: 0.6328 - val_loss: 0.9219 - val_accuracy: 0.5104
Epoch 15/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7531 -
accuracy: 0.6354 - val_loss: 0.9082 - val_accuracy: 0.5000
Epoch 16/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7554 -
accuracy: 0.6458 - val_loss: 0.9291 - val_accuracy: 0.5208
Epoch 17/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7591 -
accuracy: 0.6276 - val_loss: 0.9239 - val_accuracy: 0.5104
Epoch 18/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7509 -
accuracy: 0.6510 - val_loss: 0.9155 - val_accuracy: 0.5312
Epoch 19/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7352 -
accuracy: 0.6797 - val_loss: 0.9032 - val_accuracy: 0.4688
Epoch 20/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7468 -
accuracy: 0.6510 - val_loss: 0.9079 - val_accuracy: 0.5208
Epoch 21/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7324 -
accuracy: 0.6693 - val_loss: 0.8806 - val_accuracy: 0.5000
Epoch 22/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7315 -
accuracy: 0.6589 - val_loss: 0.8402 - val_accuracy: 0.5417
Epoch 23/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7117 -
accuracy: 0.6693 - val_loss: 0.8839 - val_accuracy: 0.5417
Epoch 24/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7307 -
accuracy: 0.6562 - val_loss: 0.8709 - val_accuracy: 0.5521
Epoch 25/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7305 -
accuracy: 0.6224 - val_loss: 0.8967 - val_accuracy: 0.5104
Epoch 26/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7063 -
accuracy: 0.6823 - val_loss: 0.8902 - val_accuracy: 0.5000
Epoch 27/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7033 -
accuracy: 0.6849 - val_loss: 0.8805 - val_accuracy: 0.5521
Epoch 28/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7019 -
accuracy: 0.7031 - val_loss: 0.8924 - val_accuracy: 0.5000
Epoch 29/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6883 -
accuracy: 0.6745 - val_loss: 0.8877 - val_accuracy: 0.5208
Epoch 30/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6907 -
accuracy: 0.6745 - val_loss: 0.9037 - val_accuracy: 0.5104
Epoch 31/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6887 -
accuracy: 0.6771 - val_loss: 0.8960 - val_accuracy: 0.5625
```

```
Epoch 32/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6853 -
accuracy: 0.6797 - val_loss: 0.8954 - val_accuracy: 0.5000
Epoch 33/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7036 -
accuracy: 0.6641 - val_loss: 0.8701 - val_accuracy: 0.5521
Epoch 34/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6770 -
accuracy: 0.6771 - val_loss: 0.9980 - val_accuracy: 0.4896
Epoch 35/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6877 -
accuracy: 0.6693 - val_loss: 0.8848 - val_accuracy: 0.5208
Epoch 36/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6907 -
accuracy: 0.6797 - val_loss: 1.0724 - val_accuracy: 0.4583
Epoch 37/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6941 -
accuracy: 0.6771 - val_loss: 0.9119 - val_accuracy: 0.5000
Epoch 38/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6713 -
accuracy: 0.6719 - val_loss: 0.8920 - val_accuracy: 0.5312
Epoch 39/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6568 -
accuracy: 0.6901 - val_loss: 0.9131 - val_accuracy: 0.5521
Epoch 40/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6481 -
accuracy: 0.7161 - val_loss: 0.8934 - val_accuracy: 0.4896
Epoch 41/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6635 -
accuracy: 0.7005 - val_loss: 0.9268 - val_accuracy: 0.4896
Epoch 42/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6691 -
accuracy: 0.6745 - val_loss: 0.9445 - val_accuracy: 0.5417
Epoch 43/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6557 -
accuracy: 0.6771 - val_loss: 0.9635 - val_accuracy: 0.5521
Epoch 44/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6434 -
accuracy: 0.6979 - val_loss: 0.9080 - val_accuracy: 0.5208
Epoch 45/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6378 -
accuracy: 0.7005 - val_loss: 0.9272 - val_accuracy: 0.5000
Epoch 46/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6365 -
accuracy: 0.6719 - val_loss: 0.9068 - val_accuracy: 0.5417
Epoch 47/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6276 -
accuracy: 0.7214 - val_loss: 0.9243 - val_accuracy: 0.5312
Epoch 48/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6308 -
accuracy: 0.7057 - val_loss: 0.8942 - val_accuracy: 0.5938
Epoch 49/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6640 -
accuracy: 0.6901 - val_loss: 0.9605 - val_accuracy: 0.5417
Epoch 50/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6250 -
accuracy: 0.7083 - val_loss: 0.9834 - val_accuracy: 0.4792
Epoch 51/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6399 -
accuracy: 0.6927 - val_loss: 0.9227 - val_accuracy: 0.5521
Epoch 52/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6197 -
accuracy: 0.7318 - val_loss: 0.9356 - val_accuracy: 0.5104
Epoch 53/100
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24/24 [==============================] - 0s 3ms/step - loss: 0.6357 -
accuracy: 0.6927 - val_loss: 0.9527 - val_accuracy: 0.5417
Epoch 54/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6178 -
accuracy: 0.6745 - val_loss: 0.9082 - val_accuracy: 0.5625
Epoch 55/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6426 -
accuracy: 0.7214 - val_loss: 0.9445 - val_accuracy: 0.5000
Epoch 56/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6120 -
accuracy: 0.7188 - val_loss: 0.9310 - val_accuracy: 0.5104
Epoch 57/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6096 -
accuracy: 0.7161 - val_loss: 0.9327 - val_accuracy: 0.5208
Epoch 58/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6148 -
accuracy: 0.7135 - val_loss: 0.9007 - val_accuracy: 0.5208
Epoch 59/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6246 -
accuracy: 0.7083 - val_loss: 0.9838 - val_accuracy: 0.5312
Epoch 60/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6019 -
accuracy: 0.7083 - val_loss: 0.9460 - val_accuracy: 0.5208
Epoch 61/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6118 -
accuracy: 0.6875 - val_loss: 0.9507 - val_accuracy: 0.5417
Epoch 62/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6194 -
accuracy: 0.7161 - val_loss: 0.9519 - val_accuracy: 0.5417
Epoch 63/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6099 -
accuracy: 0.7057 - val_loss: 0.9583 - val_accuracy: 0.5521
Epoch 64/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5921 -
accuracy: 0.7240 - val_loss: 0.8914 - val_accuracy: 0.5521
Epoch 65/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5975 -
accuracy: 0.7109 - val_loss: 0.9199 - val_accuracy: 0.5417
Epoch 66/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6219 -
accuracy: 0.6823 - val_loss: 0.9358 - val_accuracy: 0.5625
Epoch 67/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6074 -
accuracy: 0.6953 - val_loss: 1.0299 - val_accuracy: 0.5417
Epoch 68/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6569 -
accuracy: 0.6849 - val_loss: 1.0874 - val_accuracy: 0.5000
Epoch 69/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6226 -
accuracy: 0.7083 - val_loss: 1.0069 - val_accuracy: 0.5417
Epoch 70/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6055 -
accuracy: 0.7188 - val_loss: 0.9736 - val_accuracy: 0.5000
Epoch 71/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5809 -
accuracy: 0.7240 - val_loss: 1.0190 - val_accuracy: 0.5312
Epoch 72/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5883 -
accuracy: 0.7266 - val_loss: 0.9536 - val_accuracy: 0.5729
Epoch 73/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5729 -
accuracy: 0.7240 - val_loss: 0.9644 - val_accuracy: 0.5208
Epoch 74/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5855 -
accuracy: 0.7109 - val_loss: 0.9447 - val_accuracy: 0.5417
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Epoch 75/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5994 -
accuracy: 0.7214 - val_loss: 0.9598 - val_accuracy: 0.5208
Epoch 76/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5696 -
accuracy: 0.7318 - val_loss: 0.9773 - val_accuracy: 0.5417
Epoch 77/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5696 -
accuracy: 0.7292 - val_loss: 0.9523 - val_accuracy: 0.5312
Epoch 78/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5834 -
accuracy: 0.7214 - val_loss: 0.9384 - val_accuracy: 0.5521
Epoch 79/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5675 -
accuracy: 0.7161 - val_loss: 0.9869 - val_accuracy: 0.5521
Epoch 80/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5778 -
accuracy: 0.7031 - val_loss: 1.0323 - val_accuracy: 0.5521
Epoch 81/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5610 -
accuracy: 0.7292 - val_loss: 0.9806 - val_accuracy: 0.5521
Epoch 82/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5397 -
accuracy: 0.7682 - val_loss: 0.9934 - val_accuracy: 0.5521
Epoch 83/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5523 -
accuracy: 0.7422 - val_loss: 0.9462 - val_accuracy: 0.5625
Epoch 84/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6284 -
accuracy: 0.7031 - val_loss: 1.0214 - val_accuracy: 0.4896
Epoch 85/100
24/24 [==============================] - 0s 2ms/step - loss: 0.5591 -
accuracy: 0.7370 - val_loss: 0.9121 - val_accuracy: 0.6042
Epoch 86/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5844 -
accuracy: 0.7161 - val_loss: 0.9889 - val_accuracy: 0.5208
Epoch 87/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5583 -
accuracy: 0.7135 - val_loss: 0.9562 - val_accuracy: 0.5625
Epoch 88/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5753 -
accuracy: 0.7214 - val_loss: 0.9575 - val_accuracy: 0.5521
Epoch 89/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5453 -
accuracy: 0.7604 - val_loss: 0.9726 - val_accuracy: 0.5833
Epoch 90/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5461 -
accuracy: 0.7292 - val_loss: 1.0052 - val_accuracy: 0.5625
Epoch 91/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5580 -
accuracy: 0.7318 - val_loss: 0.9659 - val_accuracy: 0.5312
Epoch 92/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5365 -
accuracy: 0.7474 - val_loss: 0.9666 - val_accuracy: 0.5625
Epoch 93/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5504 -
accuracy: 0.7604 - val_loss: 1.1437 - val_accuracy: 0.5312
Epoch 94/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5476 -
accuracy: 0.7240 - val_loss: 1.0411 - val_accuracy: 0.5625
Epoch 95/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5498 -
accuracy: 0.7448 - val_loss: 1.0336 - val_accuracy: 0.4896
Epoch 96/100
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24/24 [==============================] - 0s 3ms/step - loss: 0.6146 -
accuracy: 0.7083 - val_loss: 1.0205 - val_accuracy: 0.5312
Epoch 97/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5858 -
accuracy: 0.7448 - val_loss: 1.0045 - val_accuracy: 0.5521
Epoch 98/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5370 -
accuracy: 0.7526 - val_loss: 0.9706 - val_accuracy: 0.5417
Epoch 99/100
24/24 [==============================] - 0s 4ms/step - loss: 0.5519 -
accuracy: 0.7161 - val_loss: 0.9453 - val_accuracy: 0.5833
Epoch 100/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5952 -
accuracy: 0.7109 - val_loss: 1.0434 - val_accuracy: 0.5729
Fold:3
Epoch 1/100
24/24 [==============================] - 1s 9ms/step - loss: 1.6382 -
accuracy: 0.3828 - val_loss: 1.0932 - val_accuracy: 0.4896
Epoch 2/100
24/24 [==============================] - 0s 3ms/step - loss: 1.0816 -
accuracy: 0.4792 - val_loss: 1.0929 - val_accuracy: 0.4896
Epoch 3/100
24/24 [==============================] - 0s 3ms/step - loss: 1.0604 -
accuracy: 0.5026 - val_loss: 1.0849 - val_accuracy: 0.5000
Epoch 4/100
24/24 [==============================] - 0s 3ms/step - loss: 1.0475 -
accuracy: 0.5026 - val_loss: 1.0681 - val_accuracy: 0.5000
Epoch 5/100
24/24 [==============================] - 0s 3ms/step - loss: 1.0417 -
accuracy: 0.4974 - val_loss: 1.0603 - val_accuracy: 0.5104
Epoch 6/100
24/24 [==============================] - 0s 3ms/step - loss: 1.0327 -
accuracy: 0.5130 - val_loss: 1.0700 - val_accuracy: 0.5000
Epoch 7/100
24/24 [==============================] - 0s 3ms/step - loss: 1.0273 -
accuracy: 0.5026 - val_loss: 1.0654 - val_accuracy: 0.5000
Epoch 8/100
24/24 [==============================] - 0s 3ms/step - loss: 1.0039 -
accuracy: 0.5104 - val_loss: 1.0439 - val_accuracy: 0.5104
Epoch 9/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9989 -
accuracy: 0.5026 - val_loss: 1.0374 - val_accuracy: 0.5000
Epoch 10/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9928 -
accuracy: 0.5130 - val_loss: 1.0480 - val_accuracy: 0.5000
Epoch 11/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9920 -
accuracy: 0.5078 - val_loss: 1.0550 - val_accuracy: 0.5000
Epoch 12/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9832 -
accuracy: 0.5052 - val_loss: 1.0533 - val_accuracy: 0.4896
Epoch 13/100
24/24 [==============================] - 0s 2ms/step - loss: 0.9707 -
accuracy: 0.5104 - val_loss: 1.0141 - val_accuracy: 0.5417
Epoch 14/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9704 -
accuracy: 0.5130 - val_loss: 1.0233 - val_accuracy: 0.5104
Epoch 15/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9646 -
accuracy: 0.5026 - val_loss: 1.0359 - val_accuracy: 0.5312
Epoch 16/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9690 -
accuracy: 0.5208 - val_loss: 1.0493 - val_accuracy: 0.5104
Epoch 17/100
```

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24/24 [==============================] - 0s 3ms/step - loss: 0.9592 -
accuracy: 0.5234 - val_loss: 1.0330 - val_accuracy: 0.5208
Epoch 18/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9416 -
accuracy: 0.5286 - val_loss: 1.0211 - val_accuracy: 0.5208
Epoch 19/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9621 -
accuracy: 0.5156 - val_loss: 1.0306 - val_accuracy: 0.5104
Epoch 20/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9473 -
accuracy: 0.5312 - val_loss: 1.0214 - val_accuracy: 0.5104
Epoch 21/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9479 -
accuracy: 0.5339 - val_loss: 1.0311 - val_accuracy: 0.5000
Epoch 22/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9667 -
accuracy: 0.5234 - val_loss: 1.0189 - val_accuracy: 0.5208
Epoch 23/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9349 -
accuracy: 0.5286 - val_loss: 1.0550 - val_accuracy: 0.5104
Epoch 24/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9298 -
accuracy: 0.5417 - val_loss: 0.9979 - val_accuracy: 0.5312
Epoch 25/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9135 -
accuracy: 0.5365 - val_loss: 1.0097 - val_accuracy: 0.5208
Epoch 26/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9235 -
accuracy: 0.5573 - val_loss: 0.9939 - val_accuracy: 0.5104
Epoch 27/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9115 -
accuracy: 0.5547 - val_loss: 1.0057 - val_accuracy: 0.5312
Epoch 28/100
24/24 [==============================] - 0s 3ms/step - loss: 0.9120 -
accuracy: 0.5156 - val_loss: 0.9903 - val_accuracy: 0.5104
Epoch 29/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8785 -
accuracy: 0.5781 - val_loss: 1.0952 - val_accuracy: 0.4479
Epoch 30/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8691 -
accuracy: 0.5703 - val_loss: 0.9663 - val_accuracy: 0.5208
Epoch 31/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8745 -
accuracy: 0.5599 - val_loss: 0.9745 - val_accuracy: 0.5104
Epoch 32/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8653 -
accuracy: 0.5677 - val_loss: 0.9855 - val_accuracy: 0.4896
Epoch 33/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8413 -
accuracy: 0.5807 - val_loss: 0.9174 - val_accuracy: 0.5417
Epoch 34/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8286 -
accuracy: 0.5911 - val_loss: 0.9342 - val_accuracy: 0.5312
Epoch 35/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8244 -
accuracy: 0.5885 - val_loss: 0.9104 - val_accuracy: 0.5417
Epoch 36/100
24/24 [==============================] - 0s 4ms/step - loss: 0.8403 -
accuracy: 0.5729 - val_loss: 1.0245 - val_accuracy: 0.4896
Epoch 37/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8033 -
accuracy: 0.5833 - val_loss: 0.9090 - val_accuracy: 0.5208
Epoch 38/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8100 -
accuracy: 0.5833 - val_loss: 0.9576 - val_accuracy: 0.5000
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Epoch 39/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7887 -
accuracy: 0.5938 - val_loss: 0.9366 - val_accuracy: 0.5312
Epoch 40/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7847 -
accuracy: 0.5729 - val_loss: 0.8948 - val_accuracy: 0.5521
Epoch 41/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8008 -
accuracy: 0.5781 - val_loss: 0.9007 - val_accuracy: 0.5312
Epoch 42/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8160 -
accuracy: 0.5521 - val_loss: 1.0824 - val_accuracy: 0.4583
Epoch 43/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7844 -
accuracy: 0.6094 - val_loss: 0.9033 - val_accuracy: 0.5000
Epoch 44/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7842 -
accuracy: 0.5495 - val_loss: 0.9348 - val_accuracy: 0.5104
Epoch 45/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7936 -
accuracy: 0.5651 - val_loss: 0.9282 - val_accuracy: 0.4792
Epoch 46/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7787 -
accuracy: 0.6146 - val_loss: 0.9759 - val_accuracy: 0.4688
Epoch 47/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7578 -
accuracy: 0.5911 - val_loss: 0.8854 - val_accuracy: 0.5000
Epoch 48/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7727 -
accuracy: 0.5990 - val_loss: 1.0100 - val_accuracy: 0.4792
Epoch 49/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7465 -
accuracy: 0.6120 - val_loss: 0.9181 - val_accuracy: 0.5417
Epoch 50/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7583 -
accuracy: 0.6120 - val_loss: 0.8582 - val_accuracy: 0.5208
Epoch 51/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7247 -
accuracy: 0.6536 - val_loss: 0.8874 - val_accuracy: 0.4688
Epoch 52/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7147 -
accuracy: 0.6302 - val_loss: 0.8582 - val_accuracy: 0.5729
Epoch 53/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7386 -
accuracy: 0.6146 - val_loss: 0.8883 - val_accuracy: 0.5417
Epoch 54/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7088 -
accuracy: 0.6380 - val_loss: 0.8525 - val_accuracy: 0.5208
Epoch 55/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6805 -
accuracy: 0.6641 - val_loss: 0.8665 - val_accuracy: 0.5208
Epoch 56/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7297 -
accuracy: 0.6224 - val_loss: 0.8509 - val_accuracy: 0.5312
Epoch 57/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7259 -
accuracy: 0.6328 - val_loss: 1.0439 - val_accuracy: 0.4792
Epoch 58/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6936 -
accuracy: 0.6641 - val_loss: 0.8827 - val_accuracy: 0.5208
Epoch 59/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7166 -
accuracy: 0.6354 - val_loss: 0.8864 - val_accuracy: 0.5208
Epoch 60/100
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24/24 [==============================] - 0s 3ms/step - loss: 0.6805 -
accuracy: 0.6641 - val_loss: 0.9114 - val_accuracy: 0.5312
Epoch 61/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6836 -
accuracy: 0.6641 - val_loss: 0.8779 - val_accuracy: 0.5625
Epoch 62/100
24/24 [==============================] - 0s 2ms/step - loss: 0.7255 -
accuracy: 0.6224 - val_loss: 1.0812 - val_accuracy: 0.5000
Epoch 63/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7179 -
accuracy: 0.6536 - val_loss: 0.8990 - val_accuracy: 0.5729
Epoch 64/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6769 -
accuracy: 0.6641 - val_loss: 0.8842 - val_accuracy: 0.5000
Epoch 65/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6991 -
accuracy: 0.6458 - val_loss: 0.8962 - val_accuracy: 0.5521
Epoch 66/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7026 -
accuracy: 0.6276 - val_loss: 0.8766 - val_accuracy: 0.5729
Epoch 67/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6624 -
accuracy: 0.6901 - val_loss: 0.8458 - val_accuracy: 0.5729
Epoch 68/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6726 -
accuracy: 0.6667 - val_loss: 1.0452 - val_accuracy: 0.4375
Epoch 69/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7050 -
accuracy: 0.6797 - val_loss: 0.9576 - val_accuracy: 0.5833
Epoch 70/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7068 -
accuracy: 0.6589 - val_loss: 0.8518 - val_accuracy: 0.5521
Epoch 71/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6482 -
accuracy: 0.6667 - val_loss: 1.0265 - val_accuracy: 0.5417
Epoch 72/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6497 -
accuracy: 0.6667 - val_loss: 0.8749 - val_accuracy: 0.5521
Epoch 73/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6822 -
accuracy: 0.6719 - val_loss: 0.9017 - val_accuracy: 0.5000
Epoch 74/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6612 -
accuracy: 0.6510 - val_loss: 1.0373 - val_accuracy: 0.4896
Epoch 75/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6788 -
accuracy: 0.6458 - val_loss: 1.0015 - val_accuracy: 0.5104
Epoch 76/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6585 -
accuracy: 0.6693 - val_loss: 0.9393 - val_accuracy: 0.5104
Epoch 77/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6820 -
accuracy: 0.6406 - val_loss: 0.9062 - val_accuracy: 0.4688
Epoch 78/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6376 -
accuracy: 0.6745 - val_loss: 0.8820 - val_accuracy: 0.5104
Epoch 79/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6510 -
accuracy: 0.6823 - val_loss: 0.8838 - val_accuracy: 0.5208
Epoch 80/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6598 -
accuracy: 0.6667 - val_loss: 0.8833 - val_accuracy: 0.5625
Epoch 81/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6233 -
accuracy: 0.7031 - val_loss: 0.9578 - val_accuracy: 0.5312
```

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Epoch 82/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6171 -
accuracy: 0.6953 - val_loss: 0.8857 - val_accuracy: 0.5833
Epoch 83/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6957 -
accuracy: 0.6354 - val_loss: 1.0401 - val_accuracy: 0.5104
Epoch 84/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6843 -
accuracy: 0.6615 - val_loss: 0.8993 - val_accuracy: 0.5000
Epoch 85/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6535 -
accuracy: 0.6510 - val_loss: 0.9703 - val_accuracy: 0.4896
Epoch 86/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6299 -
accuracy: 0.6641 - val_loss: 0.9719 - val_accuracy: 0.5417
Epoch 87/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6406 -
accuracy: 0.6615 - val_loss: 1.0468 - val_accuracy: 0.5625
Epoch 88/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6727 -
accuracy: 0.6693 - val_loss: 0.9769 - val_accuracy: 0.4167
Epoch 89/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6544 -
accuracy: 0.6458 - val_loss: 0.9181 - val_accuracy: 0.5417
Epoch 90/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6262 -
accuracy: 0.6875 - val_loss: 0.8838 - val_accuracy: 0.5417
Epoch 91/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6493 -
accuracy: 0.6901 - val_loss: 0.8746 - val_accuracy: 0.5417
Epoch 92/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6581 -
accuracy: 0.6901 - val_loss: 0.8631 - val_accuracy: 0.4896
Epoch 93/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6119 -
accuracy: 0.6901 - val_loss: 1.1163 - val_accuracy: 0.5312
Epoch 94/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6081 -
accuracy: 0.6953 - val_loss: 0.8653 - val_accuracy: 0.5729
Epoch 95/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6105 -
accuracy: 0.6927 - val_loss: 0.9021 - val_accuracy: 0.5625
Epoch 96/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6039 -
accuracy: 0.7109 - val_loss: 0.8638 - val_accuracy: 0.5625
Epoch 97/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6138 -
accuracy: 0.6901 - val_loss: 0.9055 - val_accuracy: 0.5208
Epoch 98/100
24/24 [==============================] - 0s 3ms/step - loss: 0.5944 -
accuracy: 0.6979 - val_loss: 0.9611 - val_accuracy: 0.6250
Epoch 99/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6838 -
accuracy: 0.6589 - val_loss: 0.9048 - val_accuracy: 0.5729
Epoch 100/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6102 -
accuracy: 0.6979 - val_loss: 0.9907 - val_accuracy: 0.5312
Fold:4
Epoch 1/100
24/24 [==============================] - 1s 8ms/step - loss: 1.0216 -
accuracy: 0.4219 - val_loss: 0.9796 - val_accuracy: 0.4792
Epoch 2/100
24/24 [==============================] - 0s 4ms/step - loss: 0.9172 -
accuracy: 0.4740 - val_loss: 0.8901 - val_accuracy: 0.4583
Epoch 3/100
```

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24/24 [==============================] - 0s 3ms/step - loss: 0.9240 -
accuracy: 0.5000 - val_loss: 0.8903 - val_accuracy: 0.5729
Epoch 4/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8776 -
accuracy: 0.5260 - val_loss: 0.9412 - val_accuracy: 0.4375
Epoch 5/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8652 -
accuracy: 0.5625 - val_loss: 0.8709 - val_accuracy: 0.6250
Epoch 6/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8624 -
accuracy: 0.5469 - val_loss: 0.8564 - val_accuracy: 0.5729
Epoch 7/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8537 -
accuracy: 0.5651 - val_loss: 0.9092 - val_accuracy: 0.5521
Epoch 8/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8500 -
accuracy: 0.5990 - val_loss: 0.8849 - val_accuracy: 0.5625
Epoch 9/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8477 -
accuracy: 0.5417 - val_loss: 0.8900 - val_accuracy: 0.5312
Epoch 10/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8340 -
accuracy: 0.5807 - val_loss: 0.9030 - val_accuracy: 0.4479
Epoch 11/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8411 -
accuracy: 0.5729 - val_loss: 0.8554 - val_accuracy: 0.5833
Epoch 12/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8209 -
accuracy: 0.6016 - val_loss: 0.9025 - val_accuracy: 0.3854
Epoch 13/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8203 -
accuracy: 0.5755 - val_loss: 0.8597 - val_accuracy: 0.5729
Epoch 14/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8175 -
accuracy: 0.6094 - val_loss: 0.8406 - val_accuracy: 0.5104
Epoch 15/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8192 -
accuracy: 0.6380 - val_loss: 0.8635 - val_accuracy: 0.5625
Epoch 16/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8126 -
accuracy: 0.5938 - val_loss: 0.8807 - val_accuracy: 0.5729
Epoch 17/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8111 -
accuracy: 0.6042 - val_loss: 0.8642 - val_accuracy: 0.6250
Epoch 18/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8057 -
accuracy: 0.6068 - val_loss: 0.8678 - val_accuracy: 0.5625
Epoch 19/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7867 -
accuracy: 0.6094 - val_loss: 0.8096 - val_accuracy: 0.6146
Epoch 20/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7857 -
accuracy: 0.6016 - val_loss: 0.8823 - val_accuracy: 0.5833
Epoch 21/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7780 -
accuracy: 0.6250 - val_loss: 0.8194 - val_accuracy: 0.6354
Epoch 22/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7825 -
accuracy: 0.6146 - val_loss: 0.8367 - val_accuracy: 0.6042
Epoch 23/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7738 -
accuracy: 0.6380 - val_loss: 0.8919 - val_accuracy: 0.4583
Epoch 24/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7799 -
accuracy: 0.6276 - val_loss: 0.7991 - val_accuracy: 0.5208
```

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Epoch 25/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7695 -
accuracy: 0.6510 - val_loss: 0.8349 - val_accuracy: 0.6146
Epoch 26/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7664 -
accuracy: 0.6224 - val_loss: 0.7992 - val_accuracy: 0.6042
Epoch 27/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7722 -
accuracy: 0.6302 - val_loss: 0.8528 - val_accuracy: 0.6146
Epoch 28/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7758 -
accuracy: 0.6536 - val_loss: 0.8069 - val_accuracy: 0.5521
Epoch 29/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7695 -
accuracy: 0.6458 - val_loss: 0.8707 - val_accuracy: 0.5625
Epoch 30/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7693 -
accuracy: 0.6250 - val_loss: 0.8600 - val_accuracy: 0.5833
Epoch 31/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7585 -
accuracy: 0.6510 - val_loss: 0.8364 - val_accuracy: 0.5625
Epoch 32/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7550 -
accuracy: 0.6510 - val_loss: 0.8264 - val_accuracy: 0.6250
Epoch 33/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7568 -
accuracy: 0.6667 - val_loss: 0.8019 - val_accuracy: 0.5104
Epoch 34/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7521 -
accuracy: 0.6354 - val_loss: 0.8536 - val_accuracy: 0.4896
Epoch 35/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7585 -
accuracy: 0.6406 - val_loss: 0.8230 - val_accuracy: 0.5000
Epoch 36/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7395 -
accuracy: 0.6719 - val_loss: 0.7982 - val_accuracy: 0.5521
Epoch 37/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7512 -
accuracy: 0.6276 - val_loss: 0.7952 - val_accuracy: 0.5625
Epoch 38/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7569 -
accuracy: 0.6172 - val_loss: 0.8423 - val_accuracy: 0.6042
Epoch 39/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7527 -
accuracy: 0.6146 - val_loss: 0.8093 - val_accuracy: 0.6562
Epoch 40/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7268 -
accuracy: 0.6536 - val_loss: 0.8114 - val_accuracy: 0.6354
Epoch 41/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7365 -
accuracy: 0.6380 - val_loss: 0.8189 - val_accuracy: 0.6354
Epoch 42/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7360 -
accuracy: 0.6641 - val_loss: 0.8061 - val_accuracy: 0.6250
Epoch 43/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7361 -
accuracy: 0.6432 - val_loss: 0.7967 - val_accuracy: 0.6146
Epoch 44/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7115 -
accuracy: 0.6536 - val_loss: 0.8027 - val_accuracy: 0.5521
Epoch 45/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7137 -
accuracy: 0.6562 - val_loss: 0.9875 - val_accuracy: 0.4375
Epoch 46/100
```

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24/24 [==============================] - 0s 3ms/step - loss: 0.7123 -
accuracy: 0.6458 - val_loss: 0.7944 - val_accuracy: 0.6562
Epoch 47/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7271 -
accuracy: 0.6510 - val_loss: 0.7950 - val_accuracy: 0.6146
Epoch 48/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7102 -
accuracy: 0.6771 - val_loss: 0.7605 - val_accuracy: 0.6146
Epoch 49/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7023 -
accuracy: 0.6797 - val_loss: 0.9005 - val_accuracy: 0.5729
Epoch 50/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7285 -
accuracy: 0.6406 - val_loss: 0.8868 - val_accuracy: 0.5208
Epoch 51/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7041 -
accuracy: 0.6562 - val_loss: 0.9054 - val_accuracy: 0.4688
Epoch 52/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7089 -
accuracy: 0.6536 - val_loss: 0.8433 - val_accuracy: 0.5938
Epoch 53/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7090 -
accuracy: 0.6693 - val_loss: 0.7557 - val_accuracy: 0.6562
Epoch 54/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7223 -
accuracy: 0.6745 - val_loss: 0.8214 - val_accuracy: 0.5417
Epoch 55/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7117 -
accuracy: 0.6719 - val_loss: 0.9122 - val_accuracy: 0.5208
Epoch 56/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6829 -
accuracy: 0.6615 - val_loss: 0.7676 - val_accuracy: 0.5938
Epoch 57/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7011 -
accuracy: 0.6667 - val_loss: 0.7986 - val_accuracy: 0.6458
Epoch 58/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7103 -
accuracy: 0.6589 - val_loss: 0.7621 - val_accuracy: 0.5729
Epoch 59/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6795 -
accuracy: 0.6901 - val_loss: 0.8363 - val_accuracy: 0.5521
Epoch 60/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7143 -
accuracy: 0.6458 - val_loss: 0.8686 - val_accuracy: 0.5417
Epoch 61/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6925 -
accuracy: 0.6771 - val_loss: 0.8140 - val_accuracy: 0.6250
Epoch 62/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6880 -
accuracy: 0.6615 - val_loss: 0.8757 - val_accuracy: 0.5521
Epoch 63/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7247 -
accuracy: 0.6536 - val_loss: 0.7422 - val_accuracy: 0.6562
Epoch 64/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7035 -
accuracy: 0.6771 - val_loss: 0.8210 - val_accuracy: 0.5417
Epoch 65/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6854 -
accuracy: 0.6745 - val_loss: 0.8745 - val_accuracy: 0.5000
Epoch 66/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7050 -
accuracy: 0.6562 - val_loss: 0.7801 - val_accuracy: 0.6250
Epoch 67/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6915 -
accuracy: 0.6693 - val_loss: 0.8307 - val_accuracy: 0.5417
```

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Epoch 68/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6958 -
accuracy: 0.7083 - val_loss: 0.7862 - val_accuracy: 0.6354
Epoch 69/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6764 -
accuracy: 0.6745 - val_loss: 1.0474 - val_accuracy: 0.4583
Epoch 70/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6752 -
accuracy: 0.6797 - val_loss: 0.8532 - val_accuracy: 0.5729
Epoch 71/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6738 -
accuracy: 0.7005 - val_loss: 0.8164 - val_accuracy: 0.5833
Epoch 72/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6784 -
accuracy: 0.6745 - val_loss: 0.8787 - val_accuracy: 0.5625
Epoch 73/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6584 -
accuracy: 0.6615 - val_loss: 0.8037 - val_accuracy: 0.6354
Epoch 74/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6782 -
accuracy: 0.6745 - val_loss: 0.7676 - val_accuracy: 0.5521
Epoch 75/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6772 -
accuracy: 0.7031 - val_loss: 0.9043 - val_accuracy: 0.5938
Epoch 76/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6999 -
accuracy: 0.6901 - val_loss: 0.8145 - val_accuracy: 0.6146
Epoch 77/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6952 -
accuracy: 0.6719 - val_loss: 0.8177 - val_accuracy: 0.6354
Epoch 78/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6692 -
accuracy: 0.6953 - val_loss: 0.8124 - val_accuracy: 0.6562
Epoch 79/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6839 -
accuracy: 0.6693 - val_loss: 0.9393 - val_accuracy: 0.5625
Epoch 80/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6705 -
accuracy: 0.7057 - val_loss: 0.7419 - val_accuracy: 0.6146
Epoch 81/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6661 -
accuracy: 0.6979 - val_loss: 0.9246 - val_accuracy: 0.5625
Epoch 82/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7354 -
accuracy: 0.6484 - val_loss: 0.7372 - val_accuracy: 0.6771
Epoch 83/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6920 -
accuracy: 0.6823 - val_loss: 0.9088 - val_accuracy: 0.5312
Epoch 84/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6526 -
accuracy: 0.6797 - val_loss: 0.7416 - val_accuracy: 0.6667
Epoch 85/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6742 -
accuracy: 0.6927 - val_loss: 0.8157 - val_accuracy: 0.6458
Epoch 86/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6565 -
accuracy: 0.7031 - val_loss: 0.8325 - val_accuracy: 0.6354
Epoch 87/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6627 -
accuracy: 0.6849 - val_loss: 1.1087 - val_accuracy: 0.4271
Epoch 88/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6685 -
accuracy: 0.6536 - val_loss: 0.8513 - val_accuracy: 0.5938
Epoch 89/100
```

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24/24 [==============================] - 0s 3ms/step - loss: 0.6542 -
accuracy: 0.6849 - val_loss: 0.7312 - val_accuracy: 0.6979
Epoch 90/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6362 -
accuracy: 0.7005 - val_loss: 0.8815 - val_accuracy: 0.5521
Epoch 91/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6735 -
accuracy: 0.6745 - val_loss: 1.0218 - val_accuracy: 0.4271
Epoch 92/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6317 -
accuracy: 0.6901 - val_loss: 0.7826 - val_accuracy: 0.6458
Epoch 93/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6624 -
accuracy: 0.6979 - val_loss: 0.8834 - val_accuracy: 0.5208
Epoch 94/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6539 -
accuracy: 0.6901 - val_loss: 0.9051 - val_accuracy: 0.5833
Epoch 95/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6830 -
accuracy: 0.6641 - val_loss: 0.7515 - val_accuracy: 0.6562
Epoch 96/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6318 -
accuracy: 0.7161 - val_loss: 0.8728 - val_accuracy: 0.5938
Epoch 97/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6508 -
accuracy: 0.6823 - val_loss: 0.9000 - val_accuracy: 0.5938
Epoch 98/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6635 -
accuracy: 0.6719 - val_loss: 0.7917 - val_accuracy: 0.6354
Epoch 99/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6331 -
accuracy: 0.7005 - val_loss: 0.8366 - val_accuracy: 0.6042
Epoch 100/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6592 -
accuracy: 0.6927 - val_loss: 0.9353 - val_accuracy: 0.5000
Fold:5
Epoch 1/100
24/24 [==============================] - 1s 9ms/step - loss: 1.0250 -
accuracy: 0.4349 - val_loss: 0.8076 - val_accuracy: 0.5417
Epoch 2/100
24/24 [==============================] - 0s 4ms/step - loss: 0.9227 -
accuracy: 0.5052 - val_loss: 0.8217 - val_accuracy: 0.5417
Epoch 3/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8970 -
accuracy: 0.5078 - val_loss: 0.8150 - val_accuracy: 0.4271
Epoch 4/100
24/24 [==============================] - 0s 4ms/step - loss: 0.8906 -
accuracy: 0.5339 - val_loss: 0.7918 - val_accuracy: 0.5208
Epoch 5/100
24/24 [==============================] - 0s 4ms/step - loss: 0.9561 -
accuracy: 0.5026 - val_loss: 0.8269 - val_accuracy: 0.5000
Epoch 6/100
24/24 [==============================] - 0s 4ms/step - loss: 0.8929 -
accuracy: 0.4974 - val_loss: 0.8079 - val_accuracy: 0.5208
Epoch 7/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8640 -
accuracy: 0.5521 - val_loss: 0.8591 - val_accuracy: 0.4479
Epoch 8/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8512 -
accuracy: 0.5729 - val_loss: 0.8094 - val_accuracy: 0.5521
Epoch 9/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8432 -
accuracy: 0.5938 - val_loss: 0.7710 - val_accuracy: 0.5312
Epoch 10/100
```

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24/24 [==============================] - 0s 3ms/step - loss: 0.8489 -
accuracy: 0.5833 - val_loss: 0.8013 - val_accuracy: 0.5833
Epoch 11/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8385 -
accuracy: 0.5938 - val_loss: 0.7886 - val_accuracy: 0.5833
Epoch 12/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8239 -
accuracy: 0.5964 - val_loss: 0.7750 - val_accuracy: 0.5729
Epoch 13/100
24/24 [==============================] - 0s 4ms/step - loss: 0.8844 -
accuracy: 0.5391 - val_loss: 0.7695 - val_accuracy: 0.5729
Epoch 14/100
24/24 [==============================] - 0s 4ms/step - loss: 0.8149 -
accuracy: 0.5781 - val_loss: 0.7937 - val_accuracy: 0.5833
Epoch 15/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8181 -
accuracy: 0.6224 - val_loss: 0.7907 - val_accuracy: 0.5417
Epoch 16/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8023 -
accuracy: 0.5859 - val_loss: 0.8112 - val_accuracy: 0.5000
Epoch 17/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8072 -
accuracy: 0.6198 - val_loss: 0.7965 - val_accuracy: 0.5417
Epoch 18/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8007 -
accuracy: 0.6250 - val_loss: 0.8372 - val_accuracy: 0.5104
Epoch 19/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8089 -
accuracy: 0.5990 - val_loss: 0.8148 - val_accuracy: 0.5417
Epoch 20/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8162 -
accuracy: 0.5885 - val_loss: 0.8376 - val_accuracy: 0.5208
Epoch 21/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7804 -
accuracy: 0.6198 - val_loss: 0.7590 - val_accuracy: 0.5833
Epoch 22/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7734 -
accuracy: 0.6276 - val_loss: 0.8190 - val_accuracy: 0.5417
Epoch 23/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7729 -
accuracy: 0.6068 - val_loss: 0.7823 - val_accuracy: 0.5521
Epoch 24/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7837 -
accuracy: 0.6120 - val_loss: 0.7783 - val_accuracy: 0.5417
Epoch 25/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7669 -
accuracy: 0.6432 - val_loss: 0.7620 - val_accuracy: 0.6042
Epoch 26/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7716 -
accuracy: 0.6328 - val_loss: 0.7870 - val_accuracy: 0.5833
Epoch 27/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7864 -
accuracy: 0.6068 - val_loss: 0.7987 - val_accuracy: 0.5521
Epoch 28/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7558 -
accuracy: 0.6536 - val_loss: 0.7999 - val_accuracy: 0.5417
Epoch 29/100
24/24 [==============================] - 0s 3ms/step - loss: 0.8185 -
accuracy: 0.6198 - val_loss: 0.7952 - val_accuracy: 0.5729
Epoch 30/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7881 -
accuracy: 0.6094 - val_loss: 0.7733 - val_accuracy: 0.6354
Epoch 31/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7572 -
accuracy: 0.6224 - val_loss: 0.8590 - val_accuracy: 0.5312
```

```
Epoch 32/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7633 -
accuracy: 0.6198 - val_loss: 0.8185 - val_accuracy: 0.5417
Epoch 33/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7463 -
accuracy: 0.6536 - val_loss: 0.7710 - val_accuracy: 0.6146
Epoch 34/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7335 -
accuracy: 0.6432 - val_loss: 0.8430 - val_accuracy: 0.5625
Epoch 35/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7372 -
accuracy: 0.6458 - val_loss: 0.7454 - val_accuracy: 0.6771
Epoch 36/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7347 -
accuracy: 0.6536 - val_loss: 0.7555 - val_accuracy: 0.5521
Epoch 37/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7200 -
accuracy: 0.6510 - val_loss: 0.8200 - val_accuracy: 0.5833
Epoch 38/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7499 -
accuracy: 0.6615 - val_loss: 0.8113 - val_accuracy: 0.5625
Epoch 39/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7262 -
accuracy: 0.6536 - val_loss: 1.1744 - val_accuracy: 0.4688
Epoch 40/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7501 -
accuracy: 0.6589 - val_loss: 0.8064 - val_accuracy: 0.5729
Epoch 41/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7157 -
accuracy: 0.6667 - val_loss: 0.7305 - val_accuracy: 0.6146
Epoch 42/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7140 -
accuracy: 0.6615 - val_loss: 0.8253 - val_accuracy: 0.5625
Epoch 43/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7076 -
accuracy: 0.6953 - val_loss: 0.8158 - val_accuracy: 0.5625
Epoch 44/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7026 -
accuracy: 0.6719 - val_loss: 0.8211 - val_accuracy: 0.5833
Epoch 45/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7112 -
accuracy: 0.6536 - val_loss: 0.7929 - val_accuracy: 0.5729
Epoch 46/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7332 -
accuracy: 0.6562 - val_loss: 1.0348 - val_accuracy: 0.4896
Epoch 47/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7072 -
accuracy: 0.6693 - val_loss: 0.7768 - val_accuracy: 0.5729
Epoch 48/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6837 -
accuracy: 0.6745 - val_loss: 0.7594 - val_accuracy: 0.5833
Epoch 49/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7044 -
accuracy: 0.6536 - val_loss: 0.7674 - val_accuracy: 0.5833
Epoch 50/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6997 -
accuracy: 0.6693 - val_loss: 0.7455 - val_accuracy: 0.6250
Epoch 51/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6783 -
accuracy: 0.6927 - val_loss: 0.7567 - val_accuracy: 0.6146
Epoch 52/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7120 -
accuracy: 0.6693 - val_loss: 0.8110 - val_accuracy: 0.5729
Epoch 53/100
```

```
24/24 [==============================] - 0s 3ms/step - loss: 0.6806 -
accuracy: 0.6875 - val_loss: 0.7800 - val_accuracy: 0.5625
Epoch 54/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6961 -
accuracy: 0.6562 - val_loss: 0.7820 - val_accuracy: 0.5833
Epoch 55/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7073 -
accuracy: 0.6849 - val_loss: 0.7519 - val_accuracy: 0.5417
Epoch 56/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6938 -
accuracy: 0.6927 - val_loss: 0.7977 - val_accuracy: 0.5833
Epoch 57/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6644 -
accuracy: 0.6771 - val_loss: 0.7908 - val_accuracy: 0.5938
Epoch 58/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6694 -
accuracy: 0.7083 - val_loss: 0.8321 - val_accuracy: 0.5833
Epoch 59/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6848 -
accuracy: 0.6667 - val_loss: 0.7978 - val_accuracy: 0.5625
Epoch 60/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6482 -
accuracy: 0.7135 - val_loss: 0.8270 - val_accuracy: 0.5625
Epoch 61/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6902 -
accuracy: 0.6693 - val_loss: 0.7976 - val_accuracy: 0.6250
Epoch 62/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7122 -
accuracy: 0.6536 - val_loss: 0.7585 - val_accuracy: 0.6146
Epoch 63/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6760 -
accuracy: 0.6641 - val_loss: 0.7942 - val_accuracy: 0.5729
Epoch 64/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6535 -
accuracy: 0.6979 - val_loss: 0.8577 - val_accuracy: 0.5833
Epoch 65/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6574 -
accuracy: 0.6953 - val_loss: 0.9392 - val_accuracy: 0.5521
Epoch 66/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6551 -
accuracy: 0.6771 - val_loss: 0.8441 - val_accuracy: 0.5833
Epoch 67/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6795 -
accuracy: 0.6589 - val_loss: 0.7169 - val_accuracy: 0.6042
Epoch 68/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6769 -
accuracy: 0.6536 - val_loss: 0.7599 - val_accuracy: 0.5729
Epoch 69/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6629 -
accuracy: 0.6719 - val_loss: 0.7391 - val_accuracy: 0.6250
Epoch 70/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6897 -
accuracy: 0.6849 - val_loss: 0.8328 - val_accuracy: 0.5833
Epoch 71/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6380 -
accuracy: 0.7161 - val_loss: 0.8402 - val_accuracy: 0.5729
Epoch 72/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7059 -
accuracy: 0.6667 - val_loss: 0.8114 - val_accuracy: 0.6354
Epoch 73/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6612 -
accuracy: 0.6979 - val_loss: 0.7955 - val_accuracy: 0.5833
Epoch 74/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6171 -
accuracy: 0.7057 - val_loss: 0.7768 - val_accuracy: 0.5833
```

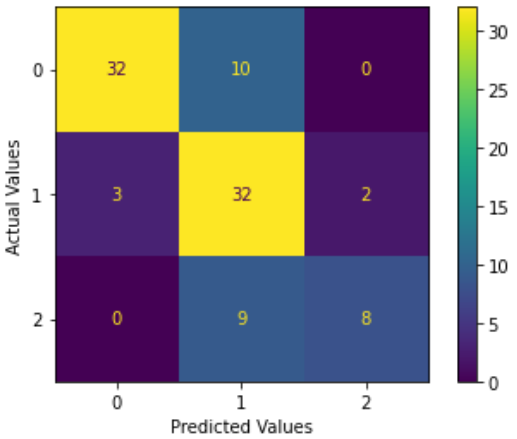
```
Epoch 75/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6527 -
accuracy: 0.6953 - val_loss: 0.9038 - val_accuracy: 0.5833
Epoch 76/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6582 -
accuracy: 0.7057 - val_loss: 0.8222 - val_accuracy: 0.5833
Epoch 77/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6577 -
accuracy: 0.6823 - val_loss: 0.8409 - val_accuracy: 0.5833
Epoch 78/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6701 -
accuracy: 0.7031 - val_loss: 0.7222 - val_accuracy: 0.6771
Epoch 79/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6648 -
accuracy: 0.6849 - val_loss: 0.7670 - val_accuracy: 0.6250
Epoch 80/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6407 -
accuracy: 0.6823 - val_loss: 0.8133 - val_accuracy: 0.5625
Epoch 81/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6357 -
accuracy: 0.7135 - val_loss: 0.7475 - val_accuracy: 0.6250
Epoch 82/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6323 -
accuracy: 0.7005 - val_loss: 0.7068 - val_accuracy: 0.7188
Epoch 83/100
24/24 [==============================] - 0s 3ms/step - loss: 0.7060 -
accuracy: 0.6849 - val_loss: 0.7881 - val_accuracy: 0.6146
Epoch 84/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6358 -
accuracy: 0.7109 - val_loss: 0.9642 - val_accuracy: 0.5625
Epoch 85/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6529 -
accuracy: 0.6693 - val_loss: 0.7657 - val_accuracy: 0.6146
Epoch 86/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6425 -
accuracy: 0.6875 - val_loss: 0.8141 - val_accuracy: 0.6250
Epoch 87/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6120 -
accuracy: 0.7005 - val_loss: 0.9054 - val_accuracy: 0.5833
Epoch 88/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6593 -
accuracy: 0.6719 - val_loss: 0.8135 - val_accuracy: 0.5833
Epoch 89/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6443 -
accuracy: 0.6927 - val_loss: 0.8615 - val_accuracy: 0.5833
Epoch 90/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6607 -
accuracy: 0.6849 - val_loss: 0.7566 - val_accuracy: 0.6458
Epoch 91/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6057 -
accuracy: 0.7161 - val_loss: 0.7441 - val_accuracy: 0.6250
Epoch 92/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6358 -
accuracy: 0.6901 - val_loss: 0.8503 - val_accuracy: 0.5938
Epoch 93/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6303 -
accuracy: 0.7005 - val_loss: 0.7407 - val_accuracy: 0.6354
Epoch 94/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6402 -
accuracy: 0.6953 - val_loss: 0.6929 - val_accuracy: 0.7292
Epoch 95/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6200 -
accuracy: 0.7057 - val_loss: 0.7878 - val_accuracy: 0.5729
Epoch 96/100
```

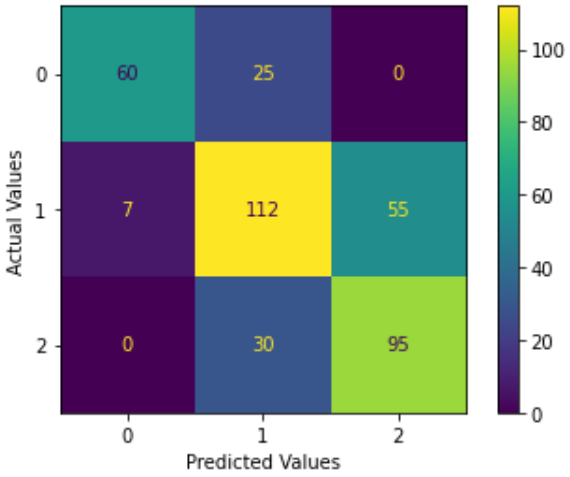
```
24/24 [==============================] - 0s 4ms/step - loss: 0.6186 -
accuracy: 0.7188 - val_loss: 0.7221 - val_accuracy: 0.6562
Epoch 97/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6169 -
accuracy: 0.7161 - val_loss: 0.7275 - val_accuracy: 0.6354
Epoch 98/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6374 -
accuracy: 0.6901 - val_loss: 0.7885 - val_accuracy: 0.6250
Epoch 99/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6082 -
accuracy: 0.7031 - val_loss: 0.8189 - val_accuracy: 0.6146
Epoch 100/100
24/24 [==============================] - 0s 3ms/step - loss: 0.6263 -
accuracy: 0.6823 - val_loss: 0.7993 - val_accuracy: 0.6042
------------------------------------------------------------------------
Score per fold
------------------------------------------------------------------------
> Fold 1 - Accuracy: 75.0%
------------------------------------------------------------------------
> Fold 2 - Accuracy: 57.291666666666664%
------------------------------------------------------------------------
> Fold 3 - Accuracy: 53.125%
------------------------------------------------------------------------
> Fold 4 - Accuracy: 50.0%
------------------------------------------------------------------------
> Fold 5 - Accuracy: 60.416666666666664%
------------------------------------------------------------------------
                                                               ----------
```

Fold1:

```
Accuracy: 0.750000
precision: 0.7805788982259569
recall; 0.6991192873545815
F1_score: 0.7170113836780504
confusion_matrix test:
[[32 10  0]
 [ 3 32  2]
 [ 0  9  8]]
confusion_matrix train:
[[ 60  25   0]
 [  7 112  55]
 [  0  30  95]]
```

Confusion Matrix1

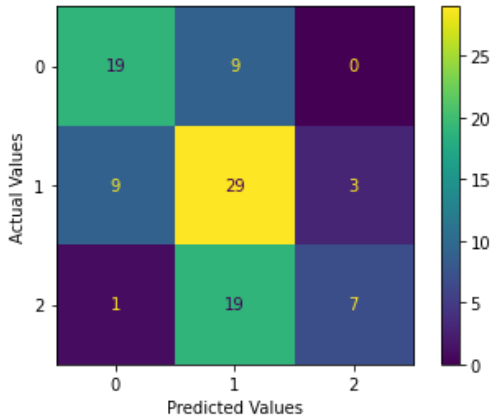


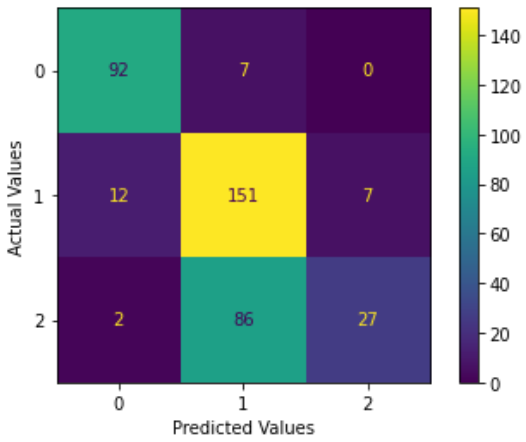


Fold2:

```
Accuracy: 0.572917
precision: 0.6213147812058882
recall; 0.5483825870004732
F1_score: 0.5456272599129741
confusion_matrix test:
[[19  9  0]
 [ 9 29  3]
 [ 1 19  7]]
confusion_matrix train:
[[ 92   7   0]
 [ 12 151   7]
 [  2  86  27]]
```

Confusion Matrix2

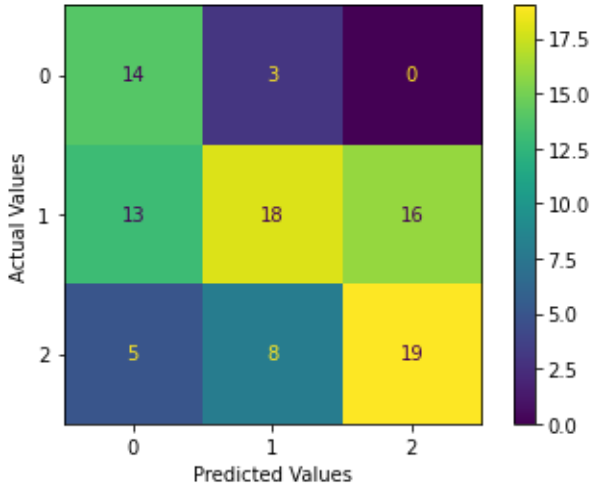


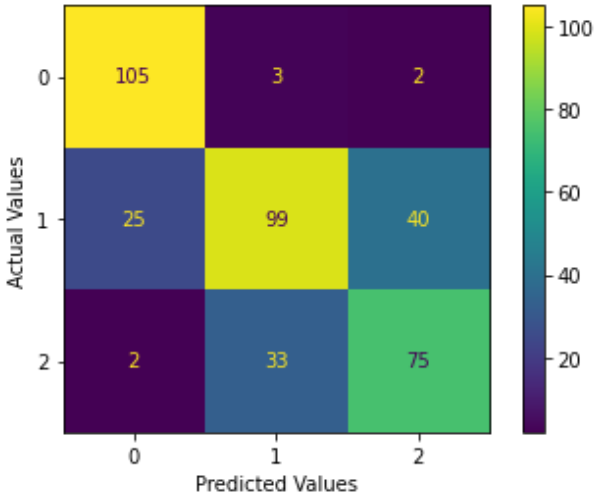


Fold3:

```
Accuracy: 0.531250
precision: 0.5336822660098521
recall; 0.6000860450563205
F1_score: 0.5374256536864549
confusion_matrix test:
[[14  3  0]
 [13 18 16]
 [ 5  8 19]]
confusion_matrix train:
[[105   3   2]
 [ 25  99  40]
 [  2  33  75]]
```

- **Confusion Matrix3**

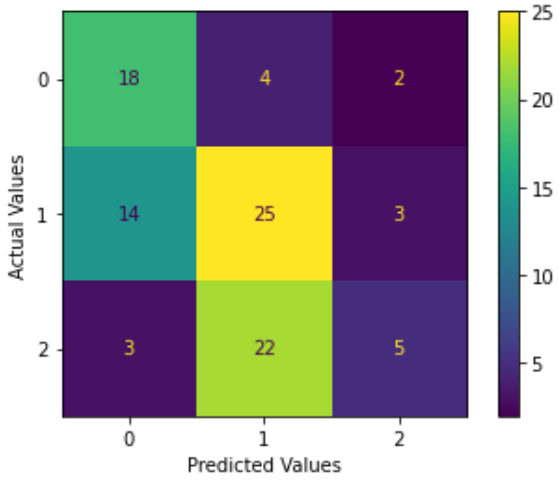


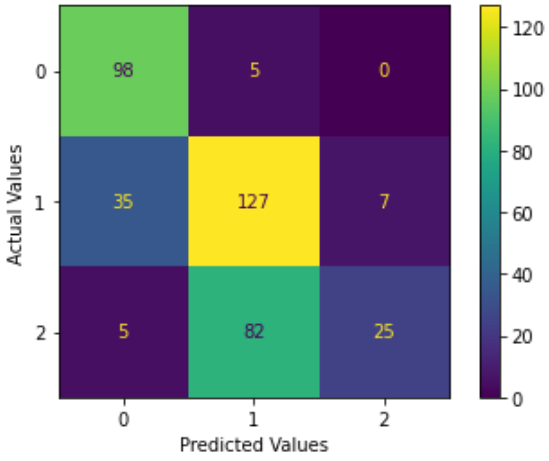


Fold4:

```
Accuracy: 0.500000
precision: 0.5014939309056956
recall; 0.5039682539682541
F1_score: 0.46593463337585805
confusion_matrix test:
[[18  4  2]
 [14 25  3]
 [ 3 22  5]]
confusion_matrix train:
[[ 98   5   0]
 [ 35 127   7]
 [  5  82  25]]
```

- **Confusion Matrix4**

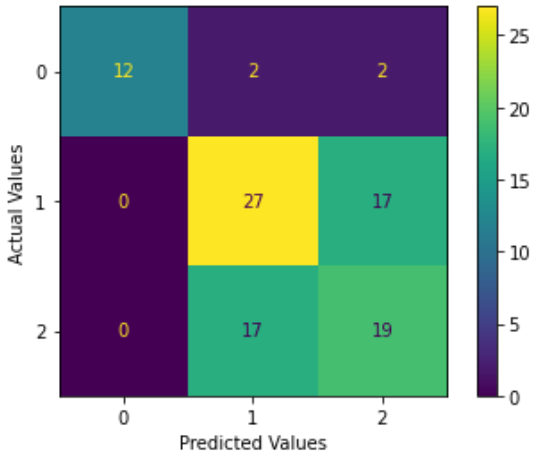


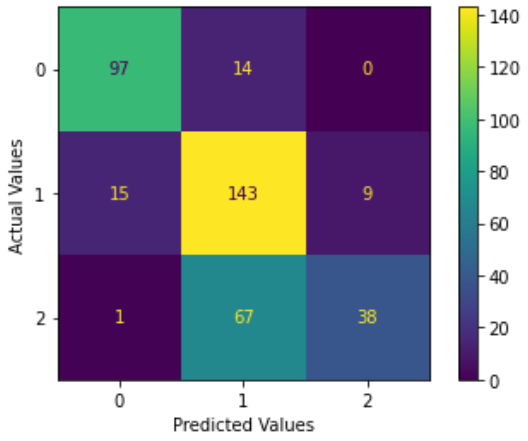


Fold5:

```
Accuracy: 0.604167
precision: 0.6956521739130435
recall; 0.6304713804713805
F1_score: 0.6568854568854569
confusion_matrix test:
[[12  2  2]
 [ 0 27 17]
 [ 0 17 19]]
confusion_matrix train:
[[ 97  14   0]
 [ 15 143   9]
 [  1  67  38]]
```

Confusion Matrix5





- **مقایسه بین مدل های مختلف و اعلام بهترین مدل**
- از بین سه مدل فوق مدل دوم، که ۴ لایه با optimization Rms وactivation function Reluاست بهترین مدل است. زیرا مقدر تست آن برای Fold ها بیشتر است.

- **توضیحات تکمیلی**

- طبق توضیحات بالا که داده شد برای هر مدل ۳ لایه، ۴ لایه، ۵ لایه، تمام activation functionهای Relu، sigmoid، tanh امتحان شده است. و برای هر کدام plotها و معیار های خواسته شده نمایش داده شده است.

- **نتایج بهبود بهترین مدل (نمره مثبت)**

- برای مدل مورد نظر یک L2 regilarizationزده شده است.

- **Epoch 100/ learning rate 0.0001**

```
Epoch 1/100
24/24 [==============================] - 3s 25ms/step - loss: 1.6974 - accuracy:
0.4583 - val_loss: 1.6351 - val_accuracy: 0.4688
Epoch 2/100
24/24 [==============================] - 0s 9ms/step - loss: 1.6254 - accuracy:
0.4844 - val_loss: 1.5872 - val_accuracy: 0.4688
Epoch 3/100
24/24 [==============================] - 0s 7ms/step - loss: 1.5718 - accuracy:
0.5104 - val_loss: 1.5488 - val_accuracy: 0.5104
Epoch 4/100
24/24 [==============================] - 0s 4ms/step - loss: 1.5264 - accuracy:
0.5339 - val_loss: 1.5159 - val_accuracy: 0.5208
Epoch 5/100
24/24 [==============================] - 0s 6ms/step - loss: 1.4855 - accuracy:
0.5703 - val_loss: 1.4842 - val_accuracy: 0.5104
Epoch 6/100
24/24 [==============================] - 0s 6ms/step - loss: 1.4486 - accuracy:
0.6068 - val_loss: 1.4551 - val_accuracy: 0.5104
Epoch 7/100
24/24 [==============================] - 0s 5ms/step - loss: 1.4134 - accuracy:
0.6198 - val_loss: 1.4265 - val_accuracy: 0.5625
Epoch 8/100
24/24 [==============================] - 0s 6ms/step - loss: 1.3805 - accuracy:
0.6589 - val_loss: 1.4001 - val_accuracy: 0.5938
```

```
Epoch 9/100
24/24 [==============================] - 0s 7ms/step - loss: 1.3491 - accuracy:
0.7005 - val_loss: 1.3757 - val_accuracy: 0.6042
Epoch 10/100
24/24 [==============================] - 0s 7ms/step - loss: 1.3189 - accuracy:
0.7266 - val_loss: 1.3519 - val_accuracy: 0.6250
Epoch 11/100
24/24 [==============================] - 0s 7ms/step - loss: 1.2899 - accuracy:
0.7500 - val_loss: 1.3296 - val_accuracy: 0.6562
Epoch 12/100
24/24 [==============================] - 0s 5ms/step - loss: 1.2622 - accuracy:
0.7734 - val_loss: 1.3095 - val_accuracy: 0.6562
Epoch 13/100
24/24 [==============================] - 0s 6ms/step - loss: 1.2356 - accuracy:
0.7917 - val_loss: 1.2884 - val_accuracy: 0.6875
Epoch 14/100
24/24 [==============================] - 0s 5ms/step - loss: 1.2103 - accuracy:
0.8073 - val_loss: 1.2690 - val_accuracy: 0.6979
Epoch 15/100
24/24 [==============================] - 0s 5ms/step - loss: 1.1863 - accuracy:
0.8307 - val_loss: 1.2509 - val_accuracy: 0.6979
Epoch 16/100
24/24 [==============================] - 0s 6ms/step - loss: 1.1639 - accuracy:
0.8490 - val_loss: 1.2331 - val_accuracy: 0.7083
Epoch 17/100
24/24 [==============================] - 0s 6ms/step - loss: 1.1429 - accuracy:
0.8594 - val_loss: 1.2171 - val_accuracy: 0.7188
Epoch 18/100
24/24 [==============================] - 0s 5ms/step - loss: 1.1223 - accuracy:
0.8672 - val_loss: 1.2020 - val_accuracy: 0.7188
Epoch 19/100
24/24 [==============================] - 0s 6ms/step - loss: 1.1026 - accuracy:
0.8698 - val_loss: 1.1873 - val_accuracy: 0.7292
Epoch 20/100
24/24 [==============================] - 0s 5ms/step - loss: 1.0837 - accuracy:
0.8724 - val_loss: 1.1735 - val_accuracy: 0.7292
Epoch 21/100
24/24 [==============================] - 0s 5ms/step - loss: 1.0652 - accuracy:
0.8776 - val_loss: 1.1611 - val_accuracy: 0.7500
Epoch 22/100
24/24 [==============================] - 0s 5ms/step - loss: 1.0480 - accuracy:
0.8828 - val_loss: 1.1488 - val_accuracy: 0.7500
Epoch 23/100
24/24 [==============================] - 0s 7ms/step - loss: 1.0315 - accuracy:
0.8828 - val_loss: 1.1353 - val_accuracy: 0.7604
Epoch 24/100
24/24 [==============================] - 0s 8ms/step - loss: 1.0150 - accuracy:
0.8880 - val_loss: 1.1240 - val_accuracy: 0.7396
Epoch 25/100
24/24 [==============================] - 0s 12ms/step - loss: 0.9990 - accuracy:
0.8906 - val_loss: 1.1125 - val_accuracy: 0.7292
Epoch 26/100
24/24 [==============================] - 0s 14ms/step - loss: 0.9834 - accuracy:
0.8880 - val_loss: 1.1015 - val_accuracy: 0.7188
Epoch 27/100
24/24 [==============================] - 0s 11ms/step - loss: 0.9676 - accuracy:
0.9036 - val_loss: 1.0912 - val_accuracy: 0.7188
Epoch 28/100
24/24 [==============================] - 0s 10ms/step - loss: 0.9529 - accuracy:
0.9010 - val_loss: 1.0814 - val_accuracy: 0.7188
Epoch 29/100
24/24 [==============================] - 0s 5ms/step - loss: 0.9382 - accuracy:
0.9010 - val_loss: 1.0722 - val_accuracy: 0.7188
Epoch 30/100
24/24 [==============================] - 0s 5ms/step - loss: 0.9236 - accuracy:
0.9036 - val_loss: 1.0647 - val_accuracy: 0.7292
Epoch 31/100
24/24 [==============================] - 0s 5ms/step - loss: 0.9099 - accuracy:
0.9062 - val_loss: 1.0564 - val_accuracy: 0.7396
Epoch 32/100
24/24 [==============================] - 0s 5ms/step - loss: 0.8962 - accuracy:
0.9062 - val_loss: 1.0462 - val_accuracy: 0.7292
```

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Epoch 33/100
24/24 [==============================] - 0s 5ms/step - loss: 0.8828 - accuracy:
0.9062 - val_loss: 1.0383 - val_accuracy: 0.7396
Epoch 34/100
24/24 [==============================] - 0s 5ms/step - loss: 0.8699 - accuracy:
0.9089 - val_loss: 1.0285 - val_accuracy: 0.7396
Epoch 35/100
24/24 [==============================] - 0s 5ms/step - loss: 0.8569 - accuracy:
0.9062 - val_loss: 1.0211 - val_accuracy: 0.7396
Epoch 36/100
24/24 [==============================] - 0s 5ms/step - loss: 0.8440 - accuracy:
0.9089 - val_loss: 1.0147 - val_accuracy: 0.7292
Epoch 37/100
24/24 [==============================] - 0s 5ms/step - loss: 0.8316 - accuracy:
0.9062 - val_loss: 1.0059 - val_accuracy: 0.7292
Epoch 38/100
24/24 [==============================] - 0s 5ms/step - loss: 0.8189 - accuracy:
0.9115 - val_loss: 0.9981 - val_accuracy: 0.7396
Epoch 39/100
24/24 [==============================] - 0s 5ms/step - loss: 0.8071 - accuracy:
0.9036 - val_loss: 0.9920 - val_accuracy: 0.7396
Epoch 40/100
24/24 [==============================] - 0s 5ms/step - loss: 0.7951 - accuracy:
0.9115 - val_loss: 0.9855 - val_accuracy: 0.7396
Epoch 41/100
24/24 [==============================] - 0s 4ms/step - loss: 0.7837 - accuracy:
0.9115 - val_loss: 0.9772 - val_accuracy: 0.7396
Epoch 42/100
24/24 [==============================] - 0s 5ms/step - loss: 0.7721 - accuracy:
0.9193 - val_loss: 0.9709 - val_accuracy: 0.7500
Epoch 43/100
24/24 [==============================] - 0s 5ms/step - loss: 0.7610 - accuracy:
0.9271 - val_loss: 0.9650 - val_accuracy: 0.7708
Epoch 44/100
24/24 [==============================] - 0s 5ms/step - loss: 0.7499 - accuracy:
0.9245 - val_loss: 0.9592 - val_accuracy: 0.7708
Epoch 45/100
24/24 [==============================] - 0s 5ms/step - loss: 0.7392 - accuracy:
0.9297 - val_loss: 0.9549 - val_accuracy: 0.7708
Epoch 46/100
24/24 [==============================] - 0s 5ms/step - loss: 0.7286 - accuracy:
0.9323 - val_loss: 0.9488 - val_accuracy: 0.7708
Epoch 47/100
24/24 [==============================] - 0s 5ms/step - loss: 0.7181 - accuracy:
0.9349 - val_loss: 0.9421 - val_accuracy: 0.7708
Epoch 48/100
24/24 [==============================] - 0s 5ms/step - loss: 0.7075 - accuracy:
0.9375 - val_loss: 0.9358 - val_accuracy: 0.7604
Epoch 49/100
24/24 [==============================] - 0s 5ms/step - loss: 0.6976 - accuracy:
0.9375 - val_loss: 0.9317 - val_accuracy: 0.7604
Epoch 50/100
24/24 [==============================] - 0s 5ms/step - loss: 0.6875 - accuracy:
0.9401 - val_loss: 0.9268 - val_accuracy: 0.7604
Epoch 51/100
24/24 [==============================] - 0s 5ms/step - loss: 0.6780 - accuracy:
0.9401 - val_loss: 0.9224 - val_accuracy: 0.7604
Epoch 52/100
24/24 [==============================] - 0s 5ms/step - loss: 0.6683 - accuracy:
0.9375 - val_loss: 0.9170 - val_accuracy: 0.7604
Epoch 53/100
24/24 [==============================] - 0s 6ms/step - loss: 0.6588 - accuracy:
0.9375 - val_loss: 0.9129 - val_accuracy: 0.7604
Epoch 54/100
24/24 [==============================] - 0s 5ms/step - loss: 0.6493 - accuracy:
0.9453 - val_loss: 0.9096 - val_accuracy: 0.7604
Epoch 55/100
24/24 [==============================] - 0s 6ms/step - loss: 0.6403 - accuracy:
0.9427 - val_loss: 0.9036 - val_accuracy: 0.7604
Epoch 56/100
24/24 [==============================] - 0s 4ms/step - loss: 0.6318 - accuracy:
0.9479 - val_loss: 0.8990 - val_accuracy: 0.7604
```

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Epoch 57/100
24/24 [==============================] - 0s 7ms/step - loss: 0.6228 - accuracy:
0.9479 - val_loss: 0.8970 - val_accuracy: 0.7500
Epoch 58/100
24/24 [==============================] - 0s 11ms/step - loss: 0.6141 - accuracy:
0.9505 - val_loss: 0.8915 - val_accuracy: 0.7500
Epoch 59/100
24/24 [==============================] - 0s 5ms/step - loss: 0.6057 - accuracy:
0.9505 - val_loss: 0.8880 - val_accuracy: 0.7500
Epoch 60/100
24/24 [==============================] - 0s 7ms/step - loss: 0.5969 - accuracy:
0.9505 - val_loss: 0.8827 - val_accuracy: 0.7500
Epoch 61/100
24/24 [==============================] - 0s 8ms/step - loss: 0.5886 - accuracy:
0.9505 - val_loss: 0.8795 - val_accuracy: 0.7500
Epoch 62/100
24/24 [==============================] - 0s 7ms/step - loss: 0.5800 - accuracy:
0.9531 - val_loss: 0.8754 - val_accuracy: 0.7500
Epoch 63/100
24/24 [==============================] - 0s 7ms/step - loss: 0.5722 - accuracy:
0.9531 - val_loss: 0.8724 - val_accuracy: 0.7500
Epoch 64/100
24/24 [==============================] - 0s 6ms/step - loss: 0.5639 - accuracy:
0.9557 - val_loss: 0.8694 - val_accuracy: 0.7500
Epoch 65/100
24/24 [==============================] - 0s 5ms/step - loss: 0.5559 - accuracy:
0.9531 - val_loss: 0.8653 - val_accuracy: 0.7500
Epoch 66/100
24/24 [==============================] - 0s 6ms/step - loss: 0.5484 - accuracy:
0.9583 - val_loss: 0.8595 - val_accuracy: 0.7500
Epoch 67/100
24/24 [==============================] - 0s 8ms/step - loss: 0.5406 - accuracy:
0.9583 - val_loss: 0.8592 - val_accuracy: 0.7500
Epoch 68/100
24/24 [==============================] - 0s 6ms/step - loss: 0.5331 - accuracy:
0.9609 - val_loss: 0.8546 - val_accuracy: 0.7500
Epoch 69/100
24/24 [==============================] - 0s 8ms/step - loss: 0.5256 - accuracy:
0.9609 - val_loss: 0.8531 - val_accuracy: 0.7604
Epoch 70/100
24/24 [==============================] - 0s 8ms/step - loss: 0.5187 - accuracy:
0.9609 - val_loss: 0.8496 - val_accuracy: 0.7500
Epoch 71/100
24/24 [==============================] - 0s 9ms/step - loss: 0.5111 - accuracy:
0.9609 - val_loss: 0.8468 - val_accuracy: 0.7604
Epoch 72/100
24/24 [==============================] - 0s 6ms/step - loss: 0.5042 - accuracy:
0.9635 - val_loss: 0.8455 - val_accuracy: 0.7604
Epoch 73/100
24/24 [==============================] - 0s 8ms/step - loss: 0.4971 - accuracy:
0.9635 - val_loss: 0.8436 - val_accuracy: 0.7604
Epoch 74/100
24/24 [==============================] - 0s 5ms/step - loss: 0.4901 - accuracy:
0.9661 - val_loss: 0.8404 - val_accuracy: 0.7604
Epoch 75/100
24/24 [==============================] - 0s 5ms/step - loss: 0.4827 - accuracy:
0.9609 - val_loss: 0.8363 - val_accuracy: 0.7604
Epoch 76/100
24/24 [==============================] - 0s 5ms/step - loss: 0.4767 - accuracy:
0.9661 - val_loss: 0.8336 - val_accuracy: 0.7604
Epoch 77/100
24/24 [==============================] - 0s 7ms/step - loss: 0.4696 - accuracy:
0.9688 - val_loss: 0.8317 - val_accuracy: 0.7604
Epoch 78/100
24/24 [==============================] - 0s 7ms/step - loss: 0.4633 - accuracy:
0.9661 - val_loss: 0.8309 - val_accuracy: 0.7604
Epoch 79/100
24/24 [==============================] - 0s 7ms/step - loss: 0.4567 - accuracy:
0.9688 - val_loss: 0.8311 - val_accuracy: 0.7604
Epoch 80/100
24/24 [==============================] - 0s 10ms/step - loss: 0.4506 - accuracy:
0.9714 - val_loss: 0.8287 - val_accuracy: 0.7604
```

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Epoch 81/100
24/24 [==============================] - 0s 5ms/step - loss: 0.4440 - accuracy:
0.9714 - val_loss: 0.8235 - val_accuracy: 0.7604
Epoch 82/100
24/24 [==============================] - 0s 5ms/step - loss: 0.4380 - accuracy:
0.9688 - val_loss: 0.8217 - val_accuracy: 0.7604
Epoch 83/100
24/24 [==============================] - 0s 5ms/step - loss: 0.4318 - accuracy:
0.9714 - val_loss: 0.8221 - val_accuracy: 0.7604
Epoch 84/100
24/24 [==============================] - 0s 7ms/step - loss: 0.4257 - accuracy:
0.9714 - val_loss: 0.8176 - val_accuracy: 0.7604
Epoch 85/100
24/24 [==============================] - 0s 5ms/step - loss: 0.4199 - accuracy:
0.9714 - val_loss: 0.8172 - val_accuracy: 0.7604
Epoch 86/100
24/24 [==============================] - 0s 8ms/step - loss: 0.4138 - accuracy:
0.9714 - val_loss: 0.8177 - val_accuracy: 0.7500
Epoch 87/100
24/24 [==============================] - 0s 5ms/step - loss: 0.4080 - accuracy:
0.9714 - val_loss: 0.8162 - val_accuracy: 0.7500
Epoch 88/100
24/24 [==============================] - 0s 6ms/step - loss: 0.4023 - accuracy:
0.9714 - val_loss: 0.8118 - val_accuracy: 0.7500
Epoch 89/100
24/24 [==============================] - 0s 7ms/step - loss: 0.3967 - accuracy:
0.9714 - val_loss: 0.8120 - val_accuracy: 0.7500
Epoch 90/100
24/24 [==============================] - 0s 8ms/step - loss: 0.3915 - accuracy:
0.9714 - val_loss: 0.8120 - val_accuracy: 0.7500
Epoch 91/100
24/24 [==============================] - 0s 6ms/step - loss: 0.3857 - accuracy:
0.9740 - val_loss: 0.8070 - val_accuracy: 0.7604
Epoch 92/100
24/24 [==============================] - 0s 6ms/step - loss: 0.3804 - accuracy:
0.9714 - val_loss: 0.8076 - val_accuracy: 0.7604
Epoch 93/100
24/24 [==============================] - 0s 6ms/step - loss: 0.3758 - accuracy:
0.9740 - val_loss: 0.8061 - val_accuracy: 0.7604
Epoch 94/100
24/24 [==============================] - 0s 5ms/step - loss: 0.3703 - accuracy:
0.9740 - val_loss: 0.8021 - val_accuracy: 0.7604
Epoch 95/100
24/24 [==============================] - 0s 5ms/step - loss: 0.3654 - accuracy:
0.9740 - val_loss: 0.8021 - val_accuracy: 0.7604
Epoch 96/100
24/24 [==============================] - 0s 5ms/step - loss: 0.3605 - accuracy:
0.9740 - val_loss: 0.8005 - val_accuracy: 0.7604
Epoch 97/100
24/24 [==============================] - 0s 7ms/step - loss: 0.3558 - accuracy:
0.9740 - val_loss: 0.7986 - val_accuracy: 0.7604
Epoch 98/100
24/24 [==============================] - 0s 5ms/step - loss: 0.3508 - accuracy:
0.9740 - val_loss: 0.7987 - val_accuracy: 0.7604
Epoch 99/100
24/24 [==============================] - 0s 6ms/step - loss: 0.3462 - accuracy:
0.9766 - val_loss: 0.7968 - val_accuracy: 0.7604
Epoch 100/100
24/24 [==============================] - 0s 6ms/step - loss: 0.3414 -
accuracy: 0.9740 - val_loss: 0.7939 - val_accuracy: 0.7708
```
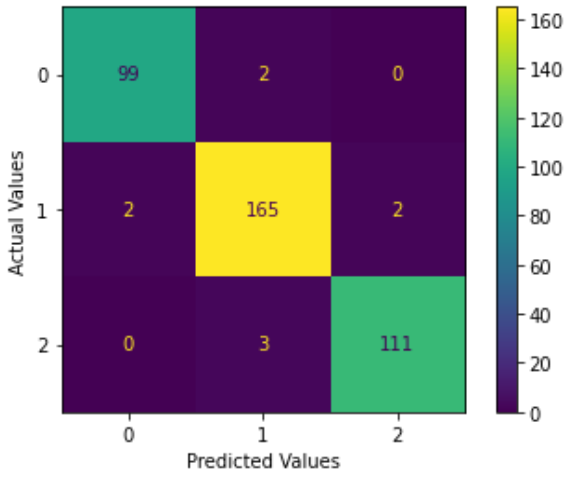
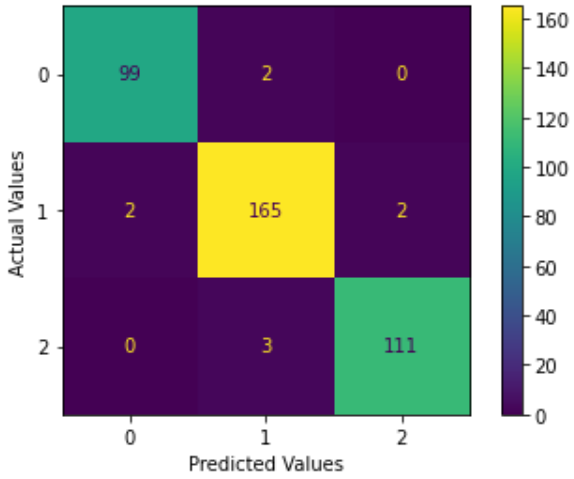
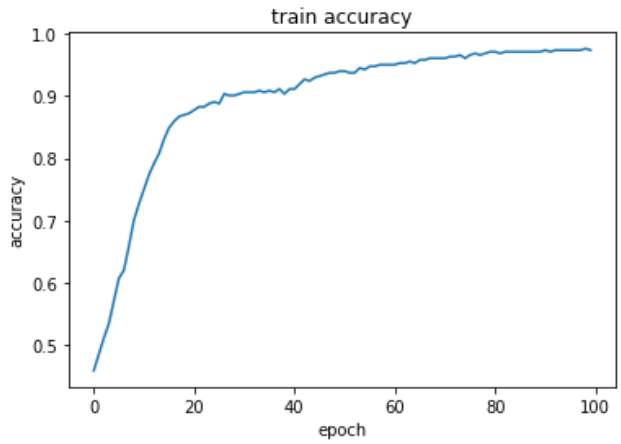

Plots:

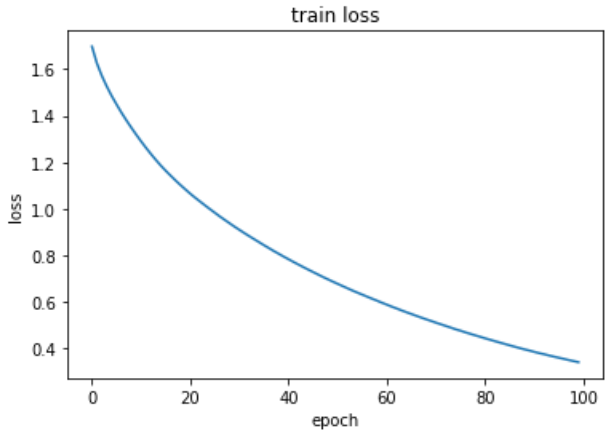
```
Accuracy: 0.770833
precision: 0.8057836161284436
recall; 0.7576312576312576
F1_score: 0.7712959555064818
confusion_matrix test:
[[17  8  1]
 [ 1 35  6]
```

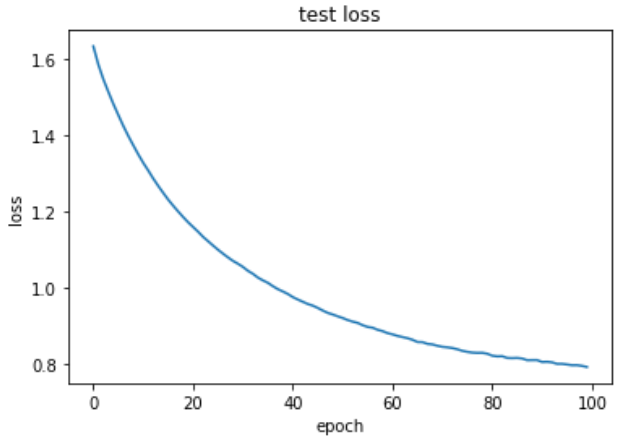
```
 [ 0  6 22]]
confusion_matrix train:
[[ 99   2   0]
 [  2 165   2]
 [  0   3 111]]
```

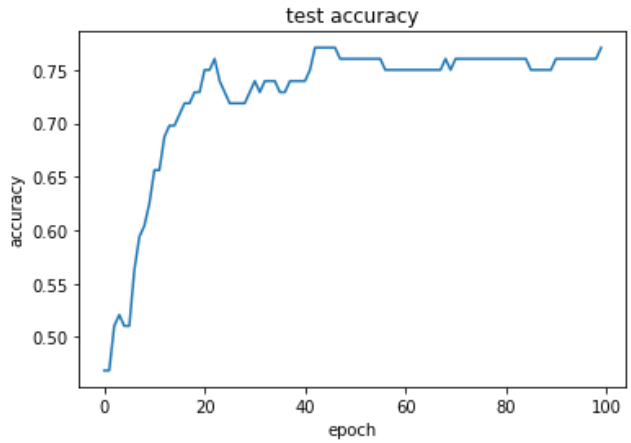





train accuracy
accuracy
epoch
1.0
0.9
0.8
0.7
0.6
0.5
0
20
40
60
80
100


train loss
loss
epoch
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0
20
40
60
80
100


test loss
loss
epoch
1.6
1.4
1.2
1.0
0.8
0
20
40
60
80
100


test accuracy
accuracy
epoch
0.75
0.70
0.65
0.60
0.55
0.50
0
20
40
60
80
100