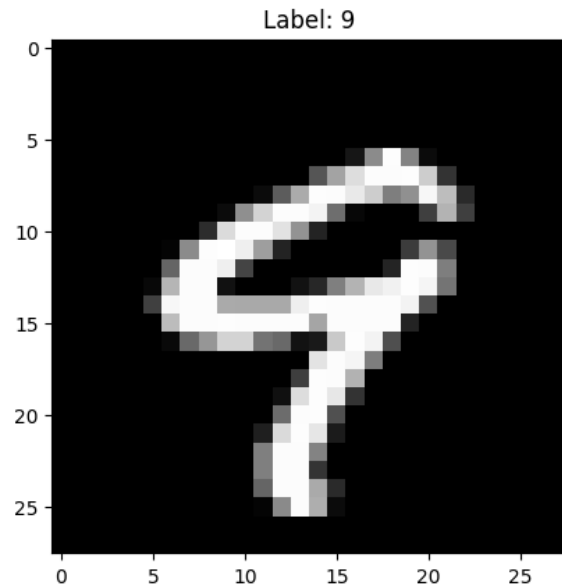


## Random sample:



## Name five activation functions:

- ReLu (Rectified Linear Unit)
- Linear
- Leaky ReLu
- Sigmoid / Logistic
- Binary Step

## Screenshot of the model:

```
# Create model
model = models.Sequential()

# Stage 1: First set of layers
model.add(layers.Conv2D(8, (3, 3), activation='relu', padding='same', input_shape=(28, 28, 1)))
model.add(layers.MaxPooling2D((2, 2)))
model.add(layers.Conv2D(8, (3, 3), activation='relu', padding='same'))
model.add(layers.MaxPooling2D((2, 2)))
model.add(layers.Conv2D(8, (3, 3), activation='relu', padding='same'))
model.add(layers.MaxPooling2D((2, 2)))

# Stage 2: Second set of layers
model.add(layers.Conv2D(16, (3, 3), activation='relu', padding='same'))
model.add(layers.MaxPooling2D((2, 2)))
model.add(layers.Conv2D(16, (3, 3), activation='relu', padding='same'))
model.add(layers.MaxPooling2D((1, 1)))
model.add(layers.Conv2D(16, (3, 3), activation='relu', padding='same'))
model.add(layers.MaxPooling2D((1, 1)))

# Stage 3: Third set of layers
model.add(layers.Conv2D(32, (3, 3), activation='relu', padding='same'))
model.add(layers.Conv2D(32, (3, 3), activation='relu', padding='same'))

# Stage 4: Flatten layer
model.add(layers.Flatten())

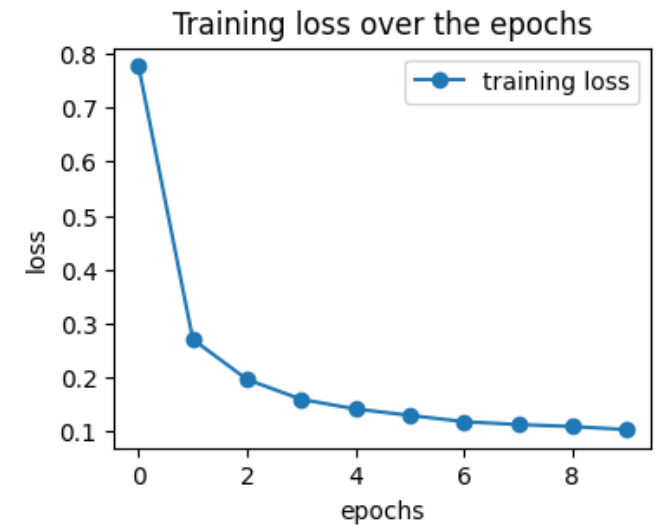
# Stage 5: Fully connected layers with Dropout
model.add(layers.Dense(128, activation='relu'))
model.add(layers.Dropout(0.2)) # Dropout with rate 0.2
model.add(layers.Dense(128, activation='relu'))
model.add(layers.Dropout(0.2)) # Dropout with rate 0.2
model.add(layers.Dense(128, activation='relu'))
model.add(layers.Dropout(0.2)) # Dropout with rate 0.2

# Stage 6: Output layer with Softmax (for classification)
model.add(layers.Dense(128, activation='relu')) # First dense layer
model.add(layers.Dense(10, activation='softmax')) # Second dense layer (output)
```

## Final test accuracy:

313/313 ————— 2s 5ms/step - acc: 0.9658 - loss: 0.1344  
Test accuracy: 97.37%

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## What does

### **sparse\_categorical\_crossentropy** mean?

- Sparse categorical crossentropy is the loss function that is used at the output layers. It measures how badly the model works and outputs a number that indicates how high the error is.

## What is „adam“?

- Adam is the optimizer that is used to train the model. It uses the loss function to update the model parameters and reduces the error by fitting the model to the data.

## What does „epoch“ mean?

- 1 epoch means that each example in the training dataset has been run through the model once. Several epochs are necessary to train the model, as it should gradually reduce its errors and make better predictions over the epochs