

# Rede Neural Convolucional para Classificação de Números

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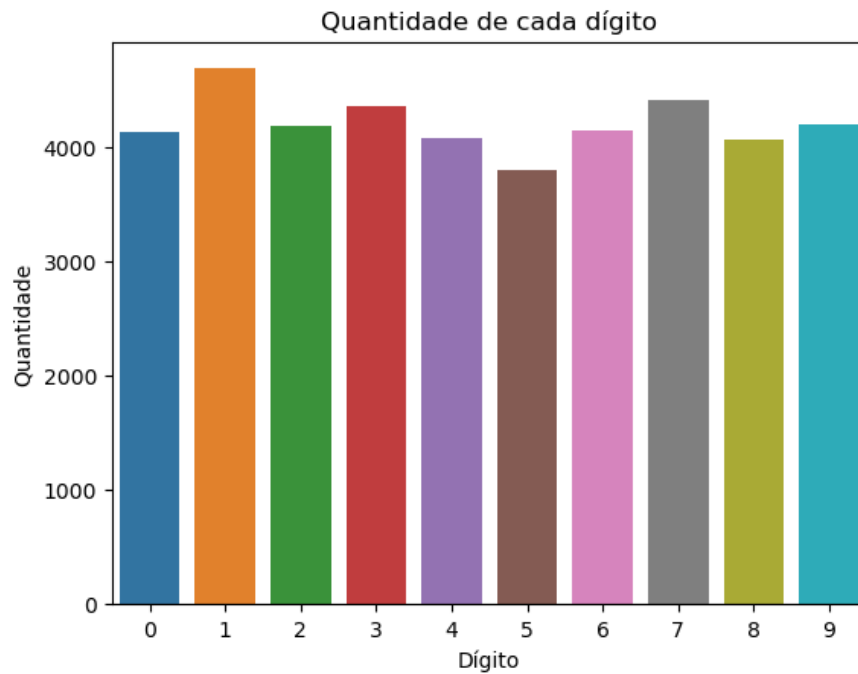


# Conjunto de dados

- Digit Recognizer (Kaggle)
- 48000 amostras
- Dígitos de 0 a 9
- 28x28 pixels
- Valor de pixel entre 0 a 255



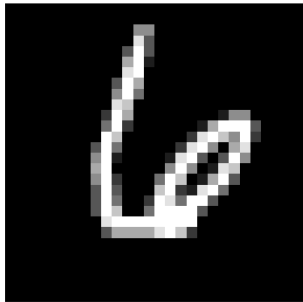
# Conjunto de dados



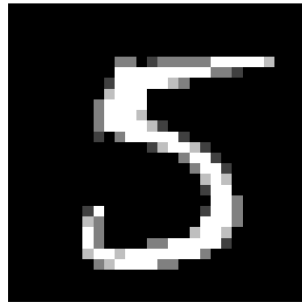


# Exemplos

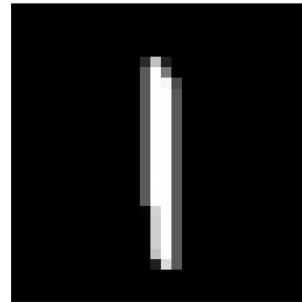
Valor Real: 6



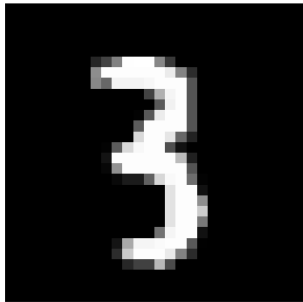
Valor Real: 5



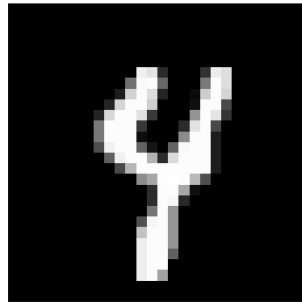
Valor Real: 1



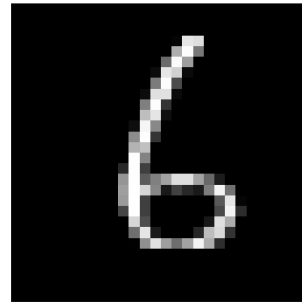
Valor Real: 3



Valor Real: 4

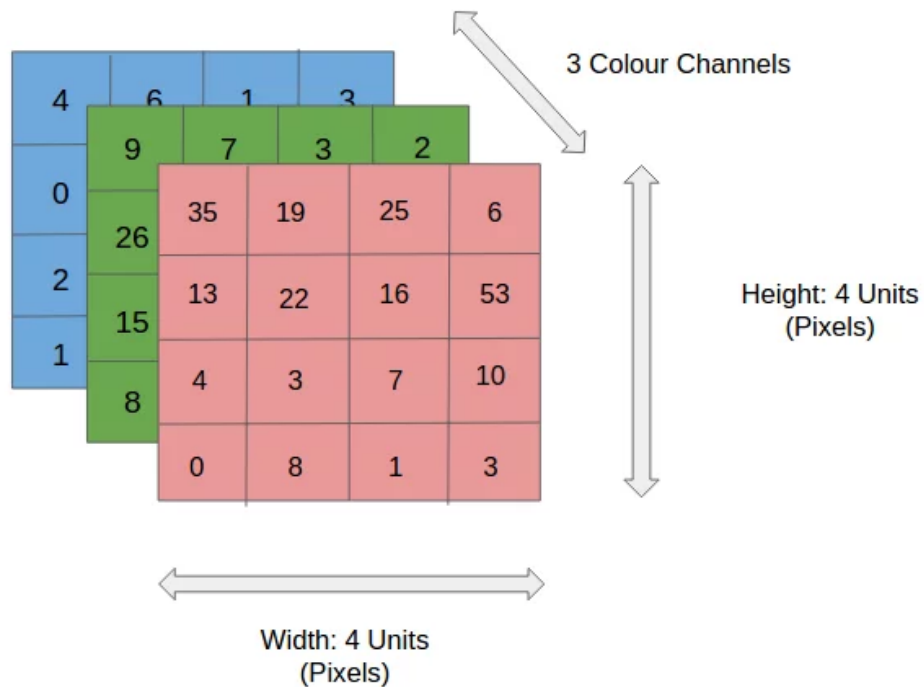


Valor Real: 6

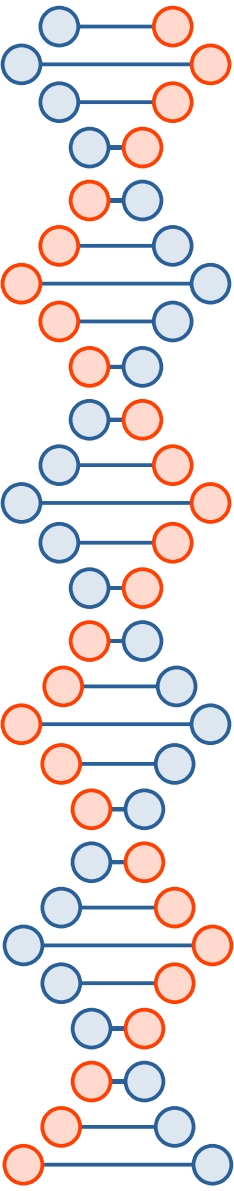


# Redes Neurais Convolucionais

As imagens são vista como matriz de 3 dimensões



# Redes Neurais Convolucionais

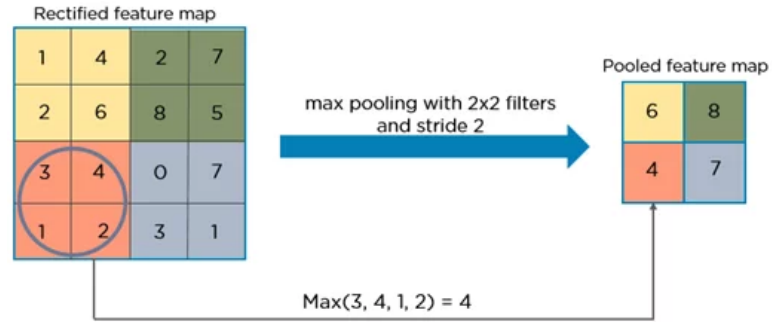


1	0	1
0	1	0
1	0	1

1	1	1	0	0
0	1	1	1	0
0	0	1	1	1
0	0	1	1	0
0	1	1	0	0

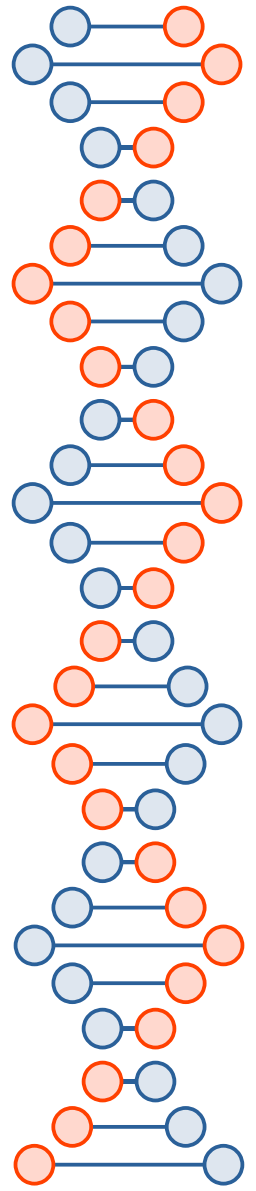
- $(1 \cdot 1) + (1 \cdot 0) + (1 \cdot 1) + (0 \cdot 0) + (1 \cdot 1) + (1 \cdot 0) + (0 \cdot 1) + (0 \cdot 0) + (1 \cdot 1) = 4$

# Redes Neurais Convolucionais



- Pooling: Redução de dimensionalidade

# Redes Neurais Convolucionais



```
In [10]: model = tf.keras.models.Sequential([
    tf.keras.layers.Conv2D(64, (3,3), activation='relu', input_shape=(28, 28, 1)),
    tf.keras.layers.MaxPooling2D(2, 2),

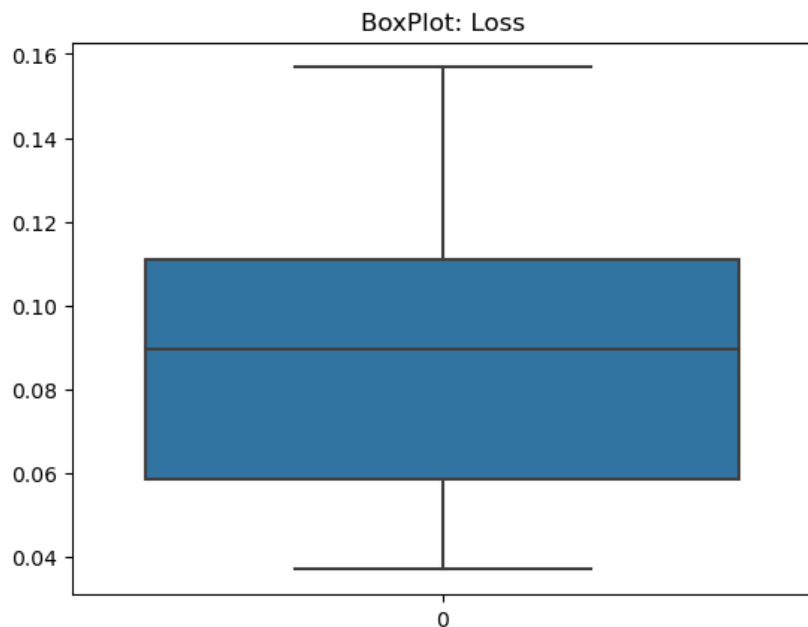
    tf.keras.layers.Conv2D(32, (3,3), activation='relu'),
    tf.keras.layers.MaxPooling2D(2, 2),

    tf.keras.layers.Flatten(),
    tf.keras.layers.Dropout(0.5),

    tf.keras.layers.Dense(512, activation='relu'),
    tf.keras.layers.Dense(10, activation='softmax')
])
```

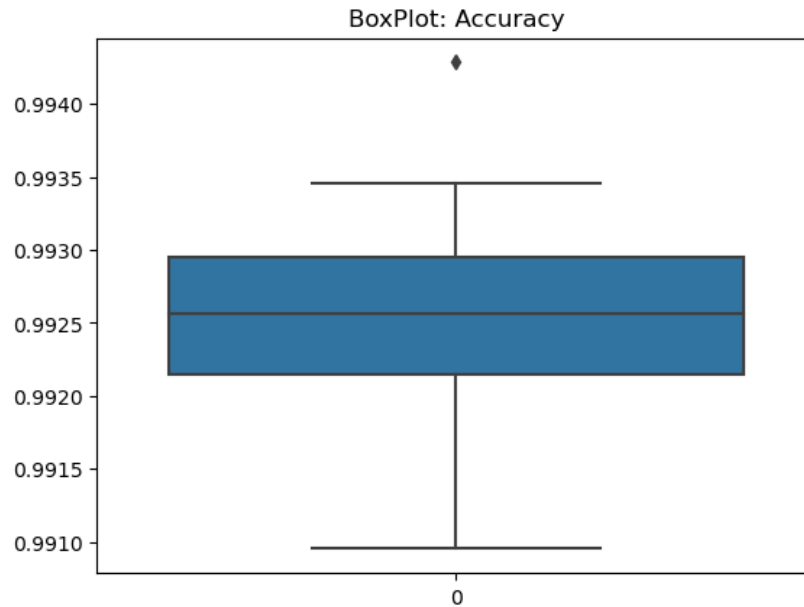
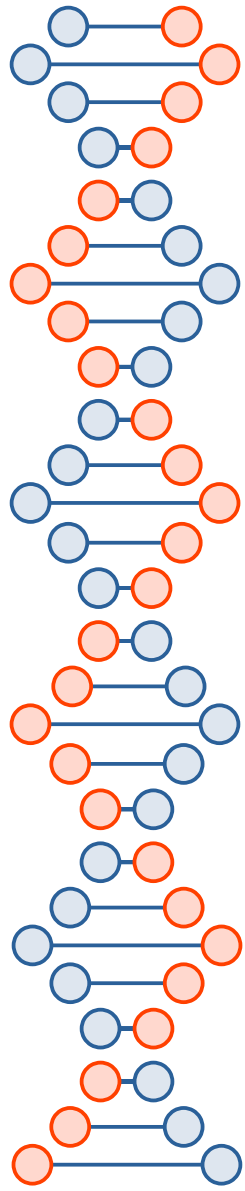


# Resultados

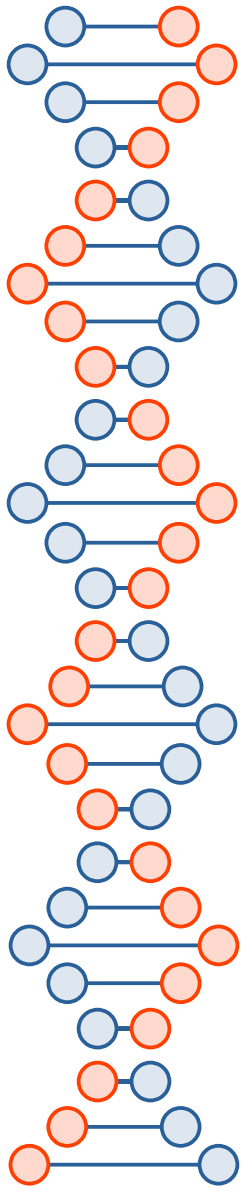


count	30.000000
mean	0.087669
std	0.030951
min	0.037097
25%	0.058634
50%	0.089810
75%	0.110912
max	0.156796

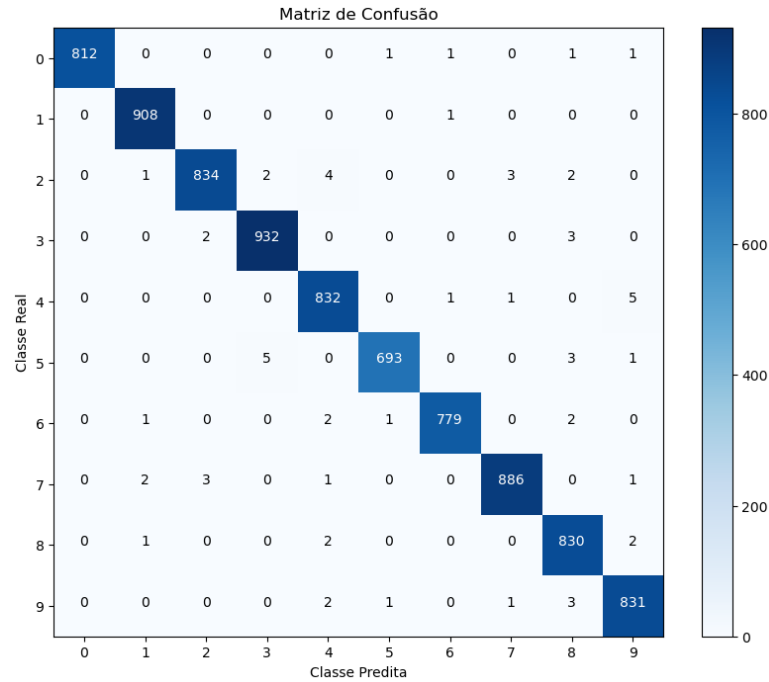
# Resultados



count	30.000000
mean	0.992492
std	0.000747
min	0.990952
25%	0.992143
50%	0.992560
75%	0.992946
max	0.994286



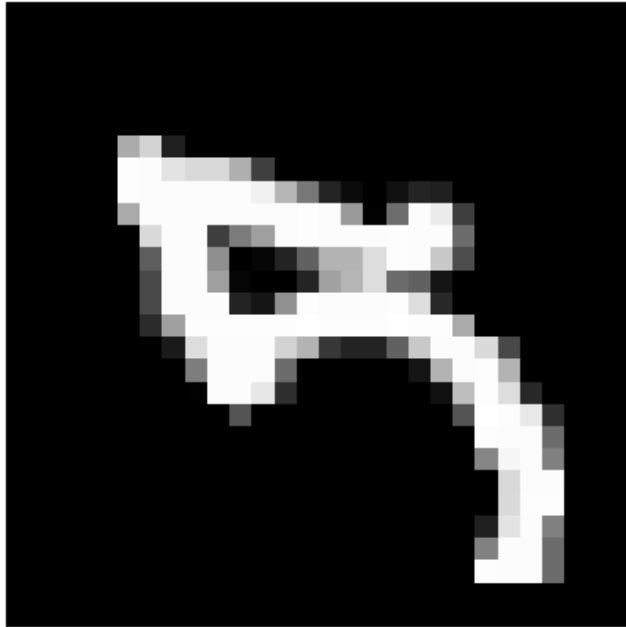
# Resultados



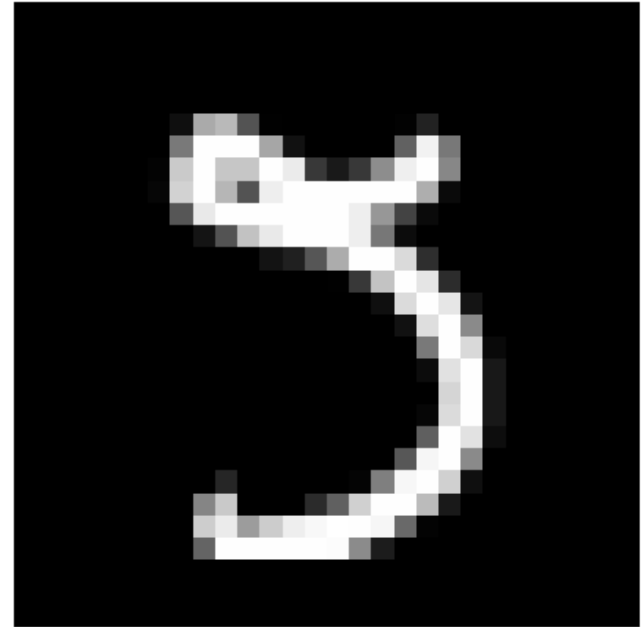


# Resultados

True label: 5, Predicted label: 3



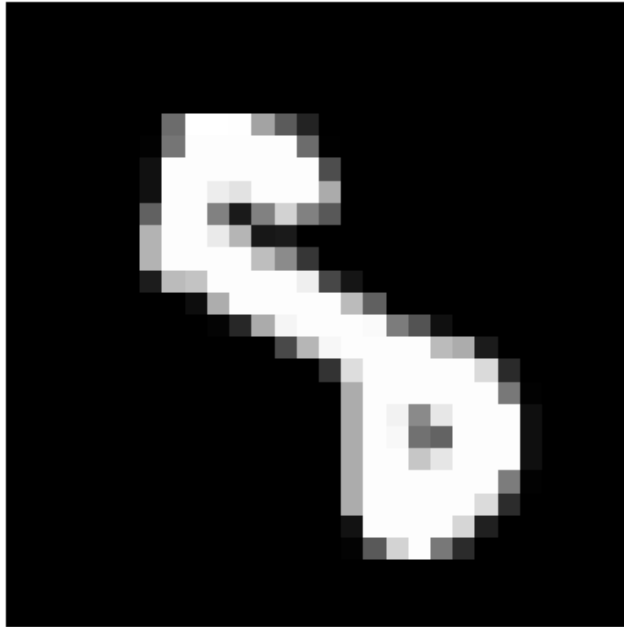
True label: 5, Predicted label: 3



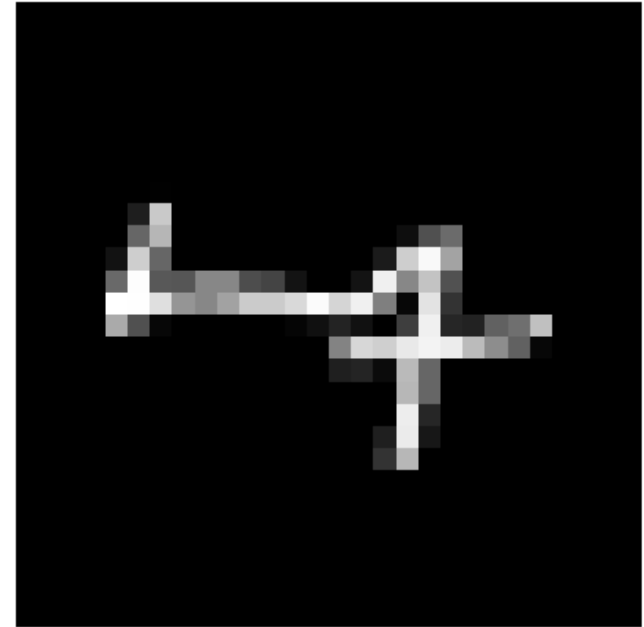


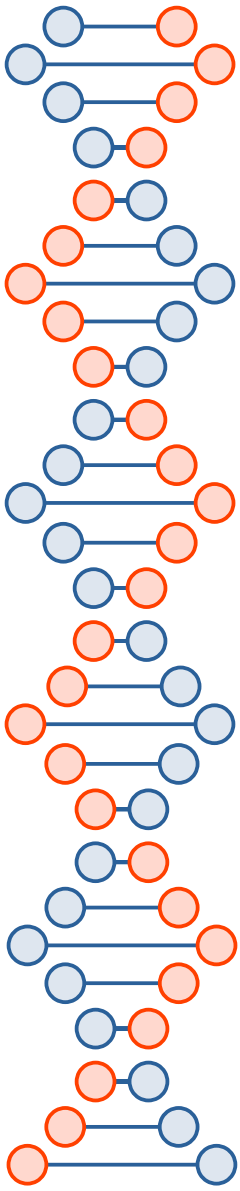
# Resultados

True label: 5, Predicted label: 8



True label: 7, Predicted label: 4





# Resultados

True label: 9, Predicted label: 8

