Is this question sincere? Identifying insincere questions on Quora using BERT and variations

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Background & Problem

- Flagging "insincere" questions is an ongoing challenge for online forums
- Insincere = non-neutral tone, disparaging, false assumptions, …
- Difficult—words like "bad", "worthless" can be used genuinely!
- **Flag input question as sincere or not**
- Dataset provided by Quora + Kaggle
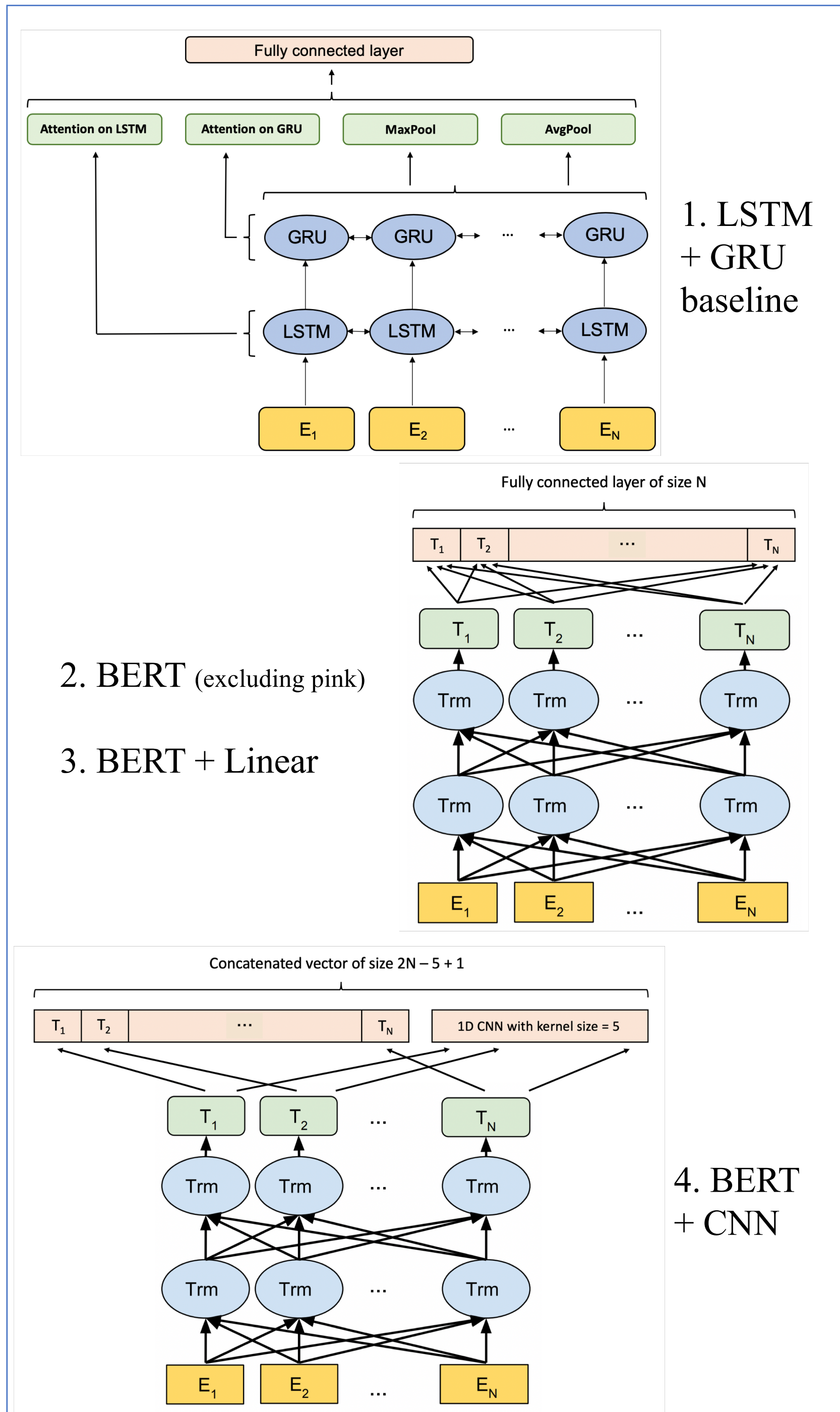- Compare LSTM+GRU baseline to BERT, BERT+CNN, and BERT+Linear

Pre-processing

1. everything.toLower()
2. Expand the contractions using a map
3. Remove $pecial chars using map
4. Autocorrect top 50 misspellings ("qoura")
5. Replace digit5 with token='#'

Conclusion & Discussion

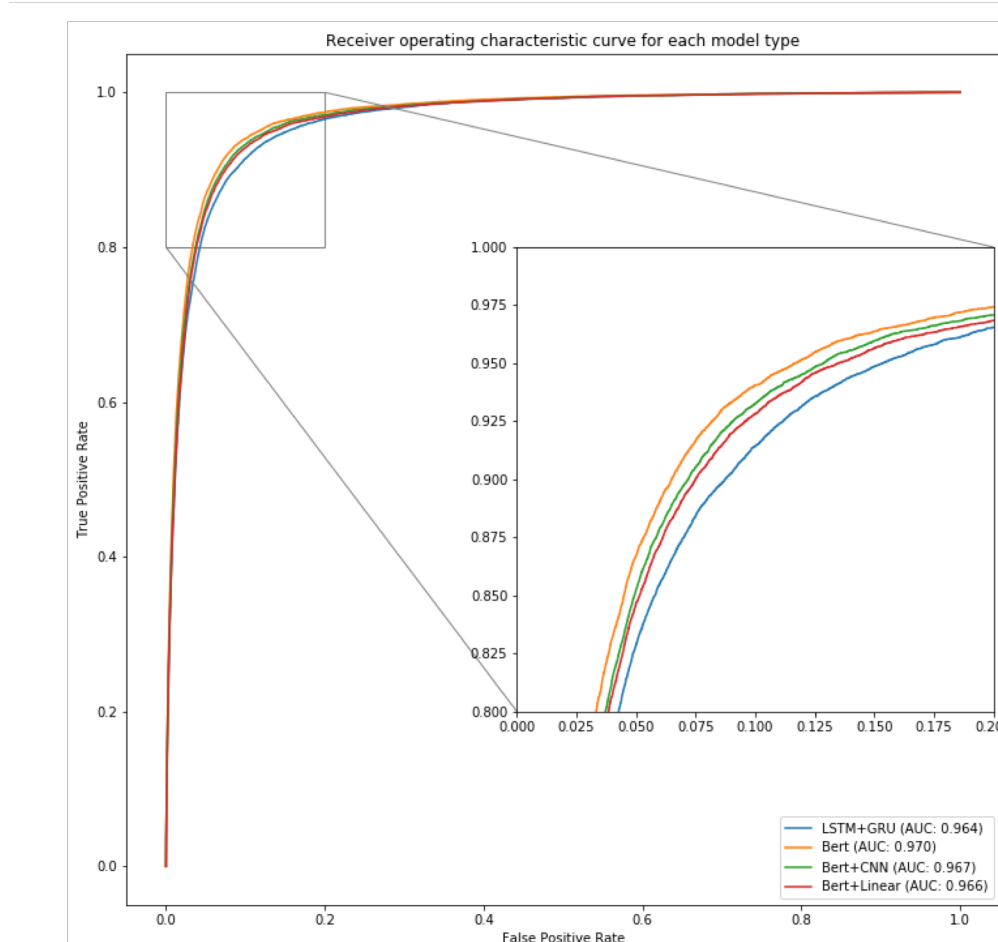- **BERT performs better than LSTM+GRU**
- Likely because fewer parameters => less propensity to overfit on noisy dataset
- BERT variations perform worse; possibly redundant parameters complicating the model
- Noise in the dataset is a huge problem! Many BERT predictions falsely marked "incorrect"

Models

1. LSTM + GRU baseline

2. BERT (excluding pink)

3. BERT + Linear

4. BERT + CNN

Results & Outputs

Model Type	Accuracy	Precision	Recall	F1 Score
LSTM + GRU	0.956	0.635	0.709	0.670
BERT	0.959	0.645	0.765	0.700
BERT + CNN	0.958	0.639	0.742	0.687
BERT + Linear	0.956	0.625	0.749	0.681

ROC Curve

Question text	Tg	LSTM	BERT
why mustangs get all the hate ?	0	1	0
why do the wealthy have trophy wives or mistresses who only love their money ?	0	1	0
are most teachers narcissists ?	0	1	0
do indian chosen representatives do not know how to cast a valid vote and value of that ?	0	0	1
when did america fall behind and how long before they can admit it to themselves ?	0	0	1
once you realized quora is a stage that attracts narcisssists,,did things seem to make more sense to you ?	0	0	1
why do not you die of shame mr .,nitin kamath,(zerodha),?	1	1	0
why do not gun control advocates think of the non,-,urban communities ?	1	1	0
why is it necessary to assasinate a us president when they stay in office only a few years ?,cannot the opponents just wait them out ?	1	1	0
is there any law in india which is incongruent with the attitudes of most indians ?	1	0	1
should all people in brazil talk to all people in italy ?	1	0	1
what would trump do if he was sent to the naughty corner in the oval office ?,how long would it take him to realise there are no corners ?	1	0	1