Proyek Machine Learning: Rock Paper Scissors

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1. Machine Learning
2. Python

Dicoding Academy batch 5

```
!pip install wget
```

```
Collecting wget
  Downloading wget-3.2.zip (10 kB)
  Preparing metadata (setup.py) ... done
Building wheels for collected packages: wget
  Building wheel for wget (setup.py) ... done
  Created wheel for wget: filename=wget-3.2-py3-none-any.whl size=9657 sha256=5ac25ba2be32d29559136f209250357b770621bcc81af115e515decc87
  Stored in directory: /root/.cache/pip/wheels/8b/f1/7f/5c94f0a7a505ca1c81cd1d9208ae2064675d97582078e6c769
Successfully built wget
Installing collected packages: wget
Successfully installed wget-3.2
```

```
import numpy as np
import wget
import zipfile
from sklearn.model_selection import train_test_split
import tensorflow as tf
import keras
from keras.models import Sequential
from keras.layers import Conv2D, AveragePooling2D, Flatten, Dense, Dropout
from keras.preprocessing import image
from keras.preprocessing.image import ImageDataGenerator
from keras.optimizers import RMSprop
# from keras.losses import CategoricalCrossentropy
from IPython.display import Image
from google.colab import files


url = "https://github.com/dicodingacademy/assets/releases/download/release/rockpaperscissors.zip"
wget.download(url, 'rockpaperscissors.zip')

with zipfile.ZipFile('rockpaperscissors.zip', 'r') as zip_ref:
    zip_ref.extractall('/content/dataset')


train_datagen = ImageDataGenerator(
    rescale=1./255,
    rotation_range=20,
    # width_shift_range=0.2,
    # height_shift_range=0.2,
    # shear_range=0.2,
    zoom_range=0.2,
    horizontal_flip=True,
    validation_split=0.4
)

val_datagen = ImageDataGenerator(
    rescale=1./255,
    rotation_range=20,
    # width_shift_range=0.2,
    # height_shift_range=0.2,
    # shear_range=0.2,
    zoom_range=0.2,
    horizontal_flip=True,
    validation_split=0.4
)
```

```
train_generator = train_datagen.flow_from_directory(
    '/content/dataset/rockpaperscissors/rps-cv-images',
    target_size=(224, 224),
    batch_size=32,
    class_mode='categorical',
    subset='training'
)

validation_generator = val_datagen.flow_from_directory(
    '/content/dataset/rockpaperscissors/rps-cv-images',
    target_size=(224, 224),
    batch_size=32,
    class_mode='categorical',
    subset='validation'
)
```

```
Found 1314 images belonging to 3 classes.
Found 874 images belonging to 3 classes.
```

```
model = Sequential([
    Conv2D(32, (3,3), activation='relu', input_shape=(224, 224, 3)),
    AveragePooling2D(2,2),
    Conv2D(64, (3,3), activation='relu'),
    AveragePooling2D(2,2),
    # Conv2D(256, (3,3), activation='relu'),
    # AveragePooling2D(2,2),
    Conv2D(64, (3,3), activation='relu'),
    AveragePooling2D(2,2),
    Flatten(),
    Dense(128, activation='relu'),
    Dropout(0.5),
    Dense(3, activation='softmax')
])
```

```
model.summary()
```

```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #   
=================================================================
 conv2d (Conv2D)             (None, 222, 222, 32)      896       
                                                                 
 average_pooling2d (Average  (None, 111, 111, 32)      0         
 Pooling2D)                                                      
                                                                 
 conv2d_1 (Conv2D)           (None, 109, 109, 64)      18496     
                                                                 
 average_pooling2d_1 (Avera  (None, 54, 54, 64)        0         
 gePooling2D)                                                    
                                                                 
 conv2d_2 (Conv2D)           (None, 52, 52, 64)        36928     
                                                                 
 average_pooling2d_2 (Avera  (None, 26, 26, 64)        0         
 gePooling2D)                                                    
                                                                 
 flatten (Flatten)           (None, 43264)             0         
                                                                 
 dense (Dense)               (None, 128)               5537920   
                                                                 
 dropout (Dropout)           (None, 128)               0         
                                                                 
 dense_1 (Dense)             (None, 3)                 387       
                                                                 
=================================================================
Total params: 5594627 (21.34 MB)
Trainable params: 5594627 (21.34 MB)
Non-trainable params: 0 (0.00 Byte)
_________________________________________________________________
```

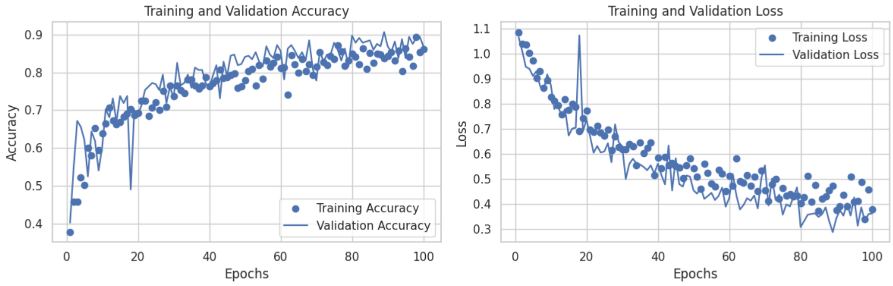
```
# from keras.callbacks import EarlyStopping

# early_stopping = EarlyStopping(monitor='val_accuracy', patience=2, mode='max', verbose=1)

model.compile(optimizer=RMSprop(learning_rate=0.0001), loss='categorical_crossentropy', metrics=['accuracy'])

history = model.fit(
    train_generator,
    steps_per_epoch=10,
    validation_data=validation_generator,
    validation_steps=10,
    epochs=100,
    verbose=1
    # callbacks=[early_stopping]
)
```

```
Epoch 1/100
10/10 [==============================] - 56s 6s/step - loss: 1.0858 - accuracy: 0.3781 - val_loss: 1.0649 - val_accuracy: 0.4031
Epoch 2/100
10/10 [==============================] - 52s 5s/step - loss: 1.0380 - accuracy: 0.4594 - val_loss: 1.0098 - val_accuracy: 0.5469
Epoch 3/100
10/10 [==============================] - 51s 5s/step - loss: 1.0364 - accuracy: 0.4594 - val_loss: 0.9469 - val_accuracy: 0.6719
Epoch 4/100
10/10 [==============================] - 52s 5s/step - loss: 1.0024 - accuracy: 0.5219 - val_loss: 0.9392 - val_accuracy: 0.6562
Epoch 5/100
10/10 [==============================] - 52s 6s/step - loss: 0.9723 - accuracy: 0.5034 - val_loss: 0.9109 - val_accuracy: 0.6219
Epoch 6/100
10/10 [==============================] - 51s 5s/step - loss: 0.9021 - accuracy: 0.6000 - val_loss: 0.9298 - val_accuracy: 0.5250
Epoch 7/100
10/10 [==============================] - 45s 5s/step - loss: 0.9293 - accuracy: 0.5813 - val_loss: 0.8701 - val_accuracy: 0.6438
Epoch 8/100
10/10 [==============================] - 44s 4s/step - loss: 0.8643 - accuracy: 0.6531 - val_loss: 0.8507 - val_accuracy: 0.6187
Epoch 9/100
10/10 [==============================] - 51s 5s/step - loss: 0.8942 - accuracy: 0.5938 - val_loss: 0.9169 - val_accuracy: 0.5406
Epoch 10/100
10/10 [==============================] - 43s 4s/step - loss: 0.8261 - accuracy: 0.6379 - val_loss: 0.8752 - val_accuracy: 0.6031
Epoch 11/100
10/10 [==============================] - 51s 5s/step - loss: 0.8115 - accuracy: 0.6656 - val_loss: 0.7788 - val_accuracy: 0.7031
Epoch 12/100
10/10 [==============================] - 45s 5s/step - loss: 0.7943 - accuracy: 0.7063 - val_loss: 0.7951 - val_accuracy: 0.6812
Epoch 13/100
10/10 [==============================] - 45s 5s/step - loss: 0.7582 - accuracy: 0.6719 - val_loss: 0.7493 - val_accuracy: 0.7312
Epoch 14/100
10/10 [==============================] - 51s 5s/step - loss: 0.8181 - accuracy: 0.6625 - val_loss: 0.7791 - val_accuracy: 0.6687
Epoch 15/100
10/10 [==============================] - 51s 5s/step - loss: 0.7769 - accuracy: 0.6687 - val_loss: 0.6729 - val_accuracy: 0.7375
Epoch 16/100
10/10 [==============================] - 43s 4s/step - loss: 0.8004 - accuracy: 0.6828 - val_loss: 0.7006 - val_accuracy: 0.7188
Epoch 17/100
10/10 [==============================] - 45s 5s/step - loss: 0.7860 - accuracy: 0.6906 - val_loss: 0.7045 - val_accuracy: 0.7375
Epoch 18/100
10/10 [==============================] - 51s 5s/step - loss: 0.6917 - accuracy: 0.7031 - val_loss: 1.0726 - val_accuracy: 0.4906
Epoch 19/100
10/10 [==============================] - 42s 4s/step - loss: 0.7406 - accuracy: 0.6862 - val_loss: 0.6902 - val_accuracy: 0.7000
Epoch 20/100
10/10 [==============================] - 51s 5s/step - loss: 0.7719 - accuracy: 0.6938 - val_loss: 0.7368 - val_accuracy: 0.6875
Epoch 21/100
10/10 [==============================] - 51s 5s/step - loss: 0.6954 - accuracy: 0.7250 - val_loss: 0.6705 - val_accuracy: 0.7125
Epoch 22/100
10/10 [==============================] - 52s 5s/step - loss: 0.6873 - accuracy: 0.7250 - val_loss: 0.6041 - val_accuracy: 0.7531
Epoch 23/100
10/10 [==============================] - 51s 5s/step - loss: 0.7111 - accuracy: 0.6844 - val_loss: 0.6312 - val_accuracy: 0.7625
Epoch 24/100
10/10 [==============================] - 45s 5s/step - loss: 0.6831 - accuracy: 0.7063 - val_loss: 0.6051 - val_accuracy: 0.7719
Epoch 25/100
10/10 [==============================] - 51s 5s/step - loss: 0.6716 - accuracy: 0.7219 - val_loss: 0.6095 - val_accuracy: 0.7688
Epoch 26/100
10/10 [==============================] - 49s 5s/step - loss: 0.6968 - accuracy: 0.7000 - val_loss: 0.6422 - val_accuracy: 0.7531
Epoch 27/100
10/10 [==============================] - 51s 5s/step - loss: 0.6139 - accuracy: 0.7500 - val_loss: 0.5665 - val_accuracy: 0.7937
Epoch 28/100
10/10 [==============================] - 51s 5s/step - loss: 0.6691 - accuracy: 0.7094 - val_loss: 0.7174 - val_accuracy: 0.7188
Epoch 29/100
10/10 [==============================] - 51s 5s/step - loss: 0.6280 - accuracy: 0.7656 - val_loss: 0.6474 - val_accuracy: 0.7625
```

```
model.evaluate(validation_generator)
```

```
28/28 [==============================] - 36s 1s/step - loss: 0.3342 - accuracy: 0.8879
[0.3342211842536926, 0.8878718614578247]
```

```
import matplotlib.pyplot as plt
import seaborn as sns

accuracy = history.history['accuracy']
val_accuracy = history.history['val_accuracy']
loss = history.history['loss']
val_loss = history.history['val_loss']
epochs = range(1, len(accuracy) + 1)

sns.set(style='whitegrid')

plt.figure(figsize=(12, 4))
plt.subplot(1, 2, 1)
plt.plot(epochs, accuracy, 'bo', label='Training Accuracy')
plt.plot(epochs, val_accuracy, 'b', label='Validation Accuracy')
plt.title('Training and Validation Accuracy')
plt.xlabel('Epochs')
plt.ylabel('Accuracy')
plt.legend()

plt.subplot(1, 2, 2)
plt.plot(epochs, loss, 'bo', label='Training Loss')
plt.plot(epochs, val_loss, 'b', label='Validation Loss')
plt.title('Training and Validation Loss')
plt.xlabel('Epochs')
plt.ylabel('Loss')
plt.legend()

plt.tight_layout()
plt.show()
```



```
def predict_uploaded_image(model, img_path):
    img = image.load_img(img_path, target_size=(224, 224))
    img = image.img_to_array(img)
    img = np.expand_dims(img, axis=0)
    img /= 255.0

    result = model.predict(img)
    class_index = np.argmax(result)

    return class_index


uploaded = files.upload()

for filename in uploaded.keys():
    img_path = filename
    class_index = predict_uploaded_image(model, img_path)

    if class_index == 0:
        print("Gambar adalah kertas")
    elif class_index == 1:
        print("Gambar adalah batu")
    else:
        print("Gambar adalah gunting")
```

```
display(Image(img_path))
```

Pilih File WhatsApp Im…t 21.52.20.jpeg

- **WhatsApp Image 2023-11-20 at 21.52.20.jpeg**(image/jpeg) - 89789 bytes, last modified: 20/11/2023 -

100% done

```
Saving WhatsApp Image 2023-11-20 at 21.52.20.jpeg to WhatsApp Image 2023-11-20 at 21.5
1/1 [==============================] - 0s 441ms/step
Gambar adalah kertas
```