Exercise 1

Group 2

The main model

Three layers

- Input layer: 16 units
- Hidden layer: 16 units
- Output layer: 1 unit with sigmoid activation function (binary classification)

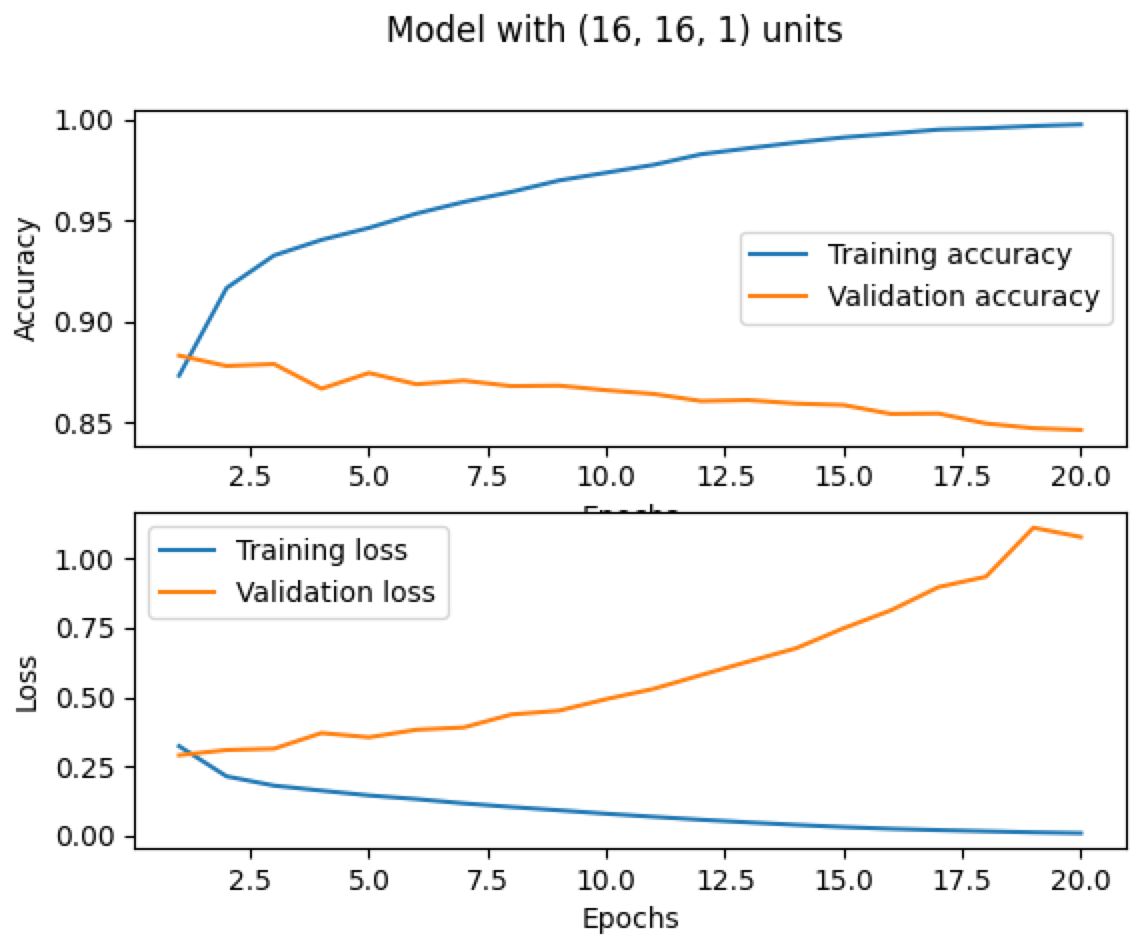
```
model = keras.Sequential()
model.add(Dense(16, activation='relu', input_shape=(NUM_WORDS,)))
model.add(Dense(16, activation='relu'))
model.add(Dense(1, activation='sigmoid'))
```

Compiling and fitting

```
model.compile(optimizer='rmsprop',
              loss='binary_crossentropy',
              metrics=['accuracy'])
```

```
history = model.fit(train_data, train_labels,
                    epochs=20,
                    validation_data=(test_data, test_labels))
```

Results


Model with (16, 16, 1) units
Accuracy
Training accuracy
Validation accuracy
Epochs
Loss
Training loss
Validation loss
Epochs

Results

With 1 epoch, accuracy is ~88% (validation)

- For testing data, loss gets lower while accuracy goes higher
- For validation data, loss grows steadily and accuracy tends to go down

Probably overfitting

Changing the units

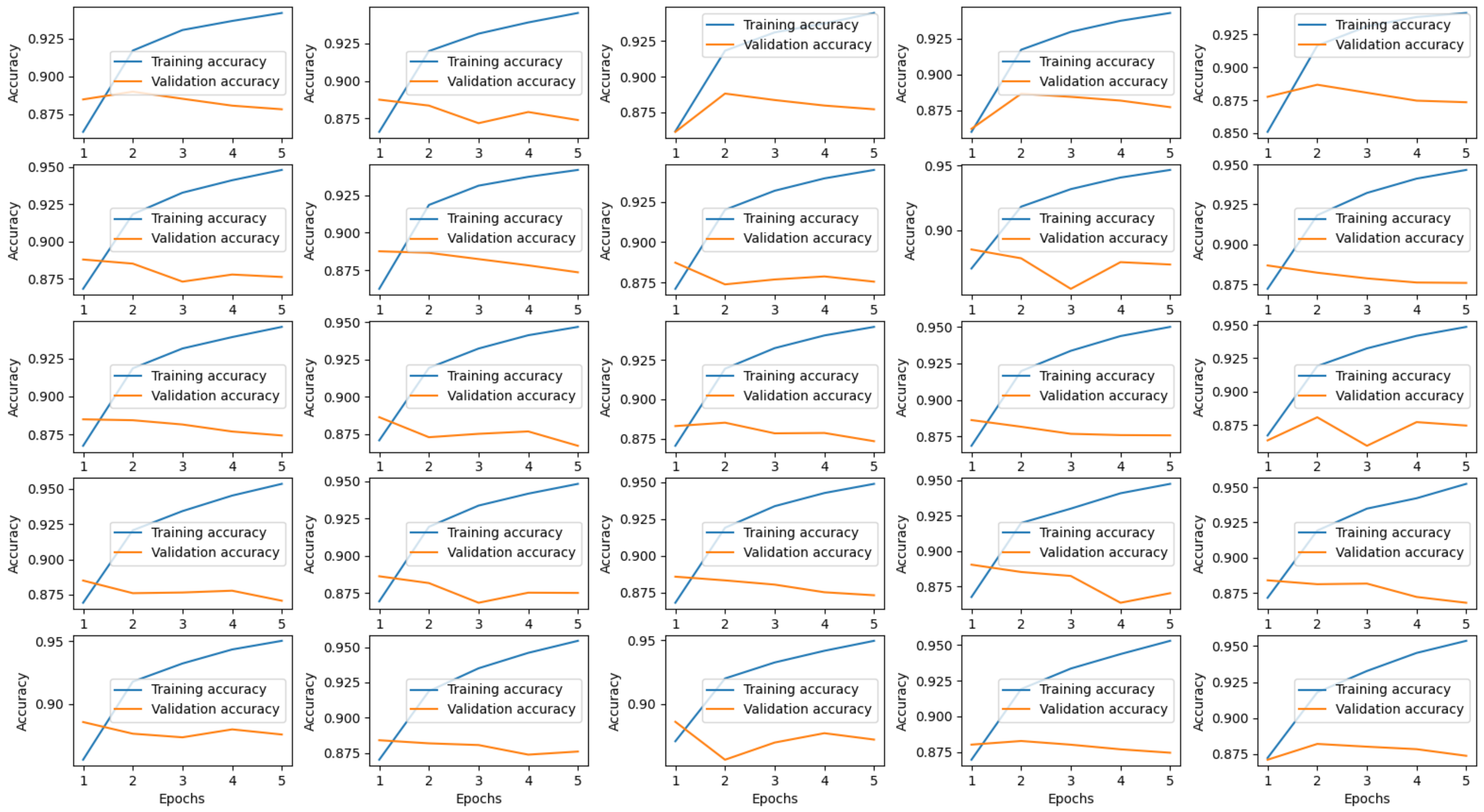
We tried changing the units of the model in the range from 5 to 25 with steps of 5

That is:

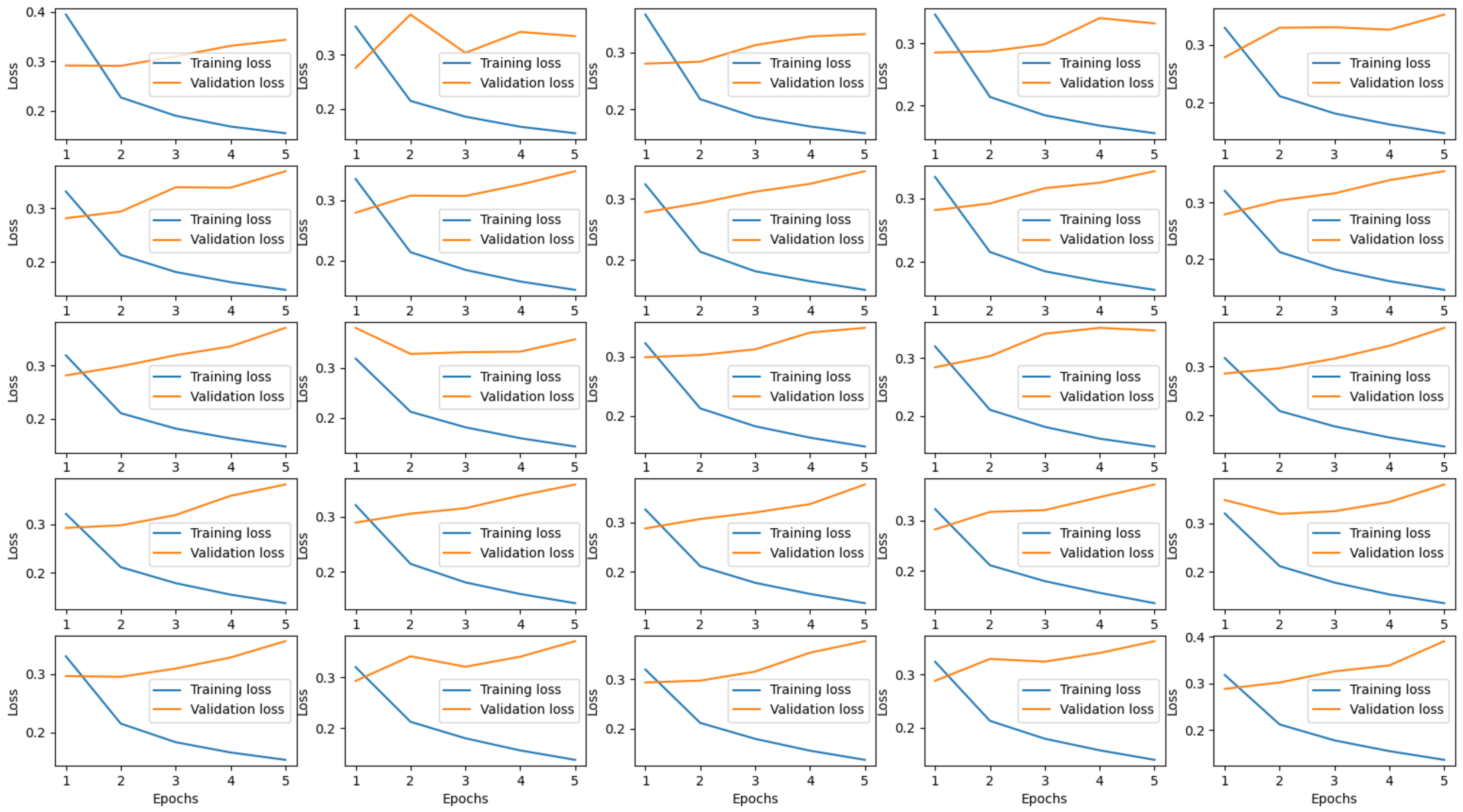
- Try the model (5, 5, 1)
- Try the model (5, 10, 1)
- ...
- Try the model (25, 25, 1)

```python
for i in range(5):
    for j in range(5):
        k1 = (i + 1) * 5
        k2 = (j + 1) * 5

        print(f'==> Checking model with ({k1}, {k2}, 1)')
        m = build_model(k1, k2)
        compile(m)
        h = fit_model(m)

        print('ACCURACY (testing, validation)')
        print(h.history['accuracy'])
        print(h.history['val_accuracy'])
        print('LOSS (testing, validation)')
        print(h.history['loss'])
        print(h.history['val_loss'])
```

Accuracy with (k1, k2, 1) units



Losses with (k1, k2, 1) units



Changing the units

Results

The graphs are not so different from the original one

Changing the units doesn't seem to affect much the results

Code

Code and `.h5` file available at https://github.com/micheleberetta98/sdu-deep-learning-2021/tree/master/day-2