Homework 1

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5/8/2019

Getting Data

```
fashion_mnist = keras::dataset_fashion_mnist()

x_train = fashion_mnist$train$x
y_train = fashion_mnist$train$y

x_test = fashion_mnist$test$x
y_test = fashion_mnist$test$y

rm(fashion_mnist)

x_train = array_reshape(x_train, c(nrow(x_train), 28 * 28)) / 255
x_test = array_reshape(x_test, c(nrow(x_test), 28 * 28)) / 255

y_train = to_categorical(y_train, 10)
y_test = to_categorical(y_test, 10)
```

Initial test

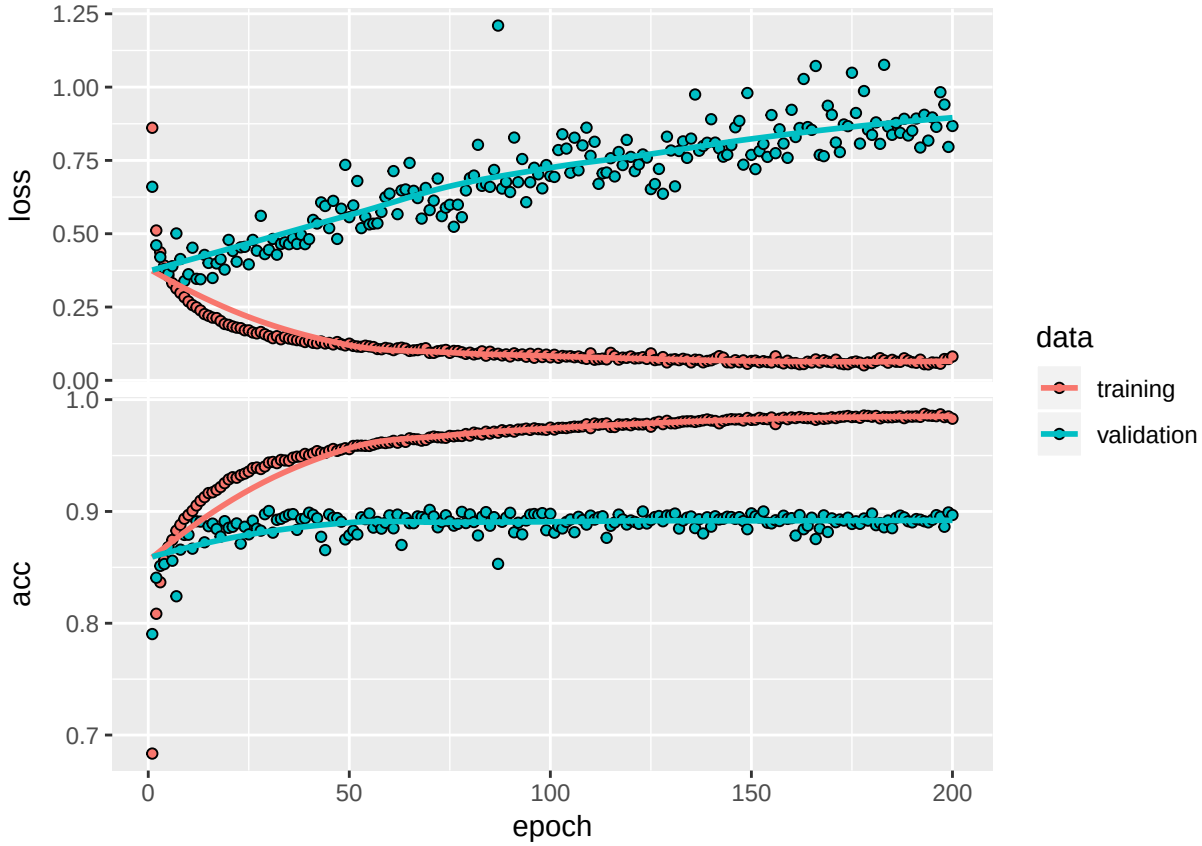
```
model = keras_model_sequential()

model %>%
  layer_dense(units = 512, activation = 'relu', input_shape = c(784)) %>%
  layer_dense(units = 512, activation = 'relu') %>%
  layer_dense(units = 512, activation = 'relu') %>%
  layer_dense(units = 512, activation = 'relu') %>%
  layer_dense(units = 10, activation = 'softmax')

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

history = model %>% fit(
  x_train, y_train,
  epochs = 200, batch_size = 512,
  validation_split = 0.1666666666666667
)

plot(history)
```




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

```
## $loss
## [1] 0.9180621
##
## $acc
## [1] 0.8936
```

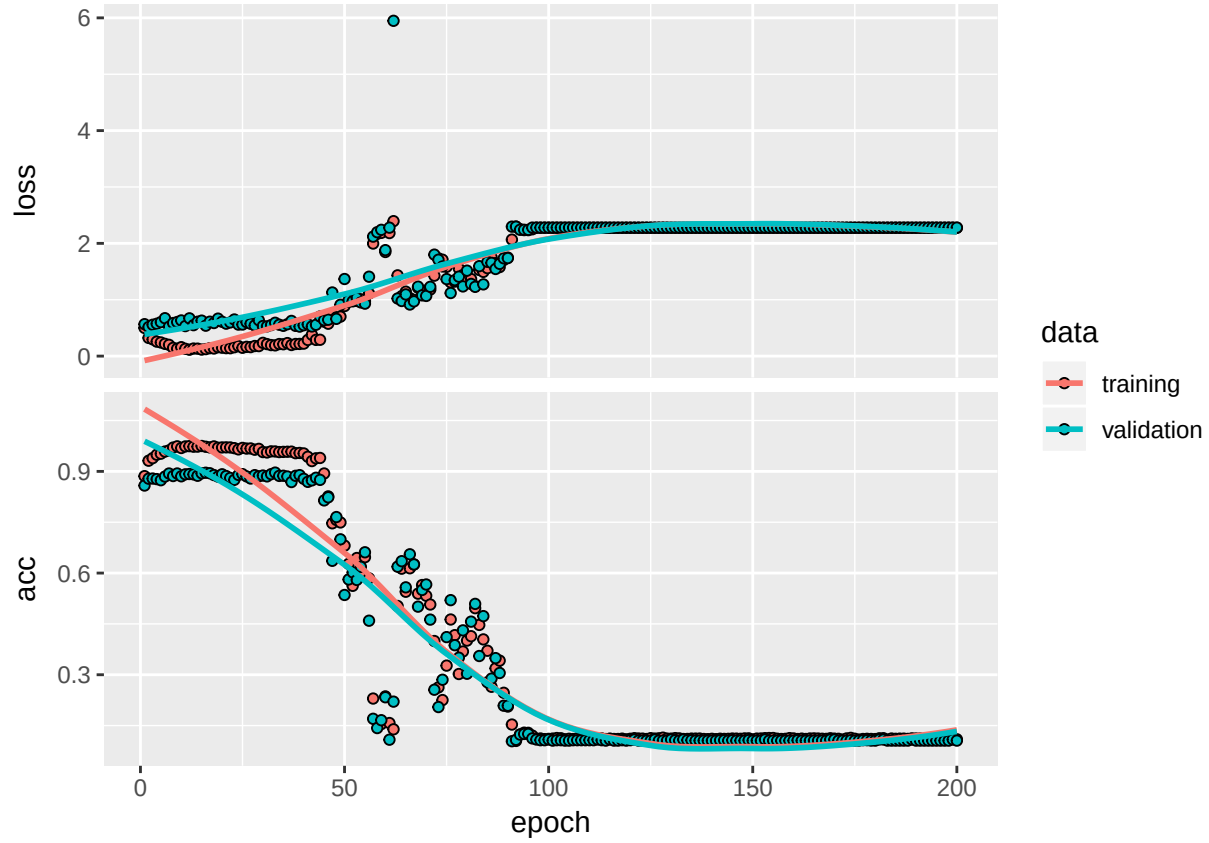
Implementing Dropout

```
model %>%
  layer_dense(units = 512, activation = 'relu', input_shape = c(784)) %>%
  layer_dropout(rate = 0.5) %>%
  layer_dense(units = 512, activation = 'relu') %>%
  layer_dropout(rate = 0.5) %>%
  layer_dense(units = 512, activation = 'relu') %>%
  layer_dropout(rate = 0.5) %>%
  layer_dense(units = 512, activation = 'relu') %>%
  layer_dropout(rate = 0.5) %>%
  layer_dense(units = 10, activation = 'softmax')

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

```
history = model %>% fit(
  x_train, y_train,
  epochs = 200, batch_size = 512,
  validation_split = 0.1666666666666667
)

plot(history)
```




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

```
## $loss
## [1] 2.271645
##
## $acc
## [1] 0.1131
```

Weight Regularization

Other Options

Final Model