

Problem / Data

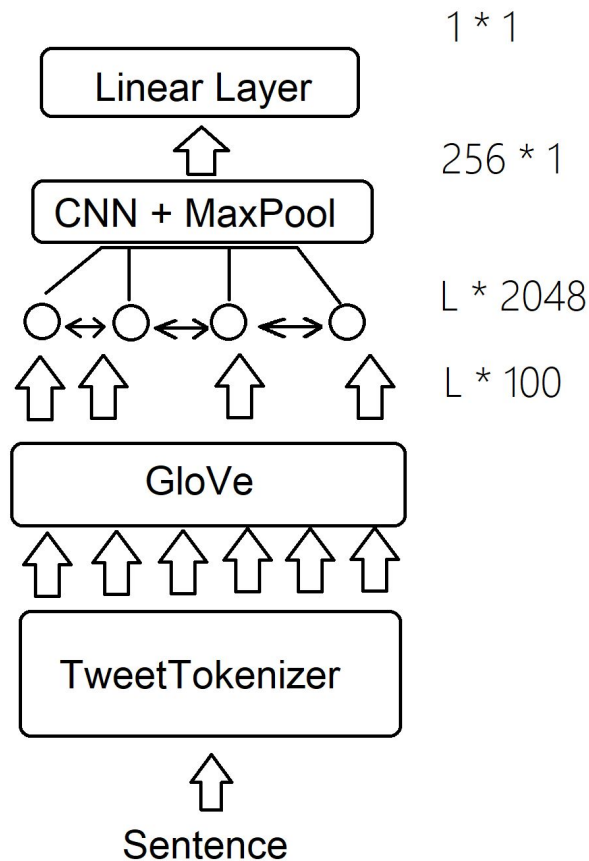
- Affective Circumplex - important in psychology
 - Valence (positive/negative)
 - Arousal (high energy/low energy)
 - Ex: Excited is high positive, high arousal
- Most sentiment analysis has neglected this model of emotion
 - Mostly use just valence or basic emotions
 - One dataset + study -> only bag-of-words + linear regression
- Data: given a Facebook post, predict valence + arousal
 - Ex:

Anonymized Message	Valence1	Valence2	Arousal1	Arousal2
Happy happy happy new year to everybody!! I have optimistic hopes for 2010.	8	9	8	8

Approach

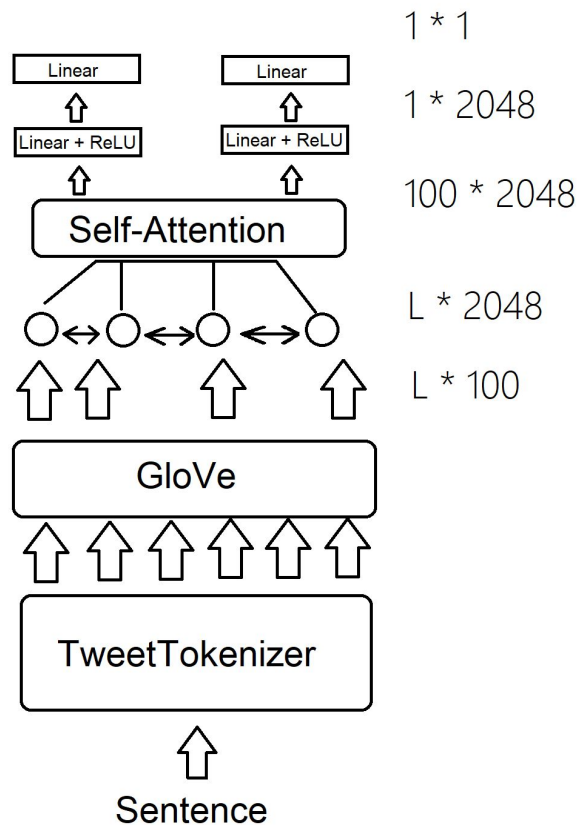
- Baseline

- Bidirectional LSTM into a CNN
 - Capture word-order
- Based on previous sentiment analysis work
- Use Linear layer for regression task
- One model for valence and arousal



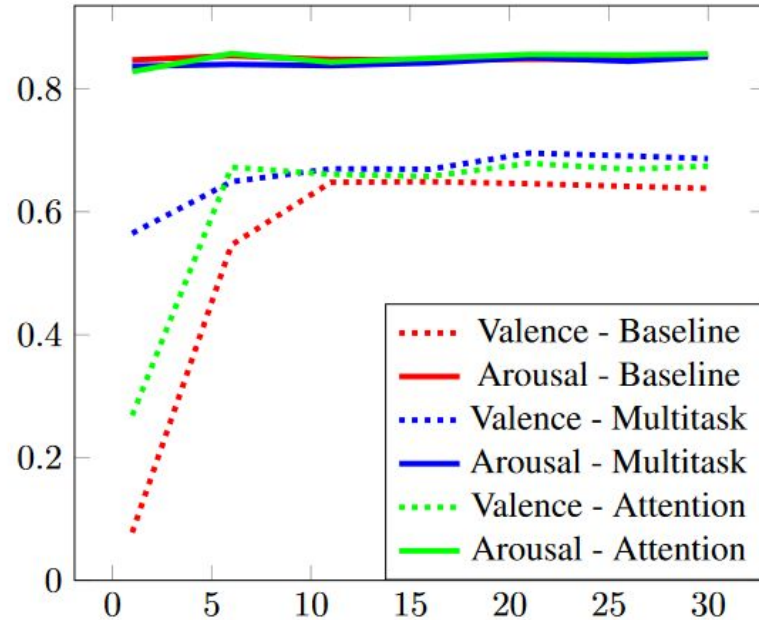
Approach (cont.)

- Multitask
 - Feed CNN into 2 separate linear layers
 - One linear layer for each dimension
 - Valence + Arousal -> similar underlying structure
- Self-Attention
 - Instead of CNN -> Lin et al (2017)
 - Feed into two sets of two linear layers



Results

- Measured correlation between predicted and human label
- Baseline model
 - Only as good as linear regression
 - Takes several epochs to train
- Self-attention
 - Also takes 5 epochs to train
 - Improved Valence - 0.68
- Multitask
 - Trains most quickly
 - Best Valence - 0.69



Analysis

- Is model choosing 'safe', middling values?
 - No: for scores of >7 and <3 , correlation was even higher
 - Performs well at extreme values
- Errors with exclamation marks
 - Ex: "My friends are going back home!!! I'll miss you guys so much!!! :(("
 - Predict as slightly positive instead of negative valence
- Lack of understanding
 - Not understanding entailment
 - Ex: "getting ready for the big move people"
 - Predict neutral arousal, human label as high arousal
 - Doesn't realize the entailment of a big move e.g. upheaval to unfamiliar place

Conclusion

- Improved on previous state-of-art for affective circumplex
 - Raised valence correlation from 0.65 to 0.69
- Used LSTM-CNN, multi-tasking, self-attention
- Further work needed for natural language understanding

References

- Preotiuc-Pietro (2016). Modelling Valence and Arousal in Facebook posts. Retrieved from <https://wwbp.org/papers/va16wassa.pdf>
- Sosa (2017). Twitter Sentiment Analysis using combined LSTM-CNN Models. Retrieved from https://www.academia.edu/35947062/Twitter_Sentiment_Analysis_using_combined_LSTM-CNN_Models
- Lin (2017). A STRUCTURED SELF-ATTENTIVE SENTENCE EMBEDDING. Retrieved from <https://arxiv.org/pdf/1703.03130.pdf>