Quora Insincere Questions Classification

Be Nice, Be Respectful

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Quora - A social platform where people can ask questions and connect with others who contribute unique insights and quality answers.

The Problem - Detecting/handling toxic and divisive content.

Aim - Develop models that identify and flag insincere questions. This project is a way to combat the problem and uphold Quora's status as a place for sharing and growing the world's knowledge.

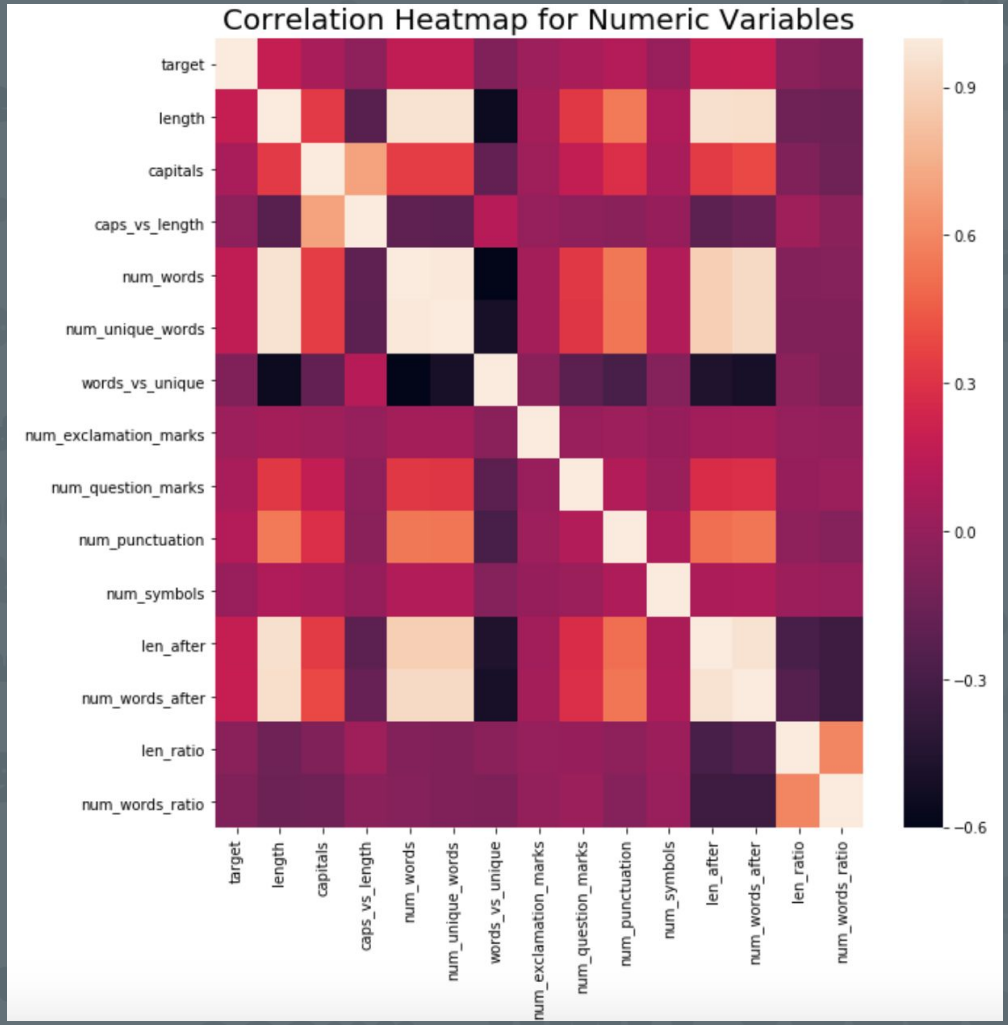
The Data

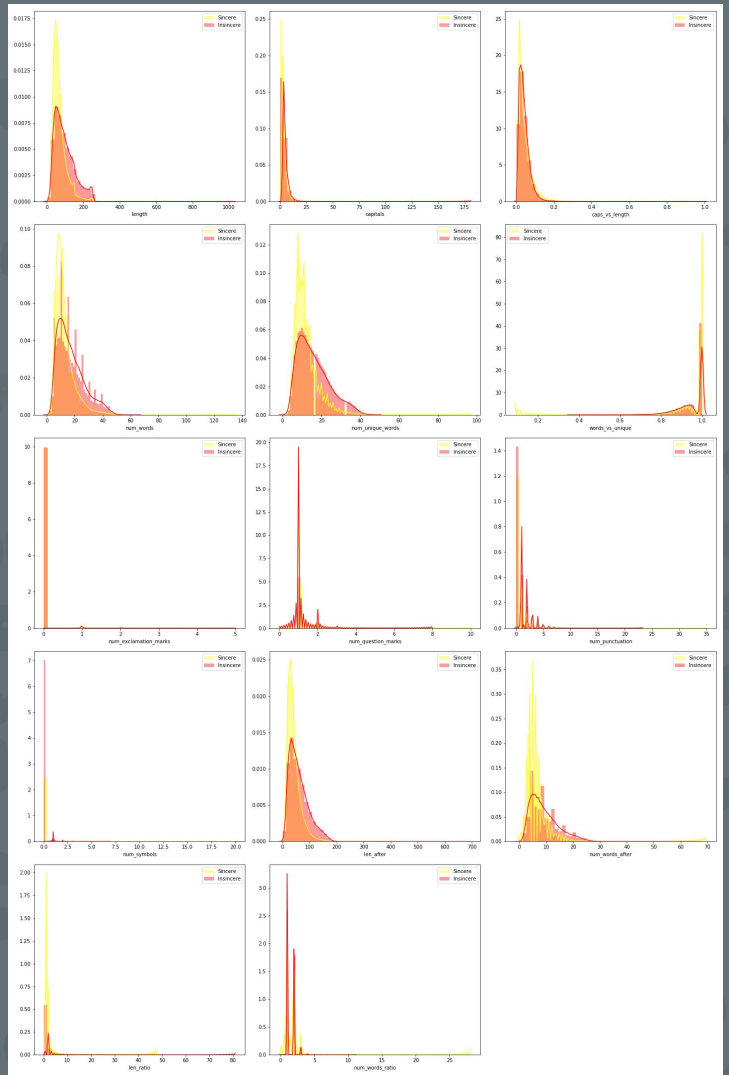
~1.3 Million Questions

Sincere Questions

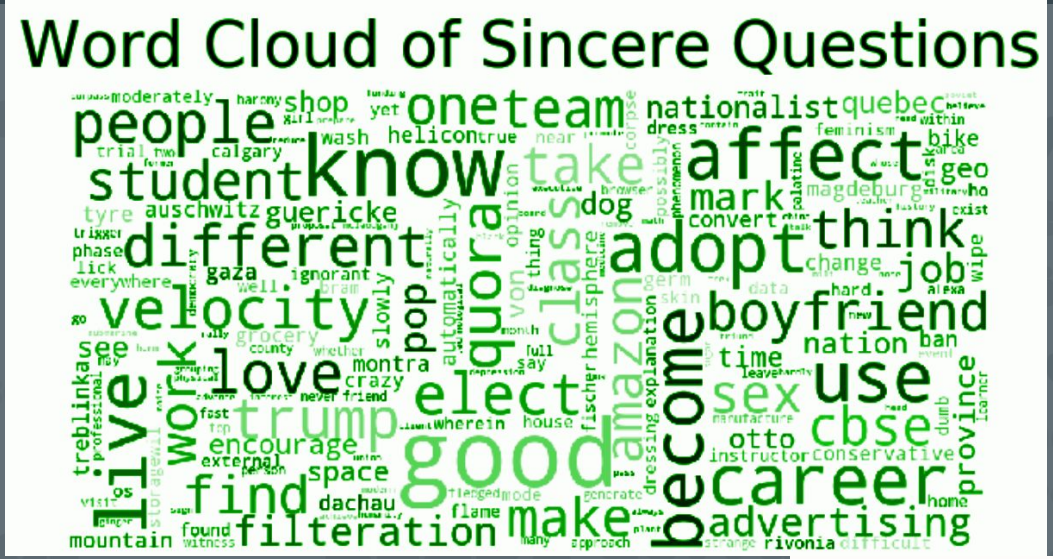
Insincere Questions

Understanding numerical features of question text



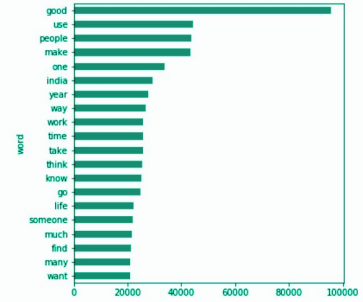


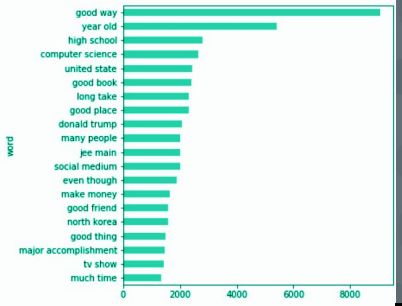
Distribution of numeric variables in Sincere vs Insincere questions

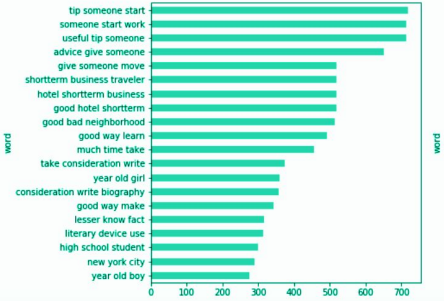


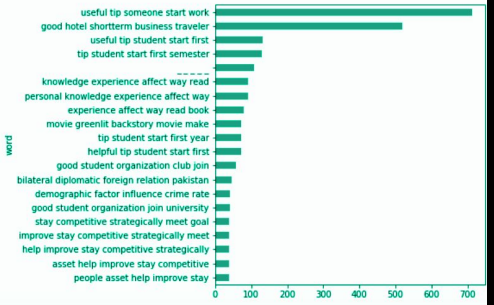
Understanding textual features of question text

Top 20 1,2,3 and 5 words phrases in sincere questions

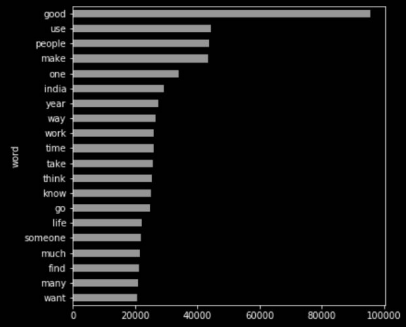


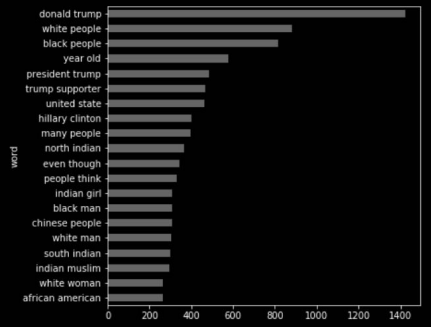


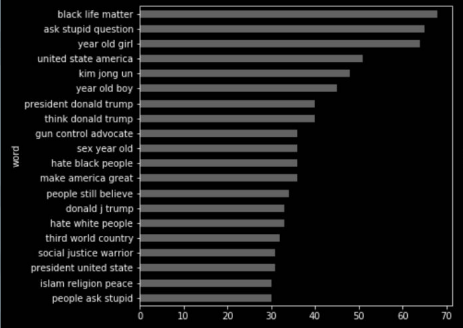


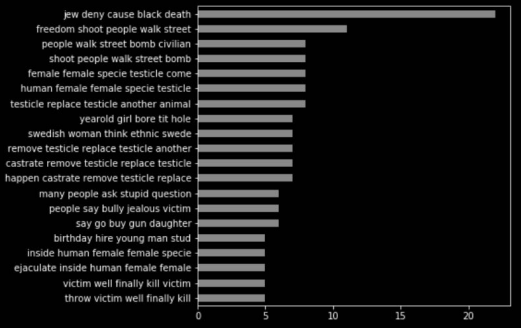


Top 20 1,2,3 and 5 words phrases in insincere questions









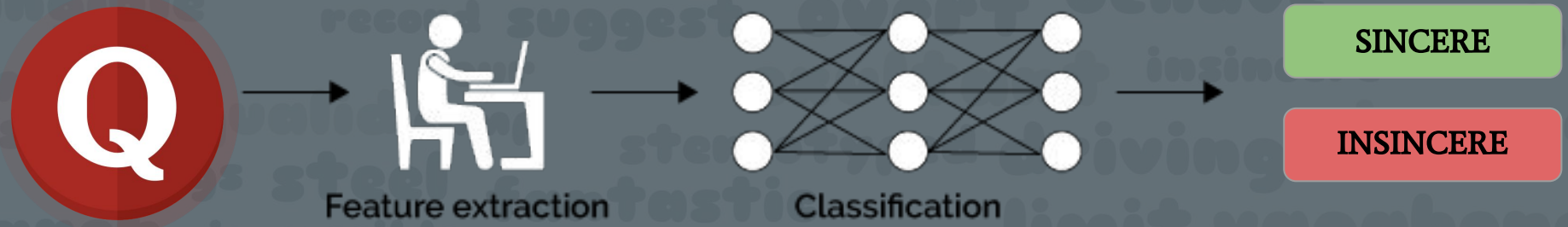
1. Insincere questions have more words than sincere questions on average.

Statistical Inferences about demographic features of the data

2. Insincere question have more number of punctuations than sincere ones.

Machine Learning

- ➔ Logistic Regression
- ➔ Naive Bayes Classifier
- ➔ KNN Classifier
- ➔ XG Boost Classifier



Deep Learning
Deep Neural Network and LSTM

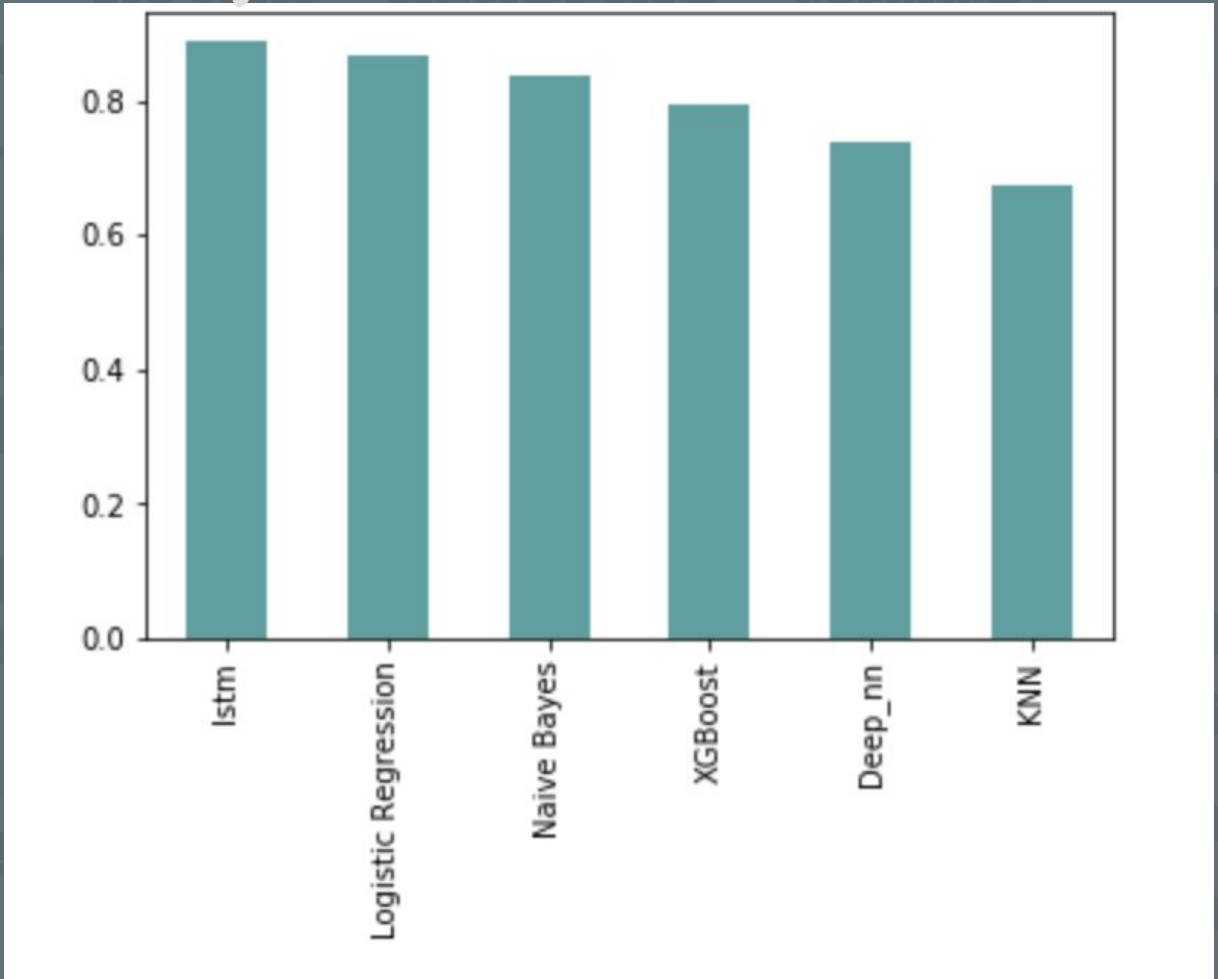
Layer (type)	Output Shape	Param #
dense_38 (Dense)	(None, 512)	256512
dropout_19 (Dropout)	(None, 512)	0
dense_39 (Dense)	(None, 512)	262656
dropout_20 (Dropout)	(None, 512)	0
dense_40 (Dense)	(None, 512)	262656
dropout_21 (Dropout)	(None, 512)	0
dense_41 (Dense)	(None, 2)	1026
activation_5 (Activation)	(None, 2)	0

Total params: 782,850
Trainable params: 782,850
Non-trainable params: 0

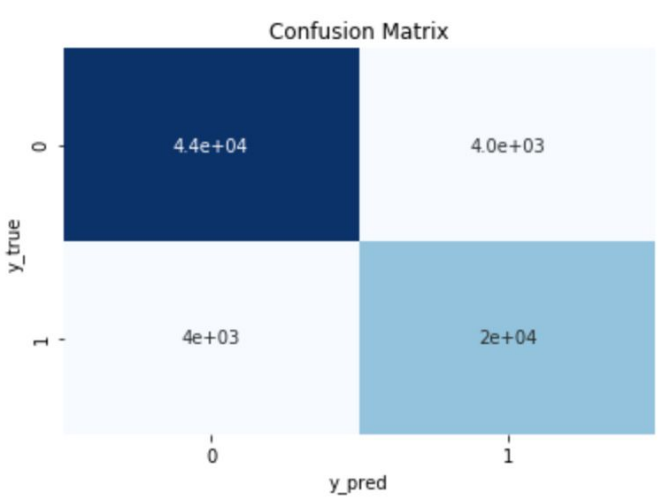
Layer (type)	Output Shape	Param #
embedding_1 (Embedding)	(None, 1, 128)	21564032
spatial_dropout1d_1 (Spatial	(None, 1, 128)	0
lstm_1 (LSTM)	(None, 64)	49408
dense_1 (Dense)	(None, 1)	65

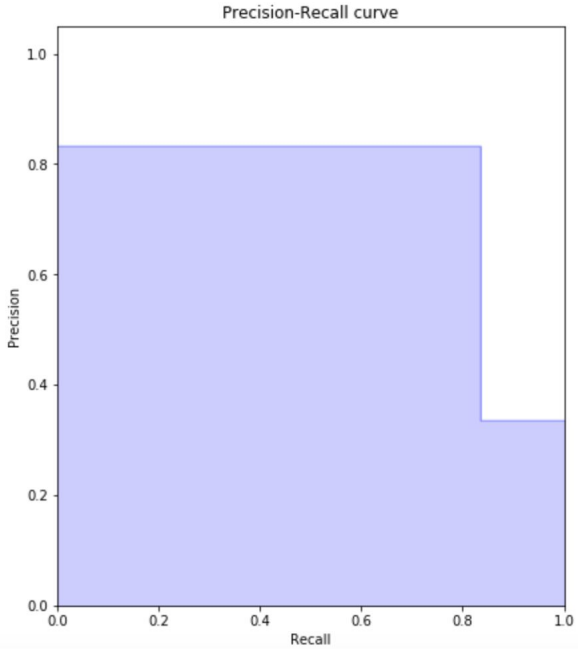
Total params: 21,613,505
Trainable params: 21,613,505
Non-trainable params: 0

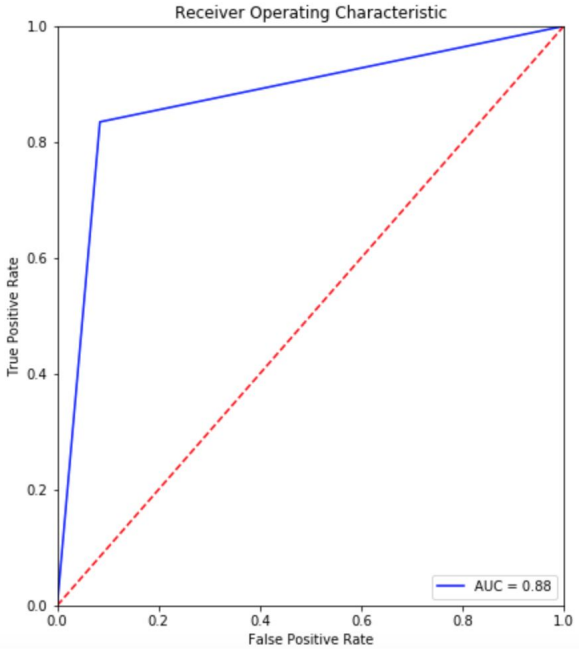
Accuracy Scores for Different Models



Confusion matrix for LSTM neural network



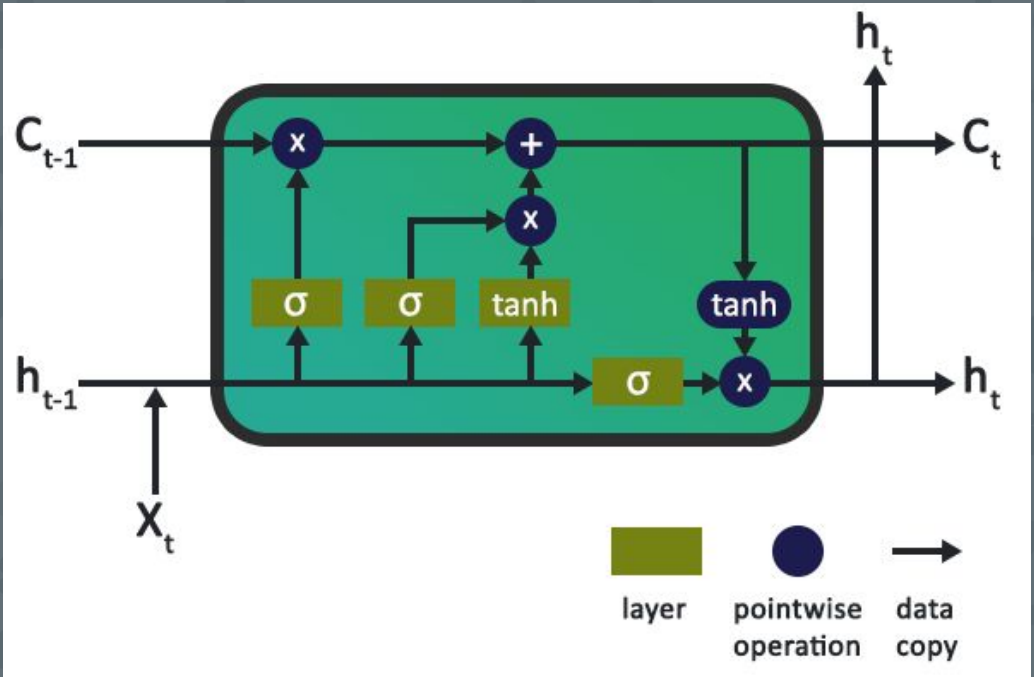




Precision-Recall Curve and ROC Curve

Conclusion

LSTM results in best accuracy.

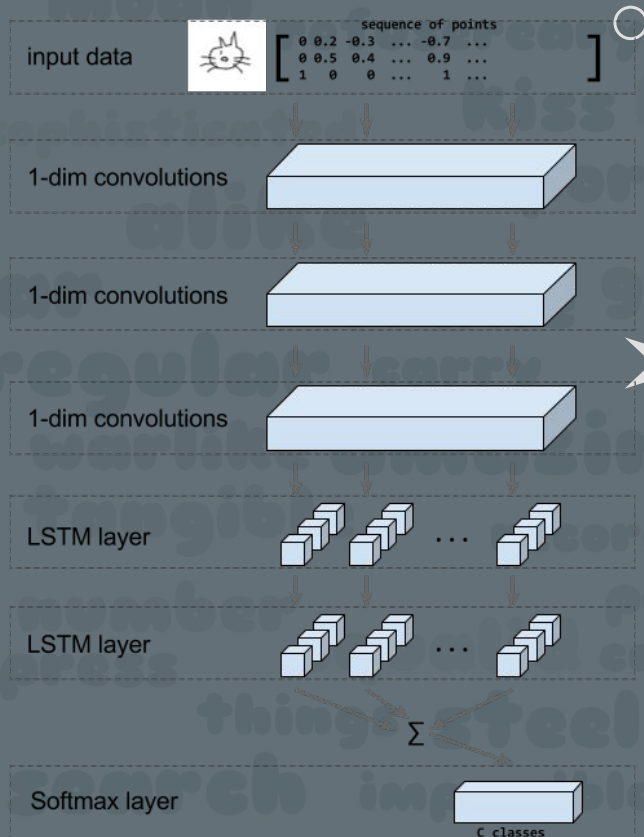


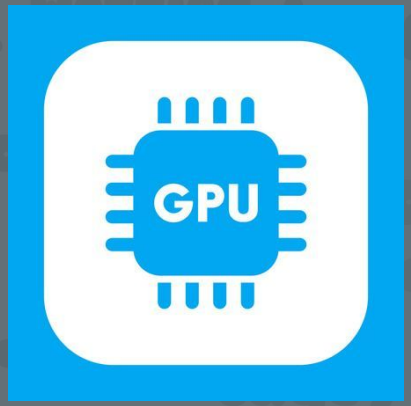
Best Model:

Accuracy = 89%
Precision = 87.5%
Recall = 87.5%

Future Directions

- Train models using GPU
  - More epochs





- Combine different models to increase accuracy
  - Bidirectional LSTM
  - Convolutional Neural Network