

kaggle.com/code/sarahabo/atividade-2-cnn-classifica-o-de-imagens/edit

Beginner Levels - L... LIVE STREAMING

## Atividade 2 - CNN Classificação de Image...

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Code

history = model.fit(x\_train\_images, train\_labels, batch\_size=120, epochs=10, validation\_split=0.2)

shuffle A.\* 2/2

Epoch 1/15  
25/25 [=====] - 188s 8s/step - loss: 2.8177 - accuracy: 0.1904 - val\_loss: 1.6494 - val\_accuracy: 0.2188  
Epoch 2/15  
25/25 [=====] - 186s 7s/step - loss: 1.6386 - accuracy: 0.1938 - val\_loss: 1.6262 - val\_accuracy: 0.1737  
Epoch 3/15  
25/25 [=====] - 188s 8s/step - loss: 1.6220 - accuracy: 0.2001 - val\_loss: 1.6142 - val\_accuracy: 0.2075  
Epoch 4/15  
25/25 [=====] - 188s 8s/step - loss: 1.6204 - accuracy: 0.1982 - val\_loss: 1.6161 - val\_accuracy: 0.2412  
Epoch 5/15  
25/25 [=====] - 189s 8s/step - loss: 1.5731 - accuracy: 0.2685 - val\_loss: 1.5429 - val\_accuracy: 0.3075  
Epoch 6/15  
25/25 [=====] - 189s 8s/step - loss: 1.4733 - accuracy: 0.3636 - val\_loss: 1.5248 - val\_accuracy: 0.3288  
Epoch 7/15  
25/25 [=====] - 189s 8s/step - loss: 1.3722 - accuracy: 0.4326 - val\_loss: 1.5468 - val\_accuracy: 0.3338  
Epoch 8/15  
25/25 [=====] - 190s 8s/step - loss: 1.2367 - accuracy: 0.5083 - val\_loss: 1.6589 - val\_accuracy: 0.3450  
Epoch 9/15  
25/25 [=====] - 189s 8s/step - loss: 1.0623 - accuracy: 0.5861 - val\_loss: 1.6958 - val\_accuracy: 0.3500  
Epoch 10/15  
25/25 [=====] - 188s 8s/step - loss: 0.7924 - accuracy: 0.7018 - val\_loss: 2.0182 - val\_accuracy: 0.3388  
Epoch 11/15  
25/25 [=====] - 189s 8s/step - loss: 0.4988 - accuracy: 0.8149 - val\_loss: 2.6503 - val\_accuracy: 0.3512  
Epoch 12/15  
25/25 [=====] - 189s 8s/step - loss: 0.2504 - accuracy: 0.9153 - val\_loss: 3.3932 - val\_accuracy: 0.3300  
Epoch 13/15  
25/25 [=====] - 190s 8s/step - loss: 0.1218 - accuracy: 0.9597 - val\_loss: 3.9887 - val\_accuracy: 0.3363  
Epoch 14/15  
25/25 [=====] - 191s 8s/step - loss: 0.0745 - accuracy: 0.9769 - val\_loss: 4.2495 - val\_accuracy: 0.3600  
Epoch 15/15  
25/25 [=====] - 189s 8s/step - loss: 0.0461 - accuracy: 0.9853 - val\_loss: 5.6095 - val\_accuracy: 0.3613

+ Code + Markdown

[13]: def plot\_accuracy\_loss(history):

Console

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LIVE STREAMING

## Atividade 2 - CNN Classificação de Image...

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Draft Session (54m) H D C P U R A M

+ Run All Code

```
plt.plot(history.history['loss'], 'o--', label = 'loss')
plt.plot(history.history['val_loss'], 'ro--', label = "val_loss")
plt.title("train_loss vs val_loss")
plt.ylabel("loss")
plt.xlabel("epochs")
```

shuffle Aa .\* 2/2

plot\_accuracy\_loss(history)

train\_acc vs val\_acc

accuracy

train\_loss vs val\_loss

loss

epochs

+ Code + Markdown

test\_loss = model.evaluate(test\_images, test\_labels)

Console

11:58 PM 11/2/2022

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BEGINNER LEVELS - L... LIVE STREAMING

## Atividade 2 - CNN Classificação de Image...

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plt.show()

Draft Session (1h:8m) H D C P U R A M

[17]: display\_random\_image(class\_names, train\_images, train\_labels)

Image #1490 : Round

[18]:

```
def display_examples(class_names, images, labels):
    """
        Display 25 images from the images array with its corresponding labels
    """

    fig = plt.figure(figsize=(10,10))
```

Console

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## Atividade 2 - CNN Classificação de Image...

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Code ▾

Draft Session (1h:9m)

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display\_examples(class\_names, train\_images, train\_labels)

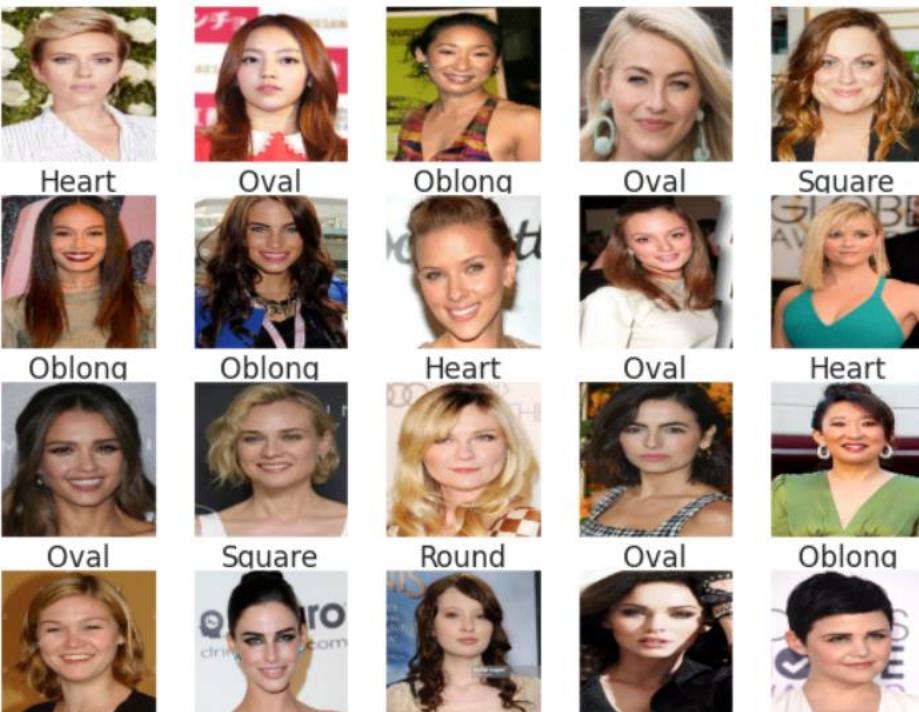
▶ shuffle

A<sup>a</sup> .\*

2/2

^ v ... x

Some examples of images of the dataset



Console

# Atividade 2 - CNN Classificação de Image...

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+ X D C R Run All Code ▾

predictions = model.predict(test\_images) # vector of probabilities  
pred\_labels = np.argmax(predictions, axis = 1) # We take the highest probability  
  
display\_random\_image(class\_names, test\_images, pred\_labels)

shuffle A\* 2/2

Image #110 : Round



```
def print_mislabeled_images(class_names, test_images, test_labels, pred_labels):  
    """  
        Print 25 examples of mislabeled images by the classifier, e.g when test_labels != pred_labels  
    """  
    B00 = (test_labels == pred_labels)  
    mislabeled_indices = np.where(B00 == 0)  
    mislabeled_images = test_images[mislabeled_indices]  
    mislabeled_labels = pred_labels[mislabeled_indices]
```

Console

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## Atividade 2 - CNN Classificação de Image...

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Code ▾

Draft Session (1h:9m)

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print\_mislabeled\_images(class\_names, test\_images, test\_labels, pred\_labels)

shuffle Aa .\*

2/2

^ v ... x

Some examples of images of the dataset



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LIVE STREAMING

## Atividade 2 - CNN Classificação de Image...

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Code

Draft Session (1h:9m) H D C P U R A M

shuffle 2/2

```
CM = confusion_matrix(test_labels, pred_labels)
ax = plt.axes()
sn.heatmap(CM, annot=True,
            annot_kws={"size": 10},
            xticklabels=class_names,
            yticklabels=class_names, ax = ax)
ax.set_title('Confusion matrix')
plt.show()
```

Confusion matrix

|        | Heart | Oblong | Oval | Round | Square |
|--------|-------|--------|------|-------|--------|
| Heart  | 92    | 19     | 36   | 37    | 16     |
| Oblong | 67    | 47     | 39   | 28    | 19     |
| Oval   | 59    | 16     | 67   | 37    | 21     |
| Round  | 38    | 9      | 47   | 79    | 27     |
| Square | 37    | 15     | 35   | 47    | 66     |

+ Code + Markdown

Console

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12:14 AM 11/3/2022

[https://github.com/Sara-Habo/Face-shape-Recognition/blob/main/code\\_trials\\_result/cnn\\_trained.ipynb](https://github.com/Sara-Habo/Face-shape-Recognition/blob/main/code_trials_result/cnn_trained.ipynb)

## notebook4772754ce2

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history mode: tf.train\_images, train\_labels, batch\_size=120, epochs=10, validation\_split=0.1, validation\_data is used for validation

2022-11-03 11:48:22.579424: I tensorflow/compiler/mlir/mlir\_graph\_optimization\_pass.cc:185] None of the MLIR Optimization Passes are enabled (registered 2)

Epoch 1/15

25/25 [=====] - 167s 7s/step - loss: 2.7298 - accuracy: 0.1803 - val\_loss: 1.6319 - val\_accuracy: 0.1807

Epoch 2/15

25/25 [=====] - 163s 7s/step - loss: 1.6415 - accuracy: 0.1954 - val\_loss: 1.6520 - val\_accuracy: 0.1982

Epoch 3/15

25/25 [=====] - 163s 7s/step - loss: 1.6408 - accuracy: 0.1916 - val\_loss: 1.6313 - val\_accuracy: 0.1982

Epoch 4/15

25/25 [=====] - 162s 7s/step - loss: 1.6277 - accuracy: 0.2101 - val\_loss: 1.6116 - val\_accuracy: 0.1882

Epoch 5/15

25/25 [=====] - 164s 7s/step - loss: 1.6113 - accuracy: 0.2334 - val\_loss: 1.5728 - val\_accuracy: 0.2836

Epoch 6/15

25/25 [=====] - 162s 6s/step - loss: 1.4503 - accuracy: 0.3521 - val\_loss: 1.3742 - val\_accuracy: 0.4040

Epoch 7/15

25/25 [=====] - 160s 6s/step - loss: 1.2655 - accuracy: 0.4717 - val\_loss: 1.2213 - val\_accuracy: 0.4818

Epoch 8/15

25/25 [=====] - 159s 6s/step - loss: 1.1753 - accuracy: 0.5254 - val\_loss: 1.1974 - val\_accuracy: 0.4969

Epoch 9/15

25/25 [=====] - 158s 6s/step - loss: 1.1330 - accuracy: 0.5459 - val\_loss: 1.2182 - val\_accuracy: 0.4981

Epoch 10/15

25/25 [=====] - 156s 6s/step - loss: 1.0162 - accuracy: 0.5961 - val\_loss: 1.0939 - val\_accuracy: 0.5521

Epoch 11/15

25/25 [=====] - 158s 6s/step - loss: 0.8672 - accuracy: 0.6614 - val\_loss: 1.0545 - val\_accuracy: 0.5734

Epoch 12/15

25/25 [=====] - 157s 6s/step - loss: 0.7155 - accuracy: 0.7334 - val\_loss: 1.1089 - val\_accuracy: 0.5997

Epoch 13/15

25/25 [=====] - 160s 6s/step - loss: 0.5397 - accuracy: 0.8031 - val\_loss: 1.1754 - val\_accuracy: 0.5972

Epoch 14/15

25/25 [=====] - 159s 6s/step - loss: 0.3934 - accuracy: 0.8549 - val\_loss: 1.3110 - val\_accuracy: 0.6085

Epoch 15/15

25/25 [=====] - 158s 6s/step - loss: 0.2376 - accuracy: 0.9165 - val\_loss: 1.4886 - val\_accuracy: 0.6211

+ Code

+ Markdown



Console

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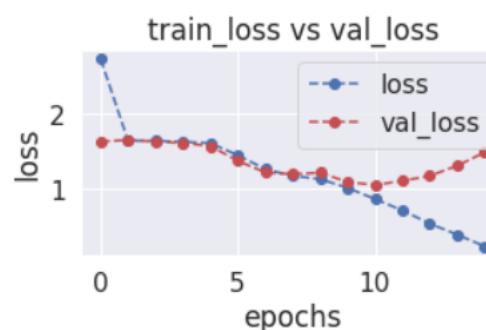
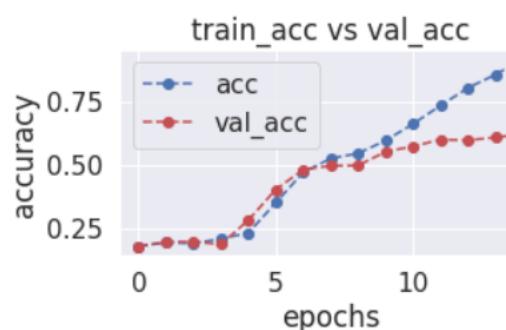
Code ▾

Draft Session (43m)

H D C P U R A M

⋮

▶ plot\_accuracy\_loss(history)



+ Code + Markdown

[ ]:  
test\_loss = model.evaluate(test\_images, test\_labels)[ ]:  
def display\_random\_image(class\_names, images, labels):  
 """  
 Display a random image from the images array and its corresponding label from the labels array.  
 """

Console



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[14]:

```
plot_accuracy_loss(history)
```

train\_acc vs val\_acc

accuracy

| Epoch | train_acc | val_acc |
|-------|-----------|---------|
| 0     | 0.25      | 0.25    |
| 5     | 0.40      | 0.40    |
| 10    | 0.60      | 0.55    |
| 15    | 0.75      | 0.60    |

train\_loss vs val\_loss

loss

| Epoch | train_loss | val_loss |
|-------|------------|----------|
| 0     | 2.0        | 1.5      |
| 5     | 1.2        | 1.2      |
| 10    | 0.8        | 1.0      |
| 15    | 0.6        | 1.2      |

▶ test\_loss = model.evaluate(test\_images, test\_labels)

```
32/32 [=====] - 11s 333ms/step - loss: 1.7018 - accuracy: 0.5892
```

+ Code + Markdown

[ ]:

```
def display_random_image(class_names, images, labels):  
    """  
        Display a random image from the images array and its correspond label from the labels array.  
    """
```

## notebook4772754ce2

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Code ▾

Draft Session (44m)

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Power

Reboot

More

```
plt.yticks([])  
plt.grid(False)  
plt.title('Image #{} : '.format(index) + class_names[labels[index]])  
plt.show()
```

```
display_random_image(class_names, train_images, train_labels)
```



+ Code

+ Markdown

```
[ ]: def display_random_image(class_names, images, labels):
```



Console

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+ Run All

Code ▾

Draft Session (44m)

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Some examples of images of the dataset



Square



Oval



Oblong



Square



Oblong



Heart



Round



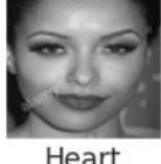
Oval



Oval



Square



Heart



Oval



Oblong



Round



Round



Square



Oval



Oval



Round



Oval

1

Console

## notebook4772754ce2 Draft saved

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Share

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Code ▾

Draft Session (45m)

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:

```
▶ predictions = model.predict(test_images)      # Vector of probabilities
pred_labels = np.argmax(predictions, axis = 1) # We take the highest probability

display_random_image(class_names, test_images, pred_labels)
```

Image #437 : Square

[+ Code](#) [+ Markdown](#)

```
[ ]: def print_mislabeled_images(class_names, test_images, test_labels, pred_labels):
    """
        Print 25 examples of mislabeled images by the classifier, e.g when test_labels != pred_labels
    """
```

Console 1

## notebook4772754ce2

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+ Run All

Code ▾

Draft Session (45m)

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⋮

Some examples of images of the dataset



Round



Heart



Oblong



Round



Square



Round



Square



Oblong



Round



Square



Round



Round



Oblong



Heart



Square



Oblong



Round



Oblong



Heart



Heart

1

Console



2:31 PM

11/3/2022

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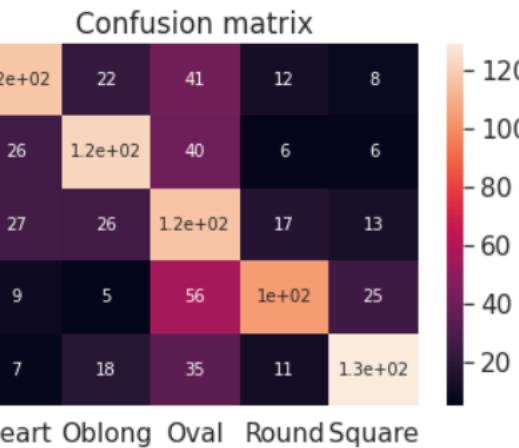
Code ▾

Draft Session (45m)

H D C P U R A M

P U R A M

```
CM = confusion_matrix(test_labels, pred_labels)
ax = plt.axes()
sn.heatmap(CM, annot=True,
            annot_kws={"size": 10},
            xticklabels=class_names,
            yticklabels=class_names, ax = ax)
ax.set_title('Confusion matrix')
plt.show()
```

[+ Code](#)[+ Markdown](#)

1

Console



<https://www.kaggle.com/code/zeyadkhalid/face-shape-recognition-73-accuracy>

- 50 epoch
- Time (1.6 hours)
- Dataset([face shape processed](#))
- Accuracy :73%

## Face Shape Recognition Draft saved

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+ Code ▾

Draft Session (2h:10m)

```
Epoch 14/50  
63/63 [=====] - 195s 3s/step - loss: 0.7586 - accuracy: 0.7062 - val_loss: 1.0295 - val_accuracy: 0.6403  
Epoch 15/50  
63/63 [=====] - 194s 3s/step - loss: 0.6694 - accuracy: 0.7588 - val_loss: 0.9807 - val_accuracy: 0.6403  
Epoch 16/50  
63/63 [=====] - 195s 3s/step - loss: 0.5948 - accuracy: 0.7740 - val_loss: 0.9541 - val_accuracy: 0.6453  
Epoch 17/50  
63/63 [=====] - 195s 3s/step - loss: 0.5231 - accuracy: 0.8196 - val_loss: 0.9693 - val_accuracy: 0.6533  
Epoch 18/50  
63/63 [=====] - 197s 3s/step - loss: 0.4602 - accuracy: 0.8303 - val_loss: 0.8979 - val_accuracy: 0.6653  
Epoch 19/50  
63/63 [=====] - 194s 3s/step - loss: 0.4279 - accuracy: 0.8443 - val_loss: 0.9125 - val_accuracy: 0.6713  
Epoch 20/50  
63/63 [=====] - 196s 3s/step - loss: 0.3978 - accuracy: 0.8629 - val_loss: 1.0959 - val_accuracy: 0.6443  
Epoch 21/50  
63/63 [=====] - 196s 3s/step - loss: 0.3509 - accuracy: 0.8758 - val_loss: 0.9637 - val_accuracy: 0.6914  
Epoch 22/50  
63/63 [=====] - 197s 3s/step - loss: 0.2403 - accuracy: 0.9151 - val_loss: 1.0979 - val_accuracy: 0.6633  
Epoch 23/50  
63/63 [=====] - 195s 3s/step - loss: 0.2535 - accuracy: 0.9062 - val_loss: 0.9747 - val_accuracy: 0.7134  
Epoch 24/50  
63/63 [=====] - 196s 3s/step - loss: 0.1721 - accuracy: 0.9428 - val_loss: 0.9940 - val_accuracy: 0.7124  
Epoch 25/50  
63/63 [=====] - 195s 3s/step - loss: 0.1661 - accuracy: 0.9450 - val_loss: 1.0301 - val_accuracy: 0.7174  
Epoch 26/50  
63/63 [=====] - 195s 3s/step - loss: 0.1125 - accuracy: 0.9730 - val_loss: 1.0815 - val_accuracy: 0.7154  
Epoch 27/50  
63/63 [=====] - 195s 3s/step - loss: 0.1244 - accuracy: 0.9620 - val_loss: 1.2538 - val_accuracy: 0.6894  
Epoch 28/50  
63/63 [=====] - 196s 3s/step - loss: 0.1134 - accuracy: 0.9612 - val_loss: 1.0907 - val_accuracy: 0.7154  
Epoch 29/50  
63/63 [=====] - 195s 3s/step - loss: 0.1087 - accuracy: 0.9656 - val_loss: 1.1064 - val_accuracy: 0.7174  
Epoch 30/50  
63/63 [=====] - 195s 3s/step - loss: 0.0916 - accuracy: 0.9706 - val_loss: 1.1978 - val_accuracy: 0.7144  
63/63 [=====] - 194s 3s/step - loss: 0.0715 - accuracy: 0.9769 - val_loss: 1.2006 - val_accuracy: 0.7305
```

+ Code

+ Markdown

Console



Face Shape Recognition | Kaggle × kaggle\_processed - Google Drive × +

kaggle.com/code/sarahabo/face-shape-recognition/edit

Beginner Levels - L... LIVE STREAMING

## Face Shape Recognition Draft saved

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Code

Epoch 30/50  
63/63 [=====] - 194s 3s/step - loss: 0.0715 - accuracy: 0.9769 - val\_loss: 1.2006 - val\_accuracy: 0.7

model

Draft Session (2h:10m) H D C P U R A M

+ Code + Markdown

[12]:  
# Evaluate Model  
scoreSeg = model.evaluate\_generator(test\_set)  
print("Accuracy = ", scoreSeg[1])  
  
Accuracy = 0.7304609417915344

[13]:  
model.save("face-shape-recognizer.h5")

[14]:  
# Visualize Loss & Accuracy  
  
%matplotlib inline  
acc = history.history['accuracy']  
val\_acc = history.history['val\_accuracy']  
loss = history.history['loss']  
val\_loss = history.history['val\_loss']  
  
epochs = range(len(acc))

Console

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Face Shape Recognition | Kaggle × kaggle\_processed - Google Drive × +

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Beginner Levels - L... LIVE STREAMING

# Face Shape Recognition

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Code ▾

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Training and validation accuracy

| Epoch | Training accuracy | Validation accuracy |
|-------|-------------------|---------------------|
| 0     | 0.25              | 0.25                |
| 5     | 0.55              | 0.50                |
| 10    | 0.68              | 0.58                |
| 15    | 0.82              | 0.65                |
| 20    | 0.90              | 0.68                |
| 25    | 0.95              | 0.72                |
| 30    | 0.98              | 0.75                |

Training and validation loss

| Epoch | Training Loss | Validation Loss |
|-------|---------------|-----------------|
| 0     | 4.5           | 1.5             |
| 5     | 1.0           | 1.3             |
| 10    | 0.8           | 1.1             |
| 15    | 0.6           | 1.0             |
| 20    | 0.3           | 1.1             |
| 25    | 0.1           | 1.2             |
| 30    | 0.05          | 1.2             |

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Draft Session (2h:10m)

model A<sup>a</sup> \* 4/28

Console

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Beginner Levels - L... LIVE STREAMING

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Draft Session (2h:10m) H D C P U R A M

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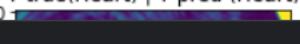
Y true(Oblong) | Y pred (Oblong)



Y true(Round) | Y pred (Round)



Y true(Heart) | Y pred (Heart)



model A\* 4/28

Console

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