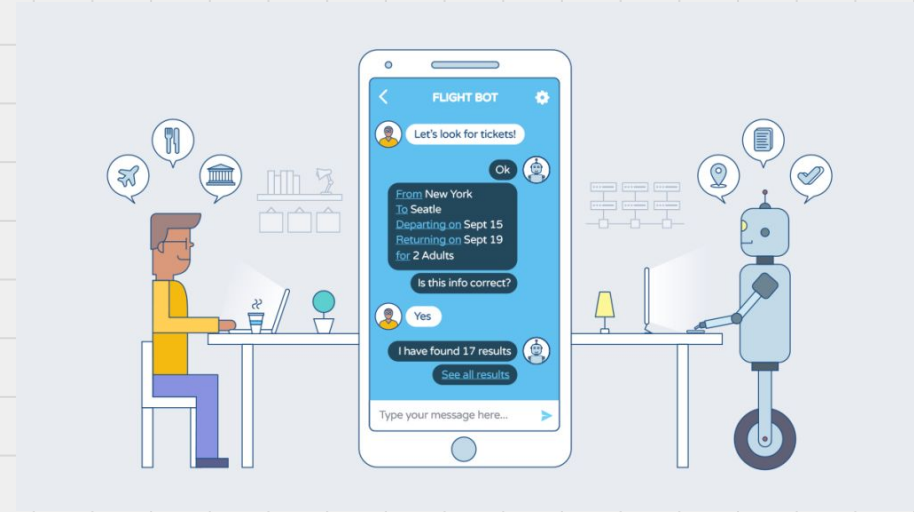# Sentiment Analysis

NLP

German Baltazar, Anyinssan Nava, David Lizama

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Context

Intelligent systems that require **interaction with a human** are usually required to follow a conversation as **human as possible**.
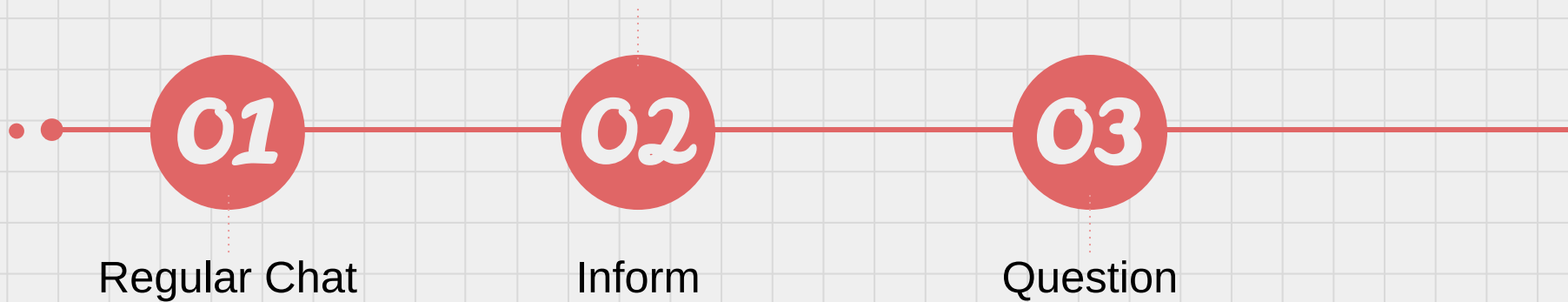
This task is achieved by **determining the context** of the conversation prior to the selection of the generated phrase.

Objective

Classify daily-life phrases into three different categories:

01
Regular Chat

02
Inform

03
Question

Deploy a functional API with the trained models

Dataset

1. Subcategory of the sequence labelling evaluation for spoken language (**SILICONE**) that cover daily life situations.
2. Four categories:
    1. Commissive
    2. Directive
    3. Inform
    4. Question
3. The first two were joined into the regular chat class.
4. Trained two different neural network models: **ANN** and **ALBERT**

Utterance (string)	Dialogue_Act (string)	
i guess you are right.but what…	question	**Class 2: Question**
i suggest a walk over to the gym…	directive	**Class 0: Chat**
that's a good idea . i hear…	commissive	**Class 0: Chat**
sounds great to me ! if they ar…	inform	**Class 1: Inform**
good.let ' s go now .	directive	**Class 0: Chat**
all right .	commissive	**Class 0: Chat**

ANN

Architecture

- Simplifying the model (one hidden layer and 4 neurons).
- Regularization and dropout.
- Embedding using low dimensions.

  "https://tfhub.dev/google/tf2-preview/nnlm-en-dim50/1"

- Training 20 epochs
- Optimizer: Adam
- Dropout of 30%

```
Model: "sequential"
_____
Layer (type)                 Output Shape              Param #
=================================================================
keras_layer (KerasLayer)     (None, 50)                48190600

dense (Dense)                (None, 4)                 204

dropout (Dropout)            (None, 4)                 0

dense_1 (Dense)              (None, 3)                 15

=================================================================
Total params: 48,190,819
Trainable params: 48,190,819
Non-trainable params: 0
_____
```
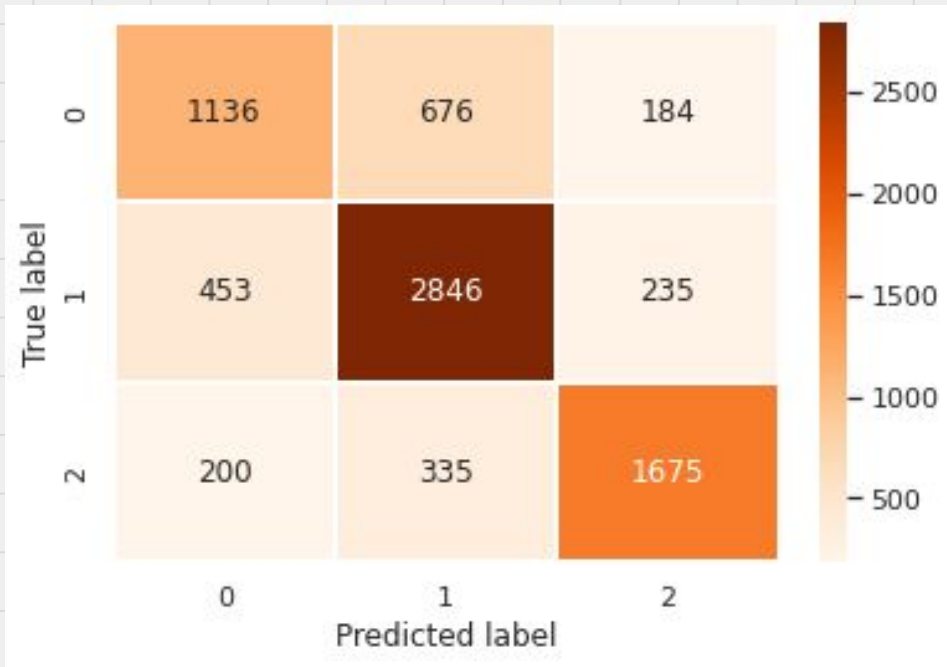
Results
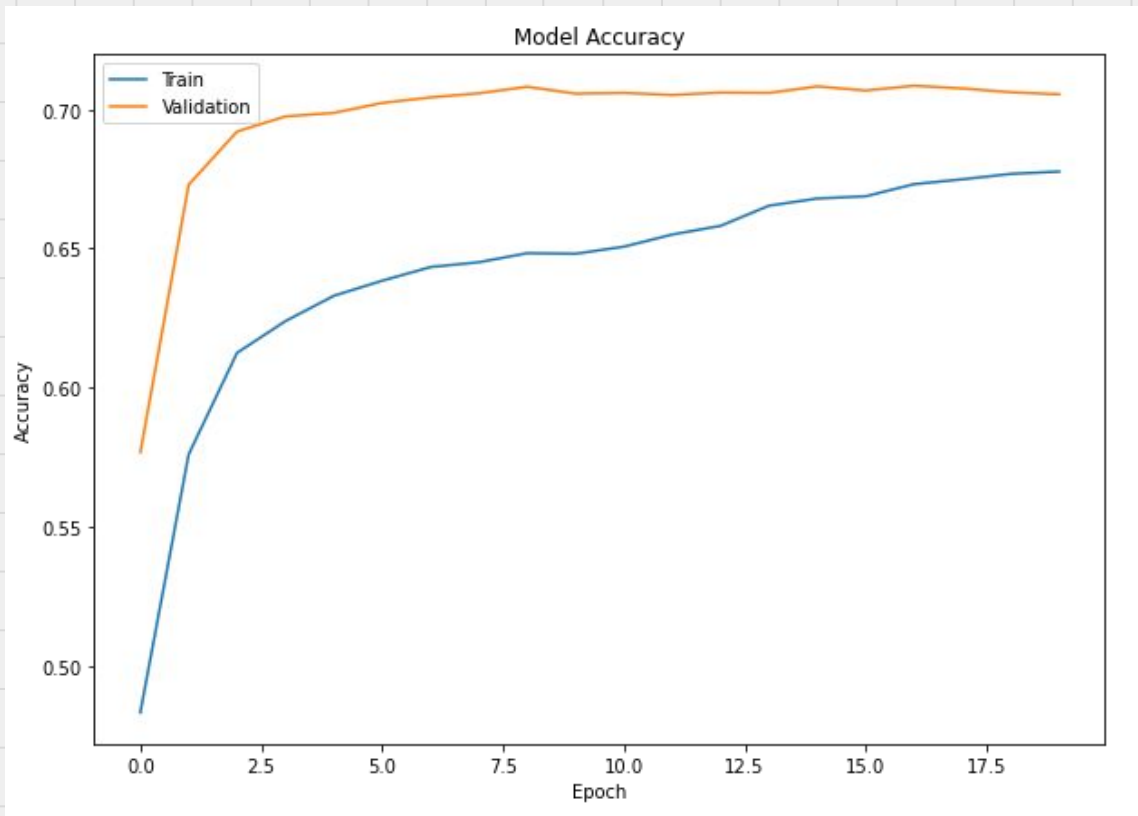
Model Accuracy

- Test accuracy = 73%
- Underfitting model

Results

- Several observations were misclassified between Talk: 0 and Informative: 1.
- Accuracy of 0.73 in Test set.
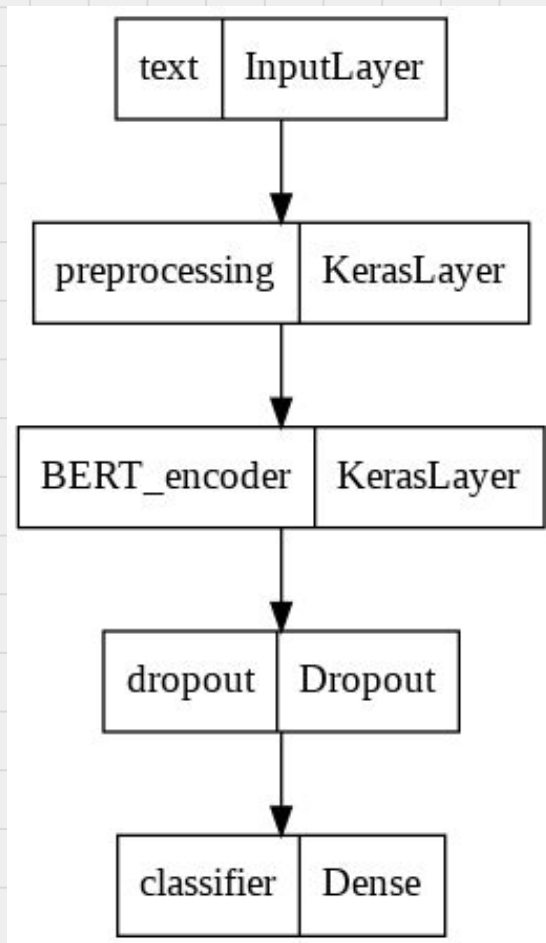- A few false negatives when the true label is a question.
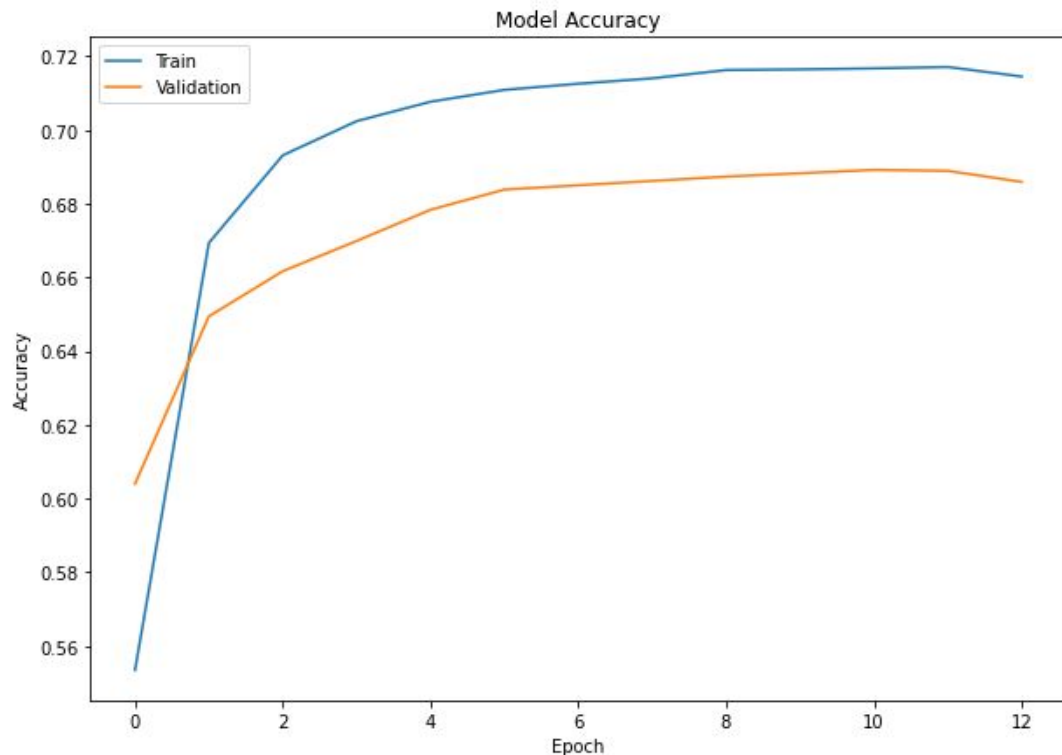
ALBERT

Architecture

- Transfer learning of the ALBERT model
- Frozen weights
- ALBERT embeddings

  "https://tfhub.dev/tensorflow/albert_en_preprocess/3"

- Training 13 epochs
- Optimizer: AdamW
- Dropout of 10%

Results

Model Accuracy

- Test accuracy = 73.12%
- Computationally expensive

Results

- Low number of epochs with low accuracy
- Difficult to separate regular chat from inform
- Require more training time and complexity on the model

NLP Chat Classification

A deployment made by German Baltazar, Anyinssan Nava, and David Lizana.

Powered by Enhance IT

How does it work?

Insert a phrase on the text field, and our NLP algorithm will classify it into one of three different categories:

Chat

Inform

Question

After writing your phrase, click on the **Submit** button to evaluate your text!

Submit

Our classifications

ANN
{{label}}

Our API

Only capable of running the ANN model.
Technical difficulties for importing necessary libraries.
Classifies and determines the percentage of being classified

Conclusions

1. Similar performance was achieved using two different models.
2. Regularization, low dimensionality and dropout were import to avoid overfitting.
3. A higher performance could be achieved with most observations and more training time.
4. A more exhausted cleaning processing might help too.
5. Running on better equipment may prevent from running out of GPU use.
6. Successful deployment of the model using API.
7. The model could be a useful preliminary stage for an interactive communication platform with human beings.

Thanks!

Do you have any questions?

Appendix

Dataset Information

- https://huggingface.co/datasets/silicone/tree/main/dummy/dyda_da/1.0.0

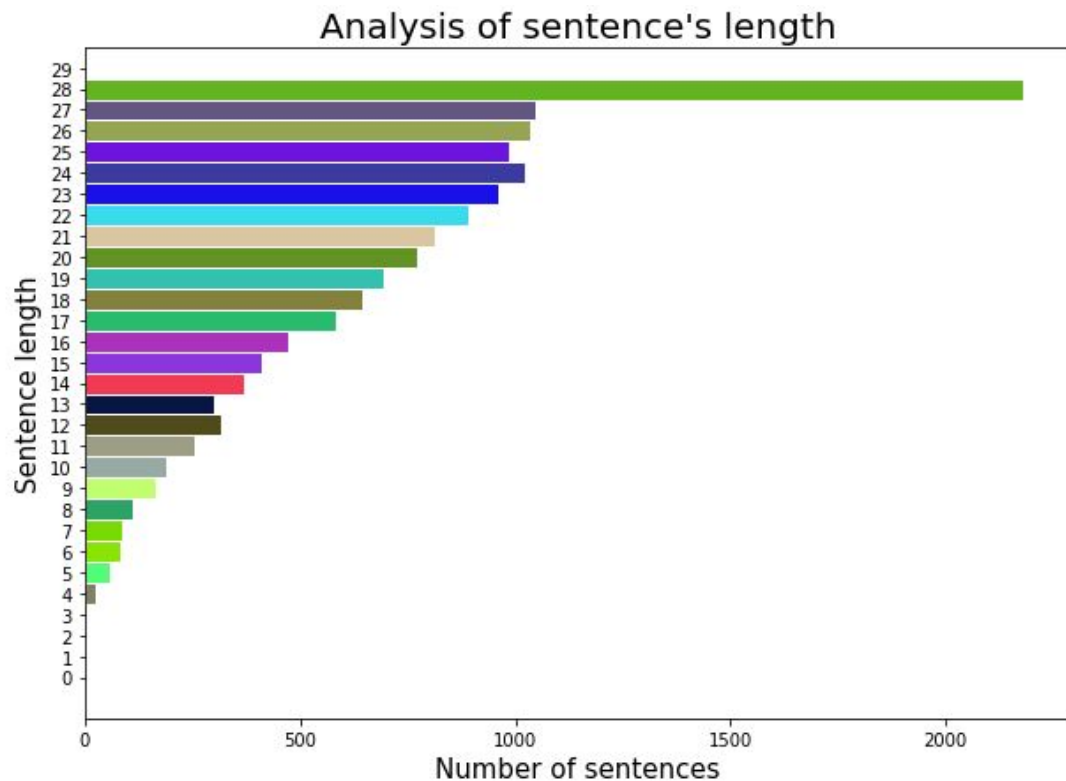|	**Training Set**	**Validation Set**	**Test Set**
Original size	87,170	8,069	7,740
Deleting duplicates	72,391	7,682	7,469

Data Class Distribution
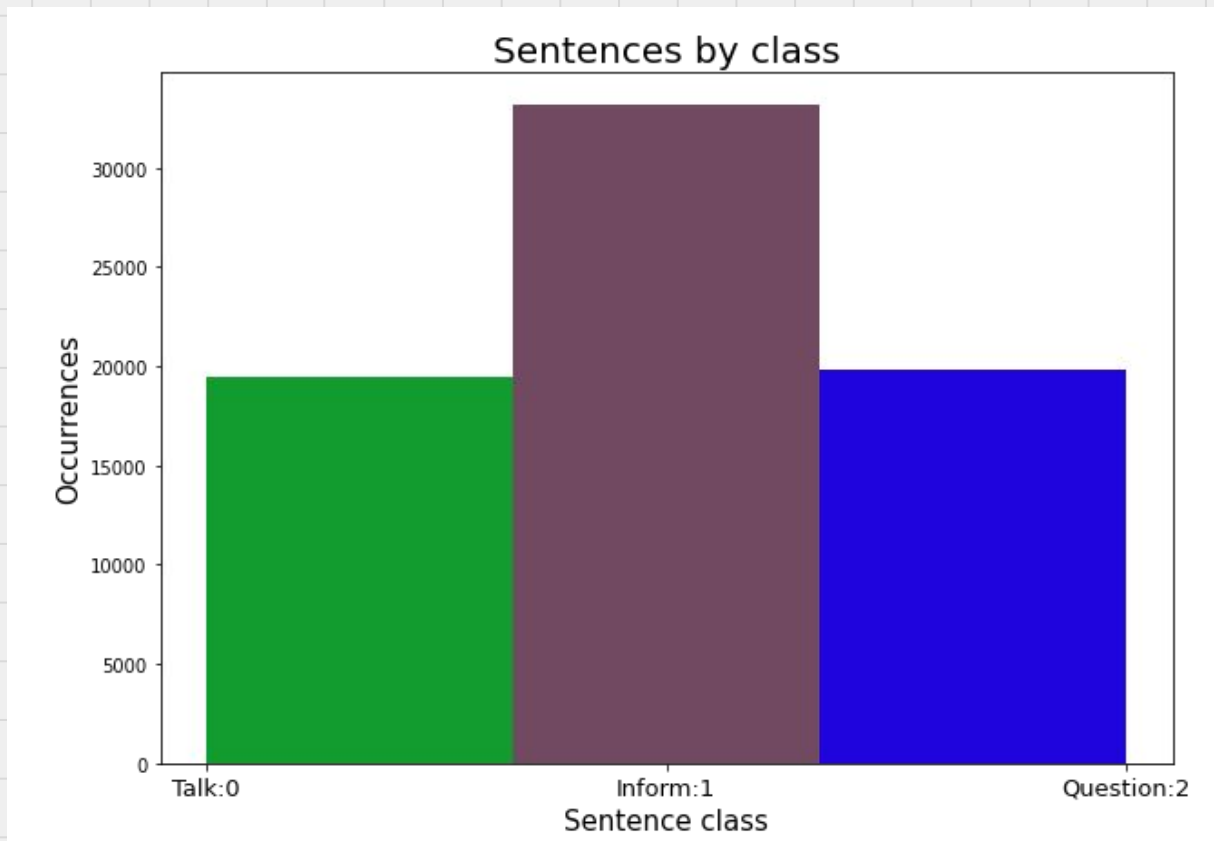
Original Sentence Lengths

Pre-processed Sentence Lengths

Analysis of sentence's length
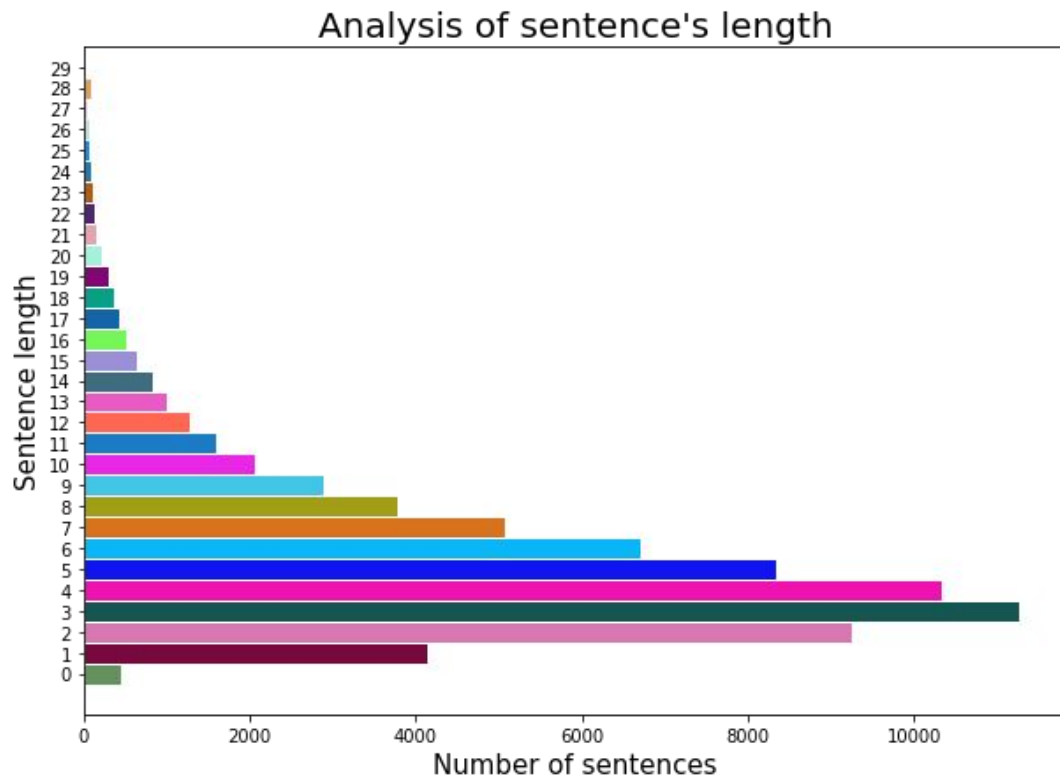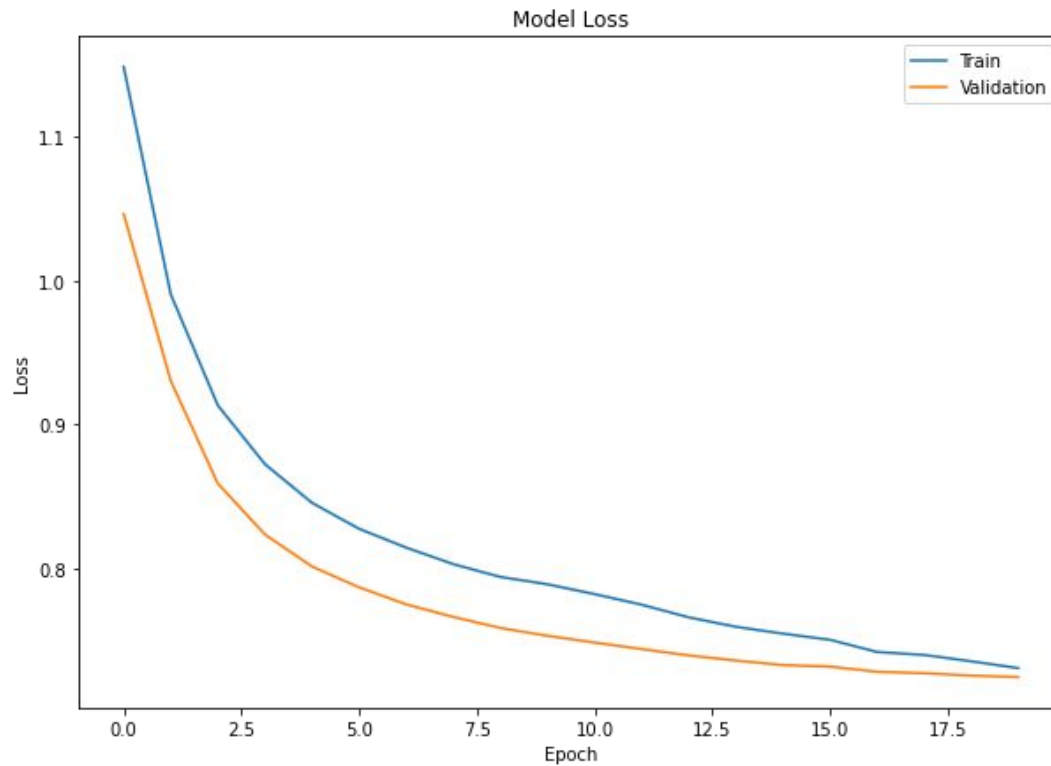
ANN Loss Function

ANN Accuracy Comparison

Training Set	Validation Set	Test Set
67.77%	70.54%	73.08%

ALBERT Loss Function
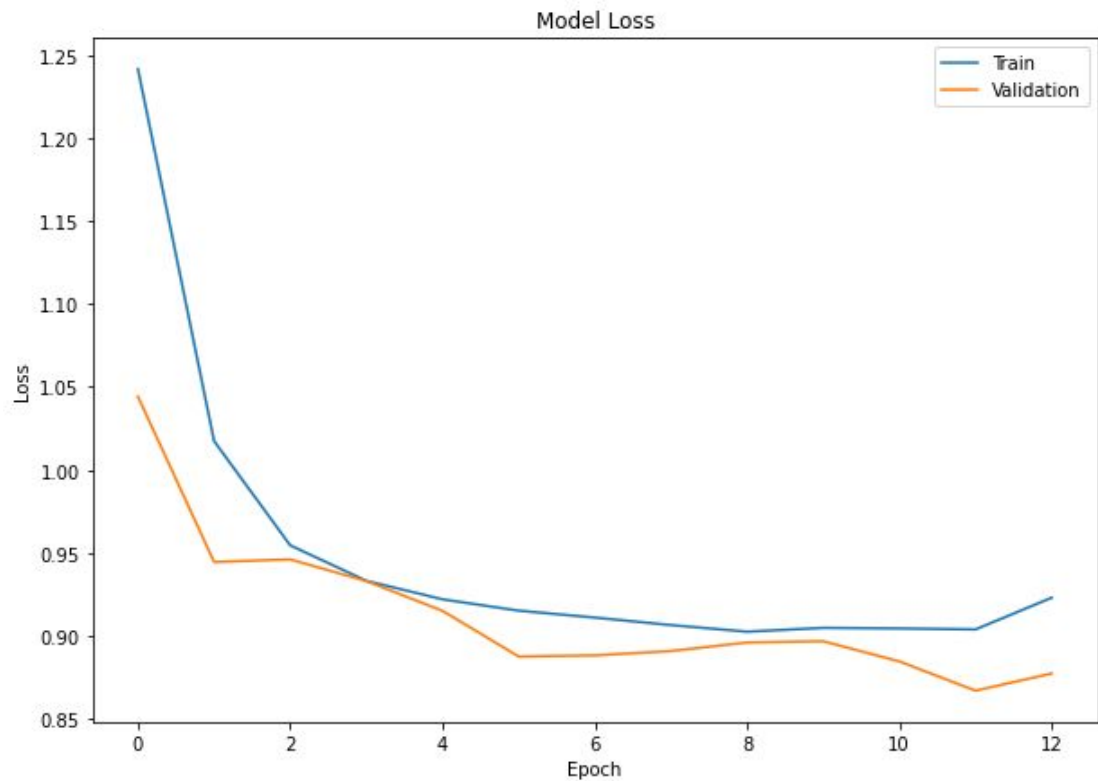
ALBERT Accuracy Comparison

Training Set	Validation Set	Test Set
71.45%	68.59%	73.12%