Spam Classification in Messages

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Overview

SMS Spam is becoming an increasingly common issue, so finding ways to detect spam messages is extremely beneficial

Our project looks at different ways to detect SMS spam, using a basic MLP, LSTM and BILSTM model

The “SMS Spam Collection Data Set” available from the UCI Machine Learning Repository was used

A model was also ran on the Enron corpus dataset

Dataset Examples

ham What you doing?how are you?
ham Ok lar... Joking wif u oni...
ham dun say so early hor... U c already then say...
ham MY NO. IN LUTON 0125698789 RING ME IF UR AROUND! H*
ham Siva is in hostel aha:-.
ham Cos i was out shopping wif darren jus now n i called him 2 ask wat present he wan lor. Then he started guessing who i was wif n he finally guessed darren lor.
spam FreeMsg: Txt: CALL to No: 86888 & claim your reward of 3 hours talk time to use from your phone now! ubscribe6GBP/ mnth inc 3hrs 16 stop?txtStop
spam Sunshine Quiz! Win a super Sony DVD recorder if you canname the capital of Australia? Text MQUIZ to 82277. B
spam URGENT! Your Mobile No 07808726822 was awarded a L2,000 Bonus Caller Prize on 02/09/03! This is our 2nd attempt to contact YOU! Call 0871-872-9758 BOX95QU

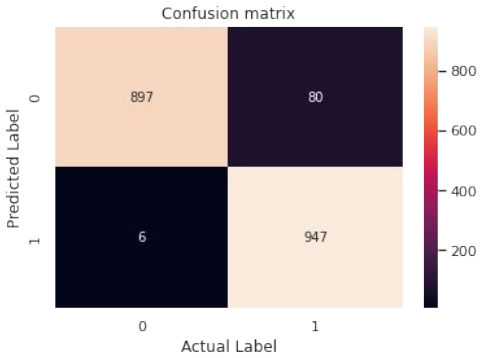
Problem modeling

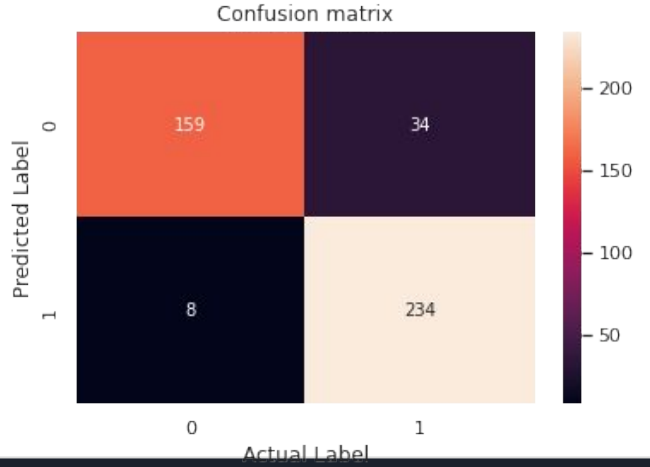
- Type of learning: Supervised Learning
- Input format: A vectorized text array
- Features: Vocab size
- Output format: Value between 0-1 (sigmoid)
- Architectures utilized:
  - MLP
  - BILSTM
  - LSTM

Problem parameters

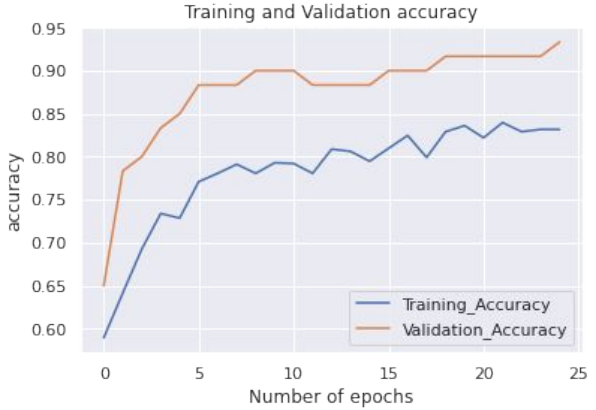
- Loss function: Binary cross entropy
- Duration:
  - Batch size = 32
  - Epochs = 25
- Optimizer: Adam
  - LR = 0.0001

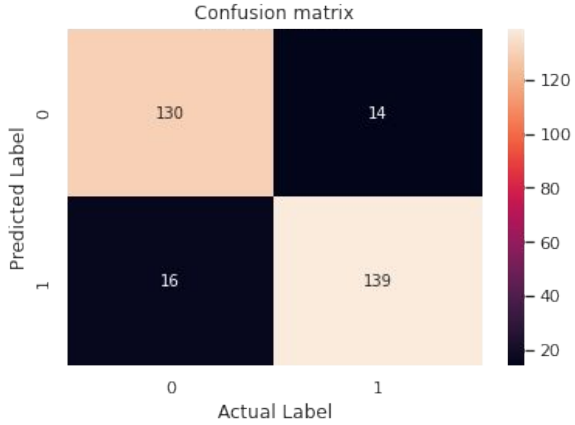
Performance Analysis - MLP Upsampling



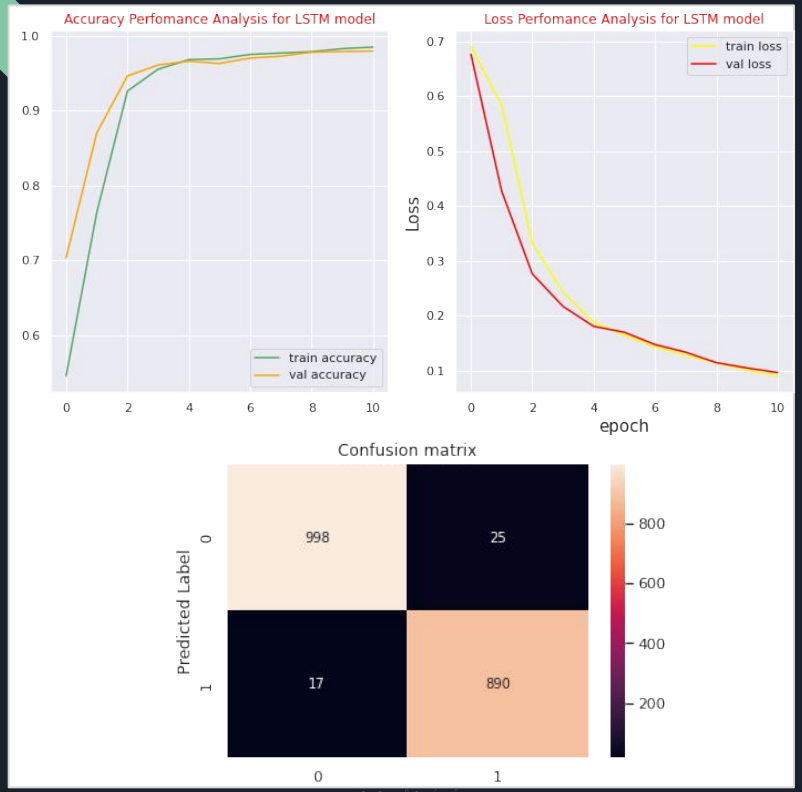


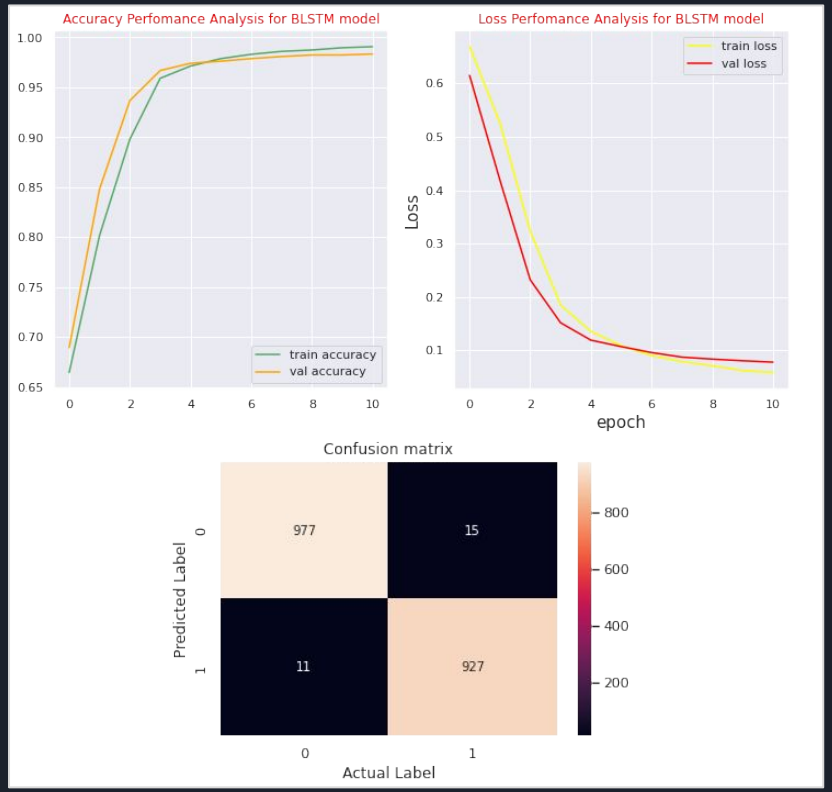
Performance Analysis - MLP (Downsampling)



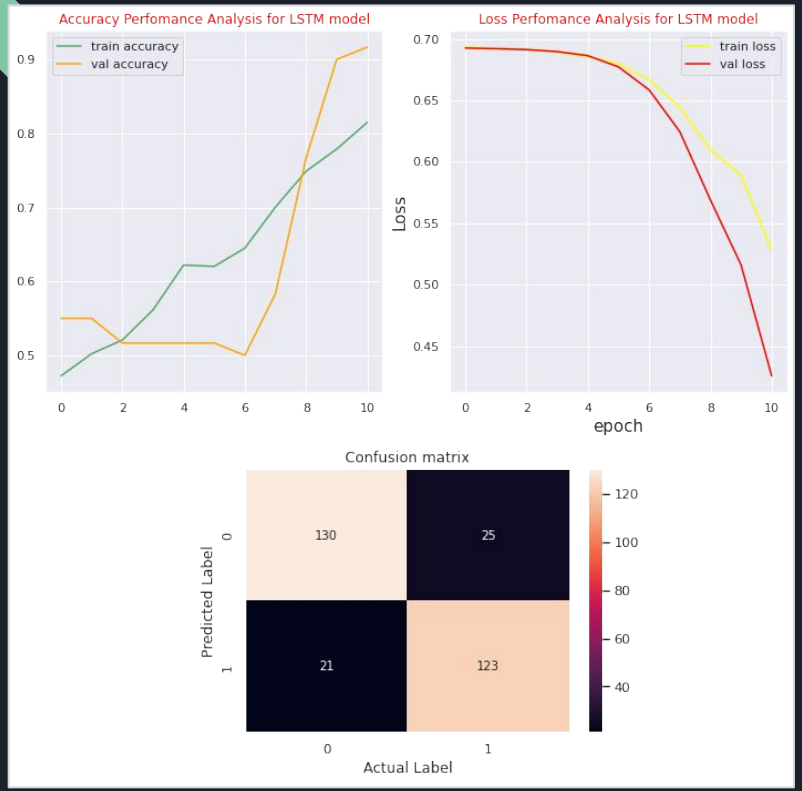


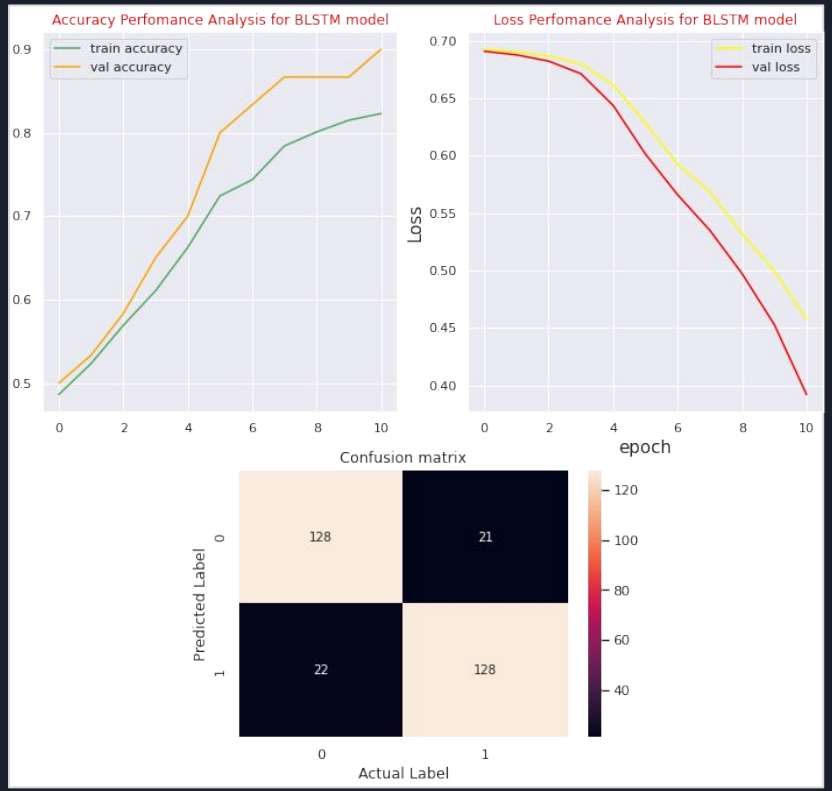
Performance Analysis - LSTM and BILSTM (Upsampling)





Performance Analysis - LSTM and BILSTM (Downsampling)





Results for models performed on upsampled data

	Accuracy	Precision `	Recall	F1-Score
Dense	95.54%	92.21%	99.37%	95.65%
LSTM	97.82%	97.27%	98.13%	97.69%
BILSTM	98.65%	98.41%	98.83%	98.62%

Results for models performed on downsampled data

	Accuracy	Precision `	Recall	F1-Score
Dense	89.97%	90.85%	89.68%	90.26%
LSTM	84.62%	83.11%	85.42%	84.25%
BILSTM	85.62%	85.91%	85.33%	85.62%

Thank you!