Assignment 4

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Question 1: Classification using NNets

1.1. Get the data

```
mnist <- dataset_fashion_mnist()

x_train <- mnist$train$x
y_train <- mnist$train$y
x_test <- mnist$test$x
y_test <- mnist$test$y

dim(x_train)
```

```
## [1] 60000    28    28
```

```
dim(x_test)
```

```
## [1] 10000    28    28
```

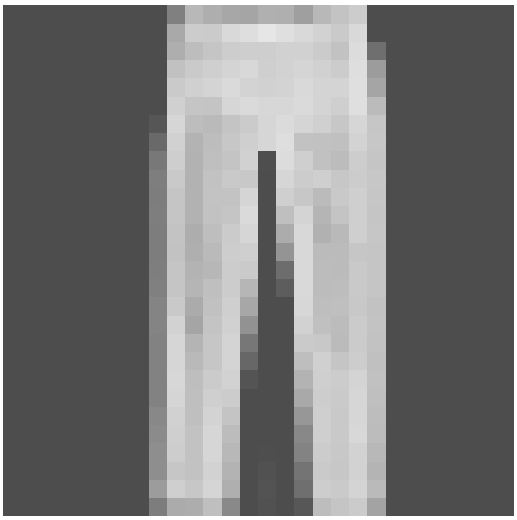
```
y_test  <- y_test[1:2560]
x_train <- x_train[1:10240,,]
x_test  <- x_test[1:2560,, ]

y_train <- y_train[1:10240]
y_test  <- y_test[1:2560]
```

1.2 Plot

Plot of a trouser (class 1)

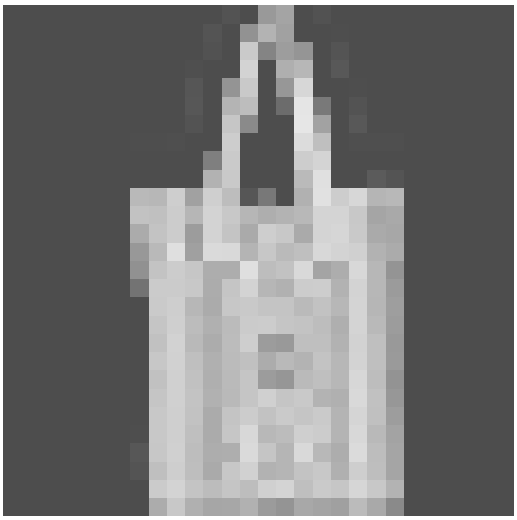
```
digit <- x_train[17,28:1,1:28]
par(pty="s") # for keeping the aspect ratio 1:1
image(t(digit), col = gray.colors(256), axes = FALSE)
```



1.2 Plot

Plot of a bag (class 9)

```
digit <- x_train[58,28:1,1:28]
par(pty="s") # for keeping the aspect ratio 1:1
image(t(digit), col = gray.colors(256), axes = FALSE)
```



1.2 Plot

Plot of an Ankle boot (class 10)

```
digit <- x_train[12,28:1,1:28]
par(pty="s") # for keeping the aspect ratio 1:1
image(t(digit), col = gray.colors(256), axes = FALSE)
```

1.3 Process the dataset

```
# reshape
x_train <- array_reshape(x_train, c(nrow(x_train), 784))
x_test <- array_reshape(x_test, c(nrow(x_test), 784))
# rescale
x_train <- x_train / 255
x_test <- x_test / 255

# convert binary to categorical
y_train <- to_categorical(y_train, 10)
y_test <- to_categorical(y_test, 10)
head(y_train)
```

```
##      [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10]
## [1,]    0    0    0    0    0    0    0    0    0     1
## [2,]    1    0    0    0    0    0    0    0    0     0
## [3,]    1    0    0    0    0    0    0    0    0     0
## [4,]    0    0    0    1    0    0    0    0    0     0
## [5,]    1    0    0    0    0    0    0    0    0     0
## [6,]    0    0    1    0    0    0    0    0    0     0
```

1.4 Fit a Shallow Network

1.5 Fit a Deep Neural Network