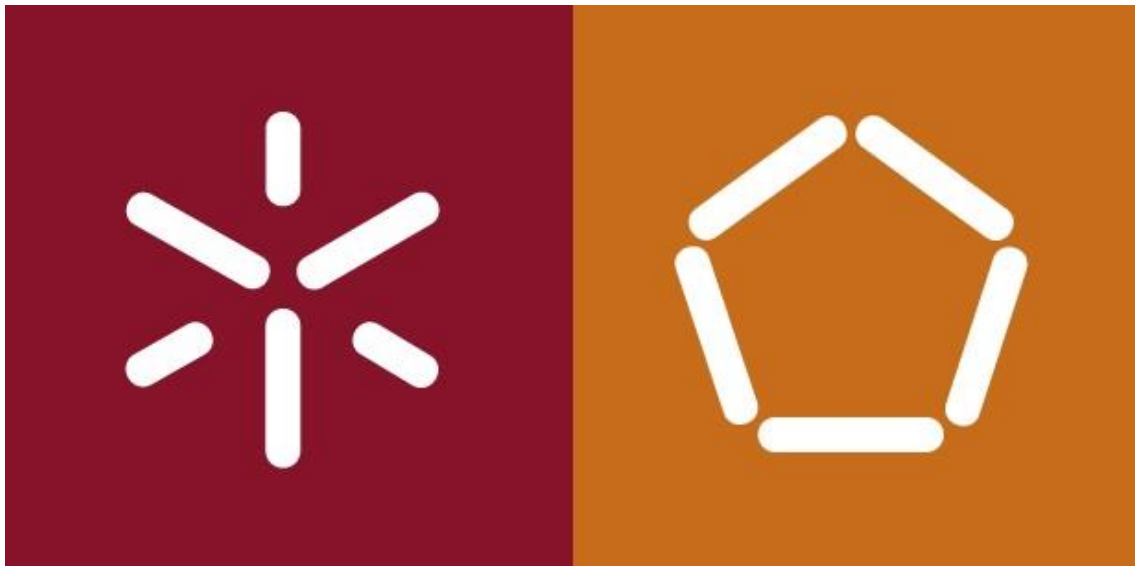


# Universidade do Minho

Departamento de Informática  
Mestrado Integrado em Engenharia Informática



Perfil de Machine Learning: Fundamentos e Aplicações  
Classificadores e Sistemas Conexionistas  
Trabalho Prático nº 7

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15 de Abril de 2020

Resultados obtidos depois dos 3 exercícios da ficha, assim como os parâmetros utilizados:

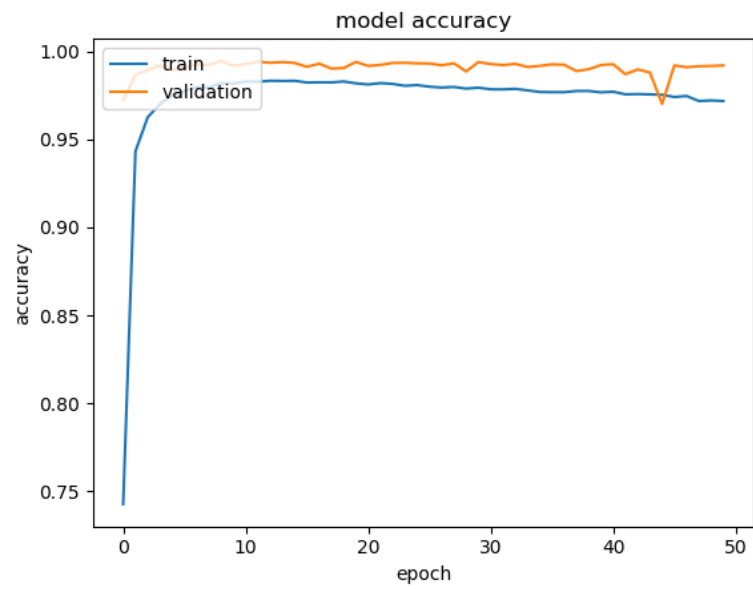
Exercício	Epochs	Batch Size	Accuracy
T1	50	150	97%
T2	50	150	87%
T3	50	150	71%

De seguida apresentarei as arquiteturas utilizadas nos 3 exercícios da ficha, bem como as respetivas curvas de aprendizagem:

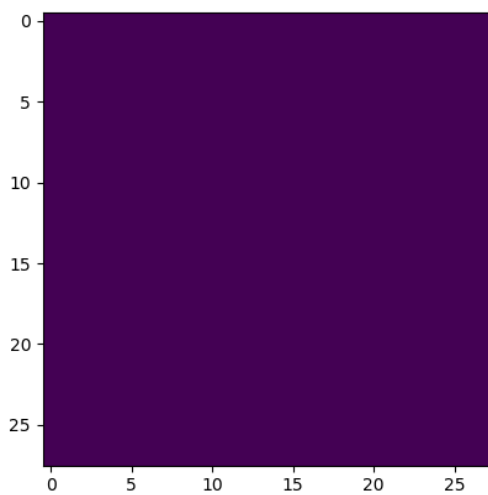
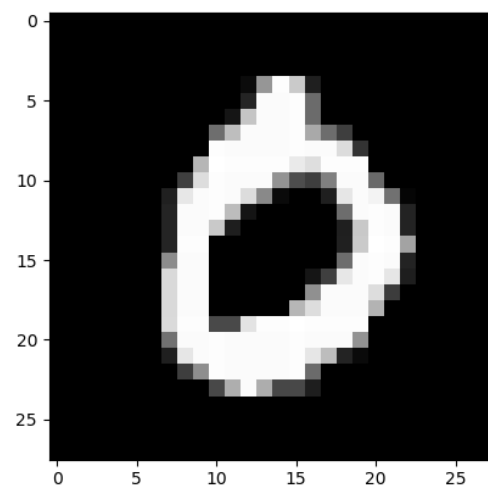
### T1 - Arquitetura:

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 28, 28, 32)	320
conv2d_1 (Conv2D)	(None, 26, 26, 32)	9248
max_pooling2d (MaxPooling2D)	(None, 13, 13, 32)	0
dropout (Dropout)	(None, 13, 13, 32)	0
conv2d_2 (Conv2D)	(None, 13, 13, 64)	18496
conv2d_3 (Conv2D)	(None, 11, 11, 64)	36928
max_pooling2d_1 (MaxPooling2D)	(None, 5, 5, 64)	0
dropout_1 (Dropout)	(None, 5, 5, 64)	0
conv2d_4 (Conv2D)	(None, 5, 5, 64)	36928
conv2d_5 (Conv2D)	(None, 3, 3, 64)	36928
max_pooling2d_2 (MaxPooling2D)	(None, 1, 1, 64)	0
dropout_2 (Dropout)	(None, 1, 1, 64)	0
flatten (Flatten)	(None, 64)	0
dense (Dense)	(None, 512)	33280
dropout_3 (Dropout)	(None, 512)	0
dense_1 (Dense)	(None, 10)	5130

## T1 – Curva de Aprendizagem:



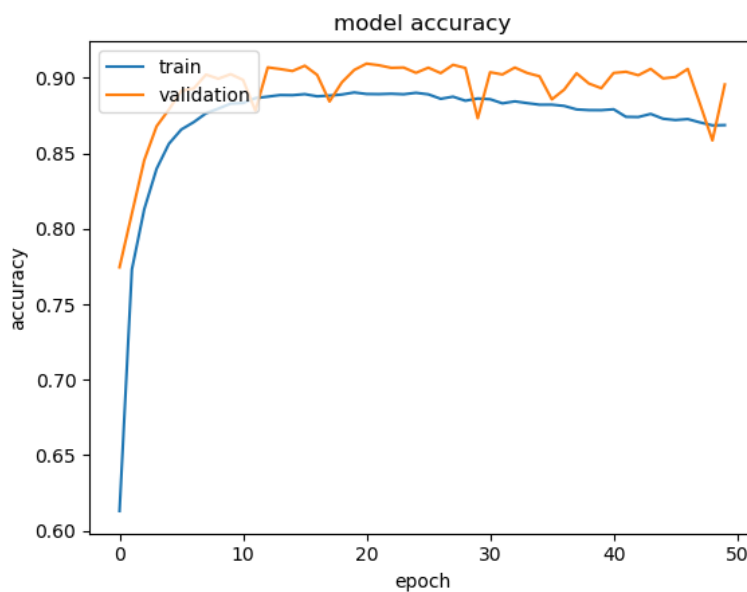
## T1 – Imagens (Features):



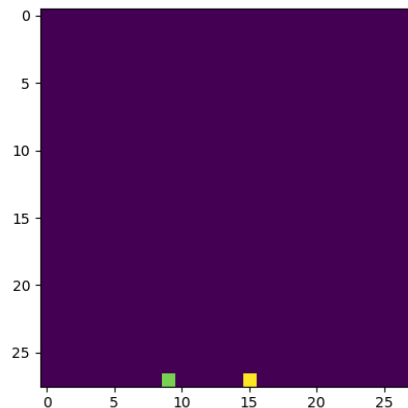
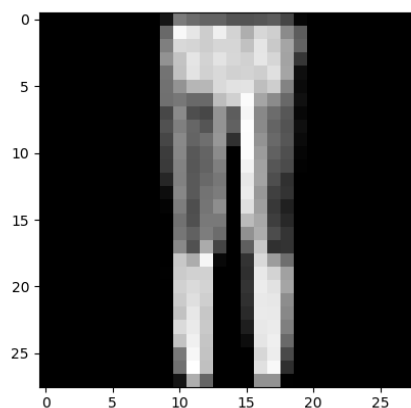
## T2 – Arquitetura:

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 28, 28, 32)	320
conv2d_1 (Conv2D)	(None, 26, 26, 32)	9248
max_pooling2d (MaxPooling2D)	(None, 13, 13, 32)	0
dropout (Dropout)	(None, 13, 13, 32)	0
conv2d_2 (Conv2D)	(None, 13, 13, 64)	18496
conv2d_3 (Conv2D)	(None, 11, 11, 64)	36928
max_pooling2d_1 (MaxPooling2D)	(None, 5, 5, 64)	0
dropout_1 (Dropout)	(None, 5, 5, 64)	0
conv2d_4 (Conv2D)	(None, 5, 5, 64)	36928
conv2d_5 (Conv2D)	(None, 3, 3, 64)	36928
max_pooling2d_2 (MaxPooling2D)	(None, 1, 1, 64)	0
dropout_2 (Dropout)	(None, 1, 1, 64)	0
flatten (Flatten)	(None, 64)	0
dense (Dense)	(None, 512)	33280
dropout_3 (Dropout)	(None, 512)	0
dense_1 (Dense)	(None, 10)	5130

## T2 – Curva de Aprendizagem:



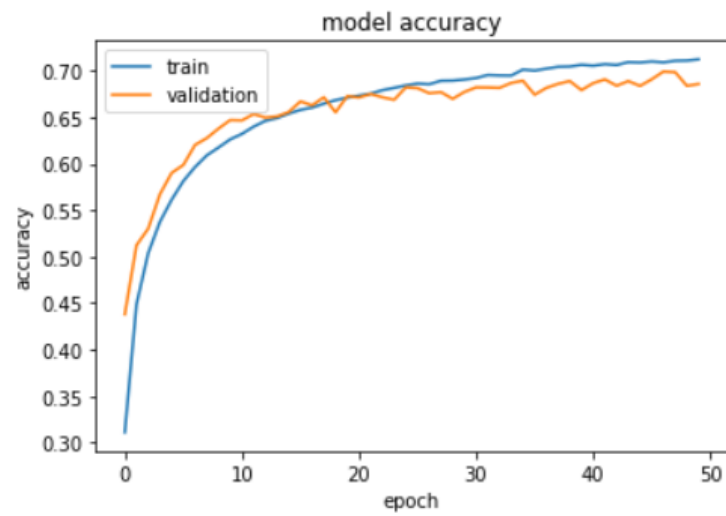
## T2 – Imagens (Features):



## T3 – Arquitetura:

Layer (type)	Output Shape	Param #
conv2d_6 (Conv2D)	(None, 32, 32, 32)	896
conv2d_7 (Conv2D)	(None, 30, 30, 32)	9248
max_pooling2d_3 (MaxPooling2D)	(None, 15, 15, 32)	0
dropout_4 (Dropout)	(None, 15, 15, 32)	0
conv2d_8 (Conv2D)	(None, 15, 15, 64)	18496
conv2d_9 (Conv2D)	(None, 13, 13, 64)	36928
max_pooling2d_4 (MaxPooling2D)	(None, 6, 6, 64)	0
dropout_5 (Dropout)	(None, 6, 6, 64)	0
conv2d_10 (Conv2D)	(None, 6, 6, 64)	36928
conv2d_11 (Conv2D)	(None, 4, 4, 64)	36928
max_pooling2d_5 (MaxPooling2D)	(None, 2, 2, 64)	0
dropout_6 (Dropout)	(None, 2, 2, 64)	0
flatten_1 (Flatten)	(None, 256)	0
dense_2 (Dense)	(None, 512)	131584
dropout_7 (Dropout)	(None, 512)	0
dense_3 (Dense)	(None, 10)	5130

### T3 – Curva de Aprendizagem:



### T3 – Imagens (Features):

