

# Klasifikasi Digits Tulisan Tangan

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# Dataset yang Digunakan

- ▶ Nama Dataset: Optical Recognition of Handwritten Digits
- ▶ Link Dataset: <https://archive.ics.uci.edu/dataset/80/optical+recognition+of+handwritten+digits>

```
from sklearn import datasets
# Load the Digits dataset
digits = datasets.load_digits()
X, y = digits.data, digits.target
```

## Jumlah Fitur dan Label

- ▶ Jumlah Fitur: 64 (8x8 piksel)
- ▶ Jumlah Label: 10 (Digit 0 hingga 9)

```
# Jumlah Fitur dan Label
num_features = X.shape[1]
num_labels = len(set(y))
print(num_features) #Output 64
print(num_labels) #Output 10
```

# Jenis Jaringan Saraf Tiruan

- ▶ Jenis Jaringan: Multilayer Perceptron (MLP)

```
# Jenis Jaringan Saraf Tiruan: MLP  
model = models.Sequential()
```

# Optimisasi dan Fungsi Aktivasi

## ► Jenis Optimisasi: Adam

```
# Optimisasi dengan adam
model.compile(optimizer='adam',
              loss='sparse_categorical_crossentropy',
              metrics=['accuracy'])
```

# Jumlah Hidden Layer dan Node

- ▶ Fungsi Aktivasi: ReLU pada Hidden Layer, Softmax pada Output Layer
- ▶ Jumlah Hidden Layer: 2
- ▶ Jumlah Total Hidden Node per Layer: 128

```
# Jumlah Hidden Layer dan Node
# Adding an additional hidden layer
model.add(layers.Dense(128, activation='relu'))
model.add(layers.Dense(128, activation='relu'))
```

## Jumlah Total Bobot (Weight)

► Jumlah Total bobot : 30282

```
# Jumlah Total Bobot  
total_weights = model.count_params()  
print(total_weight) #Output 30282
```

# Pelatihan Model (Output Epoch)

▶ 12/12

[=====] - 0s  
3ms/step - loss: 0.1115 - accuracy: 0.9722

```
# Pelatihan Model
```

```
model.fit(X_train_scaled, y_train, epochs=10, batch_size=64,  
          validation_split=0.1,  
          callbacks=[tensorboard_callback])
```



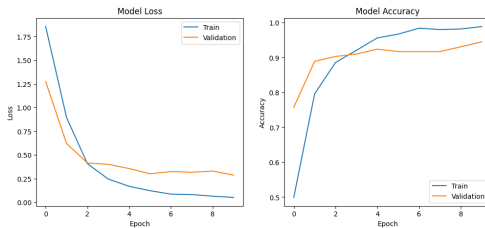
# Evaluasi Model pada Data Uji (Test Accuracy)

► Test Accuracy: 0.975..

```
# Evaluasi Model pada Data Uji
test_loss, test_acc = model.evaluate(X_test_scaled, y_test)
print(f'Test Accuracy: {test_acc}') #0.9750000238418579
```

# Plot Training

## ► Model Loss dan Accuracy



Terimakasih