Homework 9

Hwasoo Shin

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Problem 1

This is the sample syntax from 'https://keras.rstudio.com/'.

```
use_python("C:/Users/pc/Anaconda3/python.exe")

use_condaenv(conda = "C:/Users/pc/Anaconda3/Scripts/conda.exe")

system("conda config --set ssl_verify false")
```

```
## [1] 0
```

```
Sys.setenv(TENSORFLOW_PYTHON="C:/Users/pc/Anaconda3/python.exe")

Sys.setenv(KERAS_PYTHON="C:/Users/pc/Anaconda3/python.exe")

library(keras)

is_keras_available()
```

```
## [1] TRUE
```

```
mnist <- dataset_mnist()
x_train <- mnist$train$x
y_train <- mnist$train$y
x_test <- mnist$test$x
y_test <- mnist$test$y
```

```
# 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

y_train <- to_categorical(y_train, 10)
y_test <- to_categorical(y_test, 10)

model <- keras_model_sequential()
model %>%
  layer_dense(units = 256, activation = 'relu', input_shape = c(784)) %>%
  layer_dropout(rate = 0.4) %>%
  layer_dense(units = 128, activation = 'relu') %>%
  layer_dropout(rate = 0.3) %>%
  layer_dense(units = 10, activation = 'softmax')
```

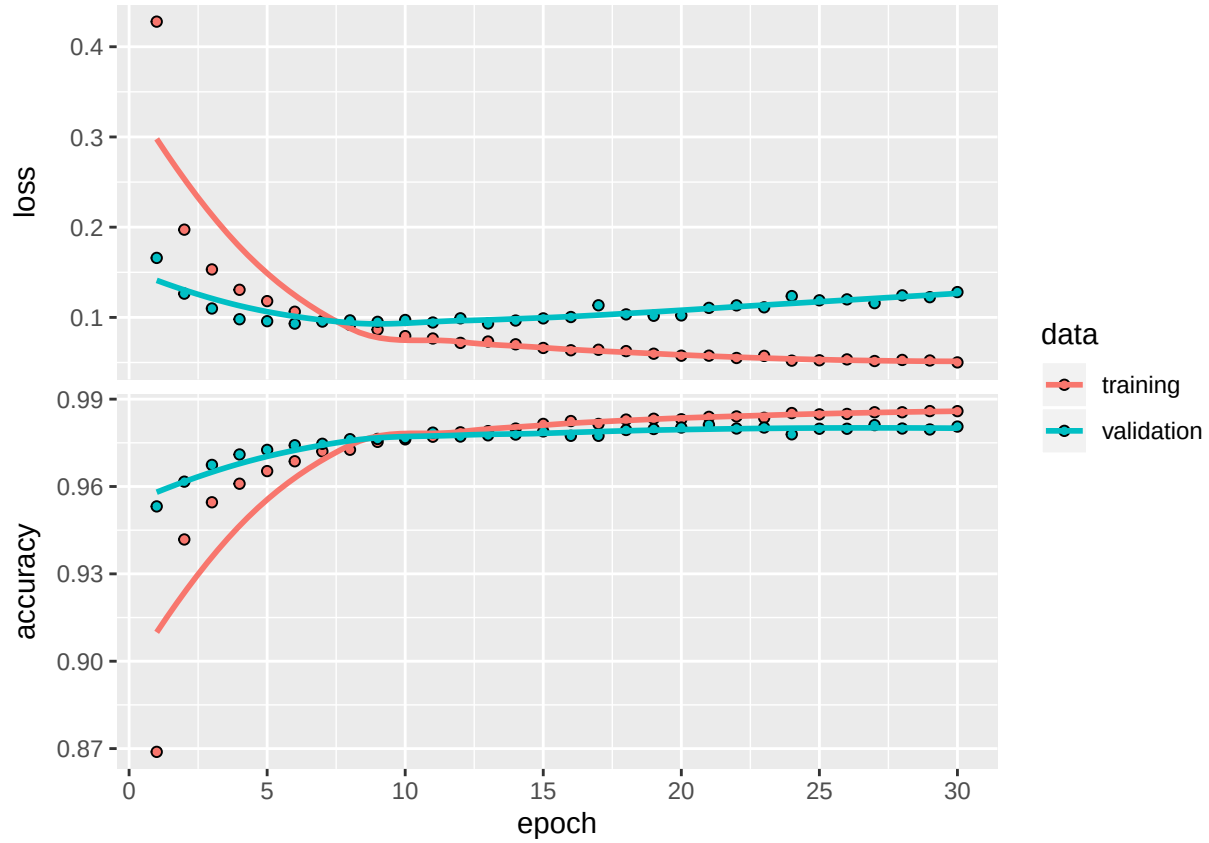
```r
summary(model)
```

```
## Model: "sequential"
## _________________________________________________________________________
## Layer (type)                         Output Shape                     Param #
## =========================================================================
## dense (Dense)                        (None, 256)                      200960
## _________________________________________________________________________
## dropout (Dropout)                    (None, 256)                      0
## _________________________________________________________________________
## dense_1 (Dense)                      (None, 128)                      32896
## _________________________________________________________________________
## dropout_1 (Dropout)                  (None, 128)                      0
## _________________________________________________________________________
## dense_2 (Dense)                      (None, 10)                       1290
## =========================================================================
## Total params: 235,146
## Trainable params: 235,146
## Non-trainable params: 0
## _________________________________________________________________________
```

```r
model %>% compile(
  loss = 'categorical_crossentropy',
  optimizer = optimizer_rmsprop(),
  metrics = c('accuracy')
)

history <- model %>% fit(
  x_train, y_train,
  epochs = 30, batch_size = 128,
  validation_split = 0.2
)

plot(history)
```




```
model %>% evaluate(x_test, y_test)
```

```
## $loss
## [1] 0.1041775
##
## $accuracy
## [1] 0.9812
```

```
model %>% predict_classes(x_test)
```

```
##   [1] 7 2 1 0 4 1 4 9 6 9 0 6 9 0 1 5 9 7 3 4 9 6 6 5 4 0 7 4 0 1 3 1 3 4
##  [35] 7 2 7 1 2 1 1 7 4 2 3 5 1 2 4 4 6 3 5 5 6 0 4 1 9 5 7 8 9 3 7 4 6 4
##  [69] 3 0 7 0 2 9 1 7 3 2 9 7 7 6 2 7 8 4 7 3 6 1 3 6 9 3 1 4 1 7 6 9 6 0
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```

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