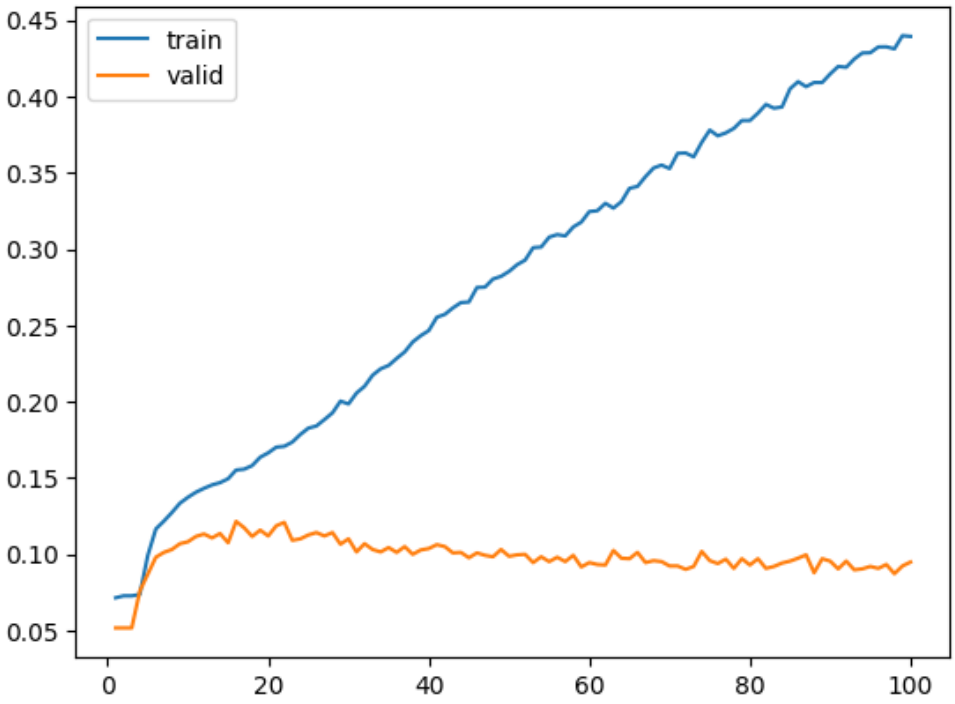
Arquitectura #1: Original
embedding (Embedding) (None, 3, 5) 14295
lstm (LSTM) (None, 3, 64) 17920
dropout (Dropout) (None, 3, 64) 0
lstm_1 (LSTM) (None, 64) 33024
dense (Dense) (None, 64) 4160
dense_1 (Dense) (None, 2858) 185770

```
model = Sequential()

model.add(Embedding(input_dim=vocab_size+1, output_dim=5, input_length=input_seq_len))
model.add(LSTM(64, return_sequences=True))
model.add(Dropout(0.2))
model.add(LSTM(64))
model.add(Dense(64, activation='relu'))
model.add(Dense(vocab_size, activation='softmax'))
model.compile(loss='categorical_crossentropy', optimizer='adam', metrics=['accuracy'])

model.summary()
```




```
Epoch 97/100
394/394 [==============================] - 3s 8ms/step - loss: 2.1751 - accuracy: 0.4325 - val_loss: 23.7611 - val_accuracy: 0.0933
Epoch 98/100
394/394 [==============================] - 3s 8ms/step - loss: 2.1581 - accuracy: 0.4312 - val_loss: 23.8963 - val_accuracy: 0.0872
Epoch 99/100
394/394 [==============================] - 4s 10ms/step - loss: 2.1322 - accuracy: 0.4398 - val_loss: 24.1326 - val_accuracy: 0.0923
Epoch 100/100
394/394 [==============================] - 4s 10ms/step - loss: 2.1408 - accuracy: 0.4393 - val_loss: 24.1844 - val_accuracy: 0.0949
```

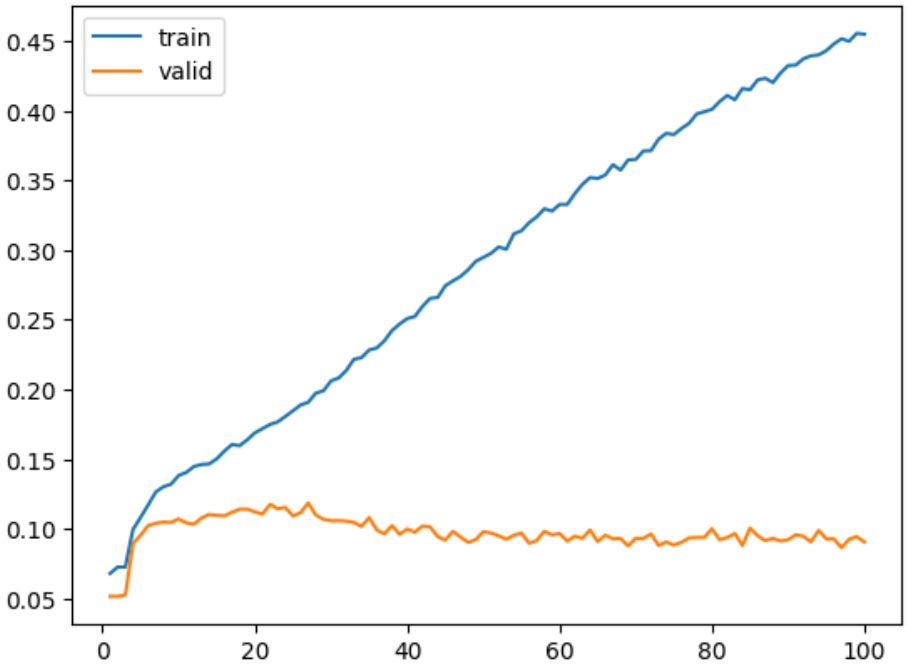
Arquitectura #2: se sube output_dim a 6. **(SIN CAMBIOS SIGNIFICATIVOS)**

```
model = Sequential()

model.add(Embedding(input_dim=vocab_size+1, output_dim=6, input_length=input_seq_len))
model.add(LSTM(64, return_sequences=True))
model.add(Dropout(0.2))
model.add(LSTM(64))
model.add(Dense(64, activation='relu'))
model.add(Dense(vocab_size, activation='softmax'))
model.compile(loss='categorical_crossentropy', optimizer='adam', metrics=['accuracy'])

model.summary()
```

embedding_2 (Embedding)	(None, 3, 6)	17154
lstm_4 (LSTM)	(None, 3, 64)	18176
dropout_2 (Dropout)	(None, 3, 64)	0
lstm_5 (LSTM)	(None, 64)	33024
dense_4 (Dense)	(None, 64)	4160
dense_5 (Dense)	(None, 2858)	185770

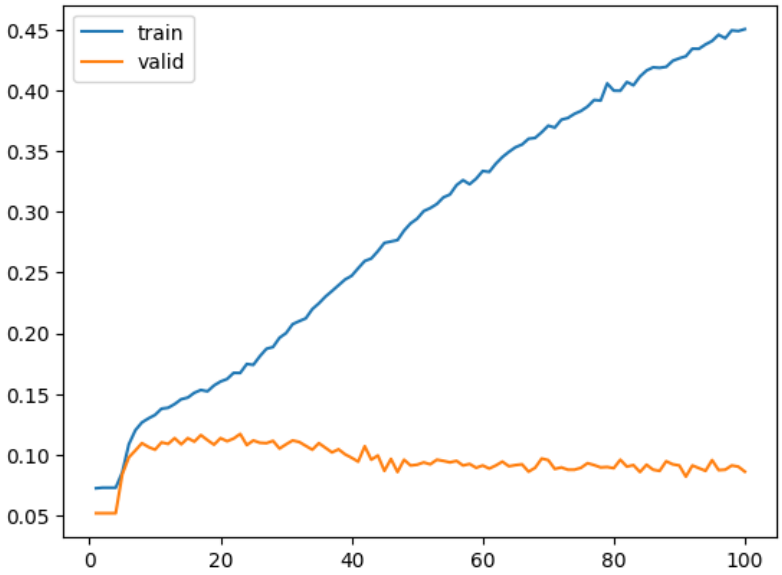



```
Epoch 97/100
394/394 [==============================] - 4s 9ms/step - loss: 2.0842 - accuracy: 0.4516 - val_loss: 24.2222 - val_accuracy: 0.0866
Epoch 98/100
394/394 [==============================] - 4s 9ms/step - loss: 2.0828 - accuracy: 0.4498 - val_loss: 24.3727 - val_accuracy: 0.0926
Epoch 99/100
394/394 [==============================] - 4s 9ms/step - loss: 2.0625 - accuracy: 0.4555 - val_loss: 24.5580 - val_accuracy: 0.0945
Epoch 100/100
394/394 [==============================] - 4s 9ms/step - loss: 2.0506 - accuracy: 0.4549 - val_loss: 24.4823 - val_accuracy: 0.0907
```

Arquitectura #3 se baja output_dim a 4. **(SIN CAMBIOS SIGNIFICATIVOS)**

```
model = Sequential()
model.add(Embedding(input_dim=vocab_size+1, output_dim=4, input_length=input_seq_len))
model.add(LSTM(64, return_sequences=True))
model.add(Dropout(0.2))
model.add(LSTM(64))
model.add(Dense(64, activation='relu'))
model.add(Dense(vocab_size, activation='softmax'))
model.compile(loss='categorical_crossentropy', optimizer='adam', metrics=['accuracy'])
model.summary()
```

embedding_3 (Embedding)	(None, 3, 4)	11436
lstm_6 (LSTM)	(None, 3, 64)	17664
dropout_3 (Dropout)	(None, 3, 64)	0
lstm_7 (LSTM)	(None, 64)	33024
dense_6 (Dense)	(None, 64)	4160
dense_7 (Dense)	(None, 2858)	185770




```
Epoch 97/100
394/394 [==============================] - 4s 9ms/step - loss: 2.0991 - accuracy: 0.4432 - val_loss: 24.1156 - val_accuracy: 0.0876
Epoch 98/100
394/394 [==============================] - 4s 10ms/step - loss: 2.0823 - accuracy: 0.4497 - val_loss: 24.1013 - val_accuracy: 0.0911
Epoch 99/100
394/394 [==============================] - 3s 9ms/step - loss: 2.0727 - accuracy: 0.4491 - val_loss: 24.4283 - val_accuracy: 0.0901
Epoch 100/100
394/394 [==============================] - 3s 8ms/step - loss: 2.0612 - accuracy: 0.4507 - val_loss: 24.4893 - val_accuracy: 0.0860
```

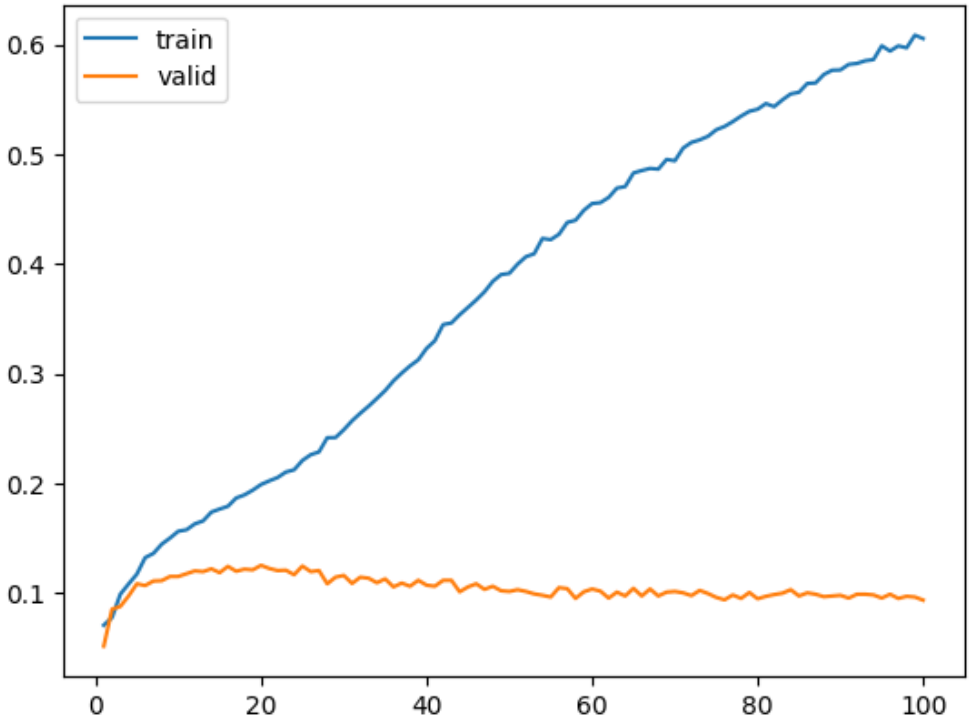
Arquitectura #4. Bidireccionales

embedding_1 (Embedding)	(None, 3, 5)	14295
bidirectional (Bidirectional)	(None, 3, 128)	35840
dropout_1 (Dropout)	(None, 3, 128)	0
bidirectional_1 (Bidirectional)	(None, 128)	98816
dense_2 (Dense)	(None, 64)	8256
dense_3 (Dense)	(None, 2858)	185770

```
model = Sequential()

model.add(Embedding(input_dim=vocab_size+1, output_dim=5, input_length=input_seq_len))
model.add(Bidirectional(LSTM(64, return_sequences=True)))
model.add(Dropout(0.2))
model.add(Bidirectional(LSTM(64)))
model.add(Dense(64, activation='relu'))
model.add(Dense(vocab_size, activation='softmax'))
model.compile(loss='categorical_crossentropy', optimizer='adam', metrics=['accuracy'])

model.summary()
```




```
Epoch 97/100
394/394 [==============================] - 5s 12ms/step - loss: 1.4696 - accuracy: 0.5987 - val_loss: 25.2469 - val_accuracy: 0.0952
Epoch 98/100
394/394 [==============================] - 5s 13ms/step - loss: 1.4732 - accuracy: 0.5968 - val_loss: 25.1457 - val_accuracy: 0.0971
Epoch 99/100
394/394 [==============================] - 4s 11ms/step - loss: 1.4434 - accuracy: 0.6084 - val_loss: 25.5794 - val_accuracy: 0.0964
Epoch 100/100
394/394 [==============================] - 5s 11ms/step - loss: 1.4324 - accuracy: 0.6053 - val_loss: 25.4606 - val_accuracy: 0.0936
```

Arquitectura #5. 128 neuronas en las capas

embedding_4 (Embedding) (None, 3, 5) 14295

lstm_8 (LSTM) (None, 3, 128) 68608

dropout_4 (Dropout) (None, 3, 128) 0

lstm_9 (LSTM) (None, 128) 131584

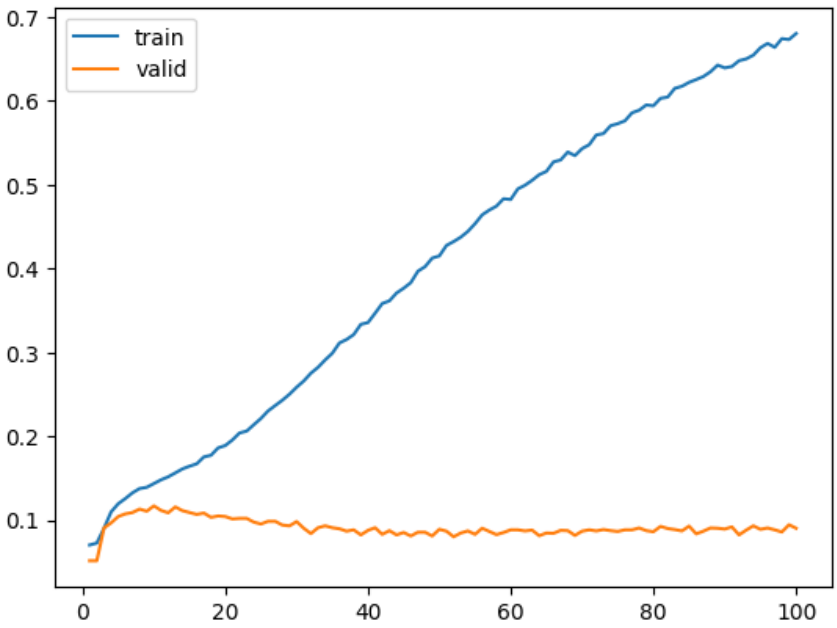
dense_8 (Dense) (None, 128) 16512

dense_9 (Dense) (None, 2858) 368682

```
model = Sequential()

model.add(Embedding(input_dim=vocab_size+1, output_dim=5, input_length=input_seq_len))
model.add(LSTM(128, return_sequences=True))
model.add(Dropout(0.2))
model.add(LSTM(128))
model.add(Dense(128, activation='relu'))
model.add(Dense(vocab_size, activation='softmax'))
model.compile(loss='categorical_crossentropy', optimizer='adam', metrics=['accuracy'])

model.summary()
```




```
Epoch 97/100
394/394 [==============================] - 3s 8ms/step - loss: 1.1788 - accuracy: 0.6635 - val_loss: 26.6580 - val_accuracy: 0.0885
Epoch 98/100
394/394 [==============================] - 4s 9ms/step - loss: 1.1477 - accuracy: 0.6739 - val_loss: 26.8267 - val_accuracy: 0.0860
Epoch 99/100
394/394 [==============================] - 4s 10ms/step - loss: 1.1398 - accuracy: 0.6728 - val_loss: 26.9015 - val_accuracy: 0.0945
Epoch 100/100
394/394 [==============================] - 3s 9ms/step - loss: 1.1183 - accuracy: 0.6800 - val_loss: 27.1387 - val_accuracy: 0.0904
```

Arquitectura #6. GRU

embedding_6 (Embedding) (None, 3, 5) 14295

gru (GRU) (None, 3, 64) 13632

dropout_5 (Dropout) (None, 3, 64) 0

gru_1 (GRU) (None, 64) 24960

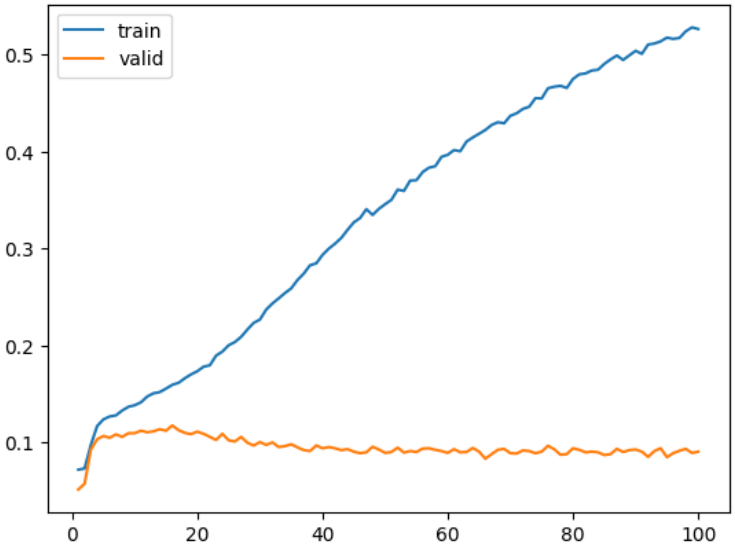
dense_10 (Dense) (None, 64) 4160

dense_11 (Dense) (None, 2858) 185770

```
model = Sequential()

model.add(Embedding(input_dim=vocab_size+1, output_dim=5, input_length=input_seq_len))
model.add(GRU(64, return_sequences=True))
model.add(Dropout(0.2))
model.add(GRU(64))
model.add(Dense(64, activation='relu'))
model.add(Dense(vocab_size, activation='softmax'))
model.compile(loss='categorical_crossentropy', optimizer='adam', metrics=['accuracy'])

model.summary()
```




```
Epoch 97/100
394/394 [==============================] - 4s 9ms/step - loss: 1.7963 - accuracy: 0.5173 - val_loss: 25.4872 - val_accuracy: 0.0917
Epoch 98/100
394/394 [==============================] - 3s 9ms/step - loss: 1.7750 - accuracy: 0.5241 - val_loss: 25.4981 - val_accuracy: 0.0936
Epoch 99/100
394/394 [==============================] - 3s 8ms/step - loss: 1.7605 - accuracy: 0.5281 - val_loss: 25.7395 - val_accuracy: 0.0895
Epoch 100/100
394/394 [==============================] - 3s 8ms/step - loss: 1.7589 - accuracy: 0.5265 - val_loss: 25.7867 - val_accuracy: 0.0907
```

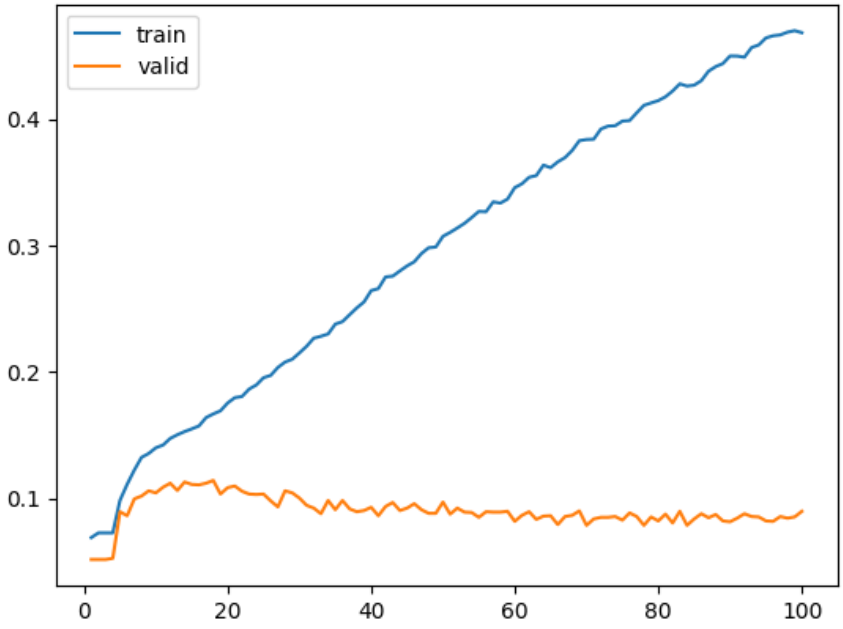
Arquitectura #7. Capas adicionales LSTM

embedding_8 (Embedding)	(None, 3, 5)	14295
lstm_10 (LSTM)	(None, 3, 64)	17920
dropout_7 (Dropout)	(None, 3, 64)	0
lstm_11 (LSTM)	(None, 3, 64)	33024
lstm_12 (LSTM)	(None, 64)	33024
dense_14 (Dense)	(None, 64)	4160
dense_15 (Dense)	(None, 2858)	185770

```
model = Sequential()

model.add(Embedding(input_dim=vocab_size+1, output_dim=5, input_length=input_seq_len))
model.add(LSTM(64, return_sequences=True))
model.add(Dropout(0.2))
model.add(LSTM(64, return_sequences=True))
model.add(LSTM(64))
model.add(Dense(64, activation='relu'))
model.add(Dense(vocab_size, activation='softmax'))
model.compile(loss='categorical_crossentropy', optimizer='adam', metrics=['accuracy'])

model.summary()
```




```
Epoch 97/100
394/394 [==============================] - 5s 11ms/step - loss: 1.9973 - accuracy: 0.4664 - val_loss: 23.2739 - val_accuracy: 0.0857
Epoch 98/100
394/394 [==============================] - 4s 10ms/step - loss: 1.9781 - accuracy: 0.4685 - val_loss: 23.1994 - val_accuracy: 0.0844
Epoch 99/100
394/394 [==============================] - 4s 11ms/step - loss: 1.9625 - accuracy: 0.4697 - val_loss: 23.4902 - val_accuracy: 0.0853
Epoch 100/100
394/394 [==============================] - 4s 11ms/step - loss: 1.9593 - accuracy: 0.4681 - val_loss: 23.3907 - val_accuracy: 0.0898
```

TABLITA

1	0.4393	
2	0.4549	
3	0.4507	
4	0.6053 *	Bidireccionales
5	0.6800 *	128 neuronas en las capas
6	0.5265 *	GRU
7	0.4681	

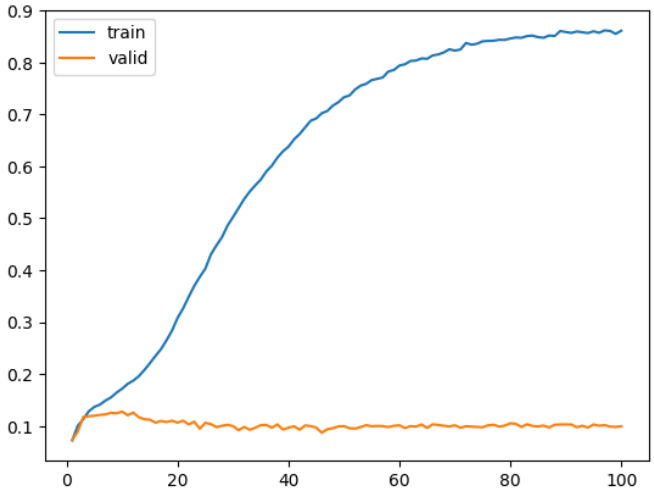
Arquitectura #8. Combinación de lo anterior.

embedding_9 (Embedding)	(None, 3, 5)	14295
bidirectional_2 (Bidirectional)	(None, 3, 256)	103680
dropout_8 (Dropout)	(None, 3, 256)	0
bidirectional_3 (Bidirectional)	(None, 256)	296448
dense_16 (Dense)	(None, 128)	32896
dense_17 (Dense)	(None, 2858)	368682

```
model = Sequential()

model.add(Embedding(input_dim=vocab_size+1, output_dim=5, input_length=input_seq_len))
model.add(Bidirectional(GRU(128, return_sequences=True)))
model.add(Dropout(0.2))
model.add(Bidirectional(GRU(128)))
model.add(Dense(128, activation='relu'))
model.add(Dense(vocab_size, activation='softmax'))
model.compile(loss='categorical_crossentropy', optimizer='adam', metrics=['accuracy'])

model.summary()
```




```
Epoch 97/100
394/394 [==============================] - 9s 22ms/step - loss: 0.4639 - accuracy: 0.8617 - val_loss: 26.8837 - val_accuracy: 0.1018
Epoch 98/100
394/394 [==============================] - 9s 22ms/step - loss: 0.4642 - accuracy: 0.8606 - val_loss: 26.6018 - val_accuracy: 0.0990
Epoch 99/100
394/394 [==============================] - 8s 20ms/step - loss: 0.4797 - accuracy: 0.8551 - val_loss: 26.9936 - val_accuracy: 0.0984
Epoch 100/100
394/394 [==============================] - 9s 22ms/step - loss: 0.4556 - accuracy: 0.8611 - val_loss: 26.9379 - val_accuracy: 0.0996
```