

Task 1.3

In first task we trained the model with a text file containing positive and negative responses. We used CNN model to create a chat bot and it provided good results as under.

Training Loss: 0.0213,
Validation Loss: 0.3354,
Training Accuracy: 100.00%,
Validation Accuracy: 87.00%

The model performed well with 87 % validation accuracy. The output of the model is below.

```
Type 'quit' to exit the program
You: This is a nice phone
User: This is a nice phone
Bot: Positive response.
You: Bad phone
User: Bad phone
Bot: Negative response.
You: I like you
User: I like you
Bot: Negative response.
You: Not an Excellent phone
User: Not an Excellent phone
Bot: Positive response.
You: quit
Exiting the program.
```

However, when working with transformers we got following results.

Training Loss: 0.7170,
Validation Loss: 0.6924,
Training Accuracy: 48.78%,
Validation Accuracy: 53.00%

The transformers took more time to train and therefore we stopped after few hours to go with the current accuracy of 50 %. Some conclusions drawn from the above results are as under.

- CNNs are designed for spatial data that is fixed and these do not generally perform well with the NLP tasks. Additional models such as LSTM and GRUs have been devised to better handle short-term memory issues in CNN.
- Since the dataset is large and CNN is good for large-scale spatial data, creating a simple chatbot with classification problem i.e. positive or negative is more effective in CNN. However, when we require the model to be more advanced that responds in natural language texts, a transformer is a better choice.

- CNN model is good for feature extraction, and in our case we extracted the feature of negative and positive responses. Smaller feedback responses are better handled in first model.
- Transformers are trained on a large dataset whereas we trained the model on less than 1000 lines of sentences. Therefore, CNN is a better choice in this case.
- Transformers do not support transfer learning unlike CNN. It is therefore better to work with current dataset for making the model more prone to futuristic improvements.