



# Evaluating the Combination of Word Embeddings with Mixture of Experts and Cascading gcForest in Identifying Sentiment Polarity

## ABSTRACT

- In this paper, we have evaluated neural word embeddings on sentiment analysis task in two steps: (i) proposed a mixture of classification experts (MoCE) model for sentiment classification task, (ii) to compare and improve the classification accuracy by different combination of word embedding as first level of features and pass it to cascade model inspired by gcForest for extracting diverse features.
- We argue that in the first step, each expert learns a certain positive or negative examples corresponding to its category and in the second step resulting features on a given task can achieve competitive performance with state-of-the-art methods in terms of accuracy, precision and recall using gcForest.

## METHOD

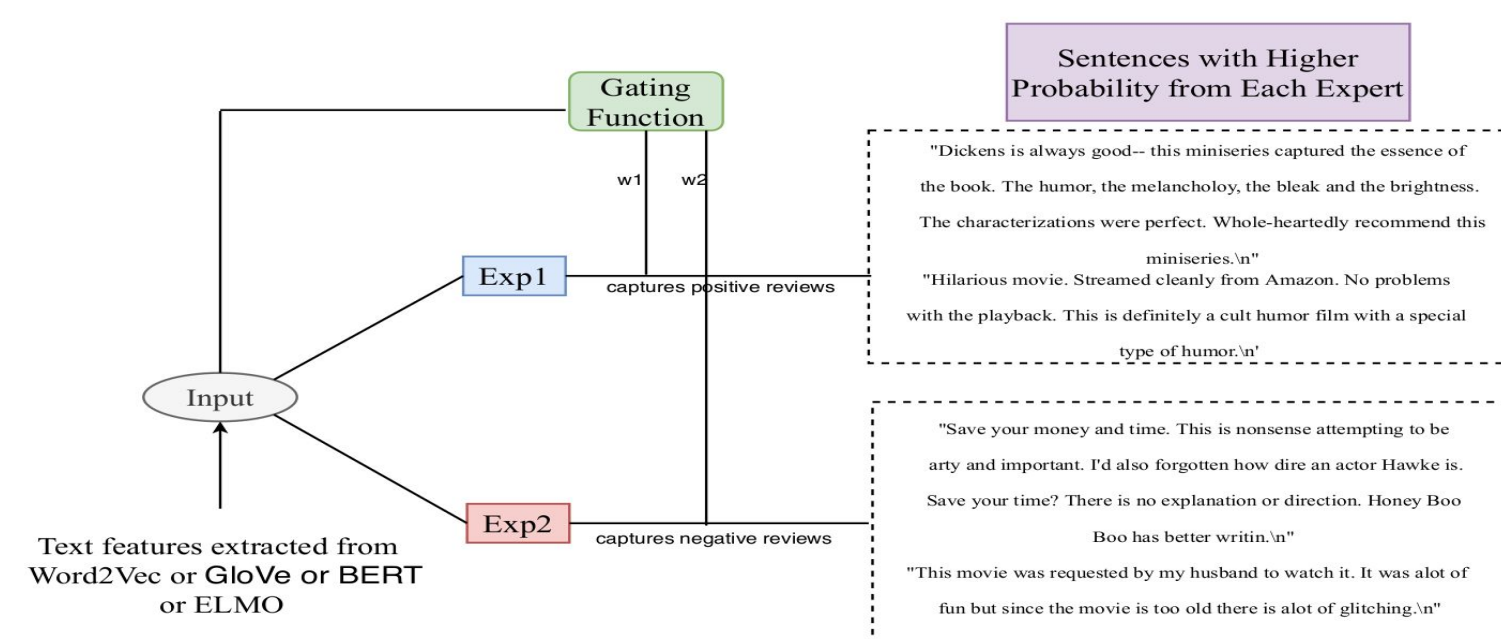


Figure 1: Proposed Mixture of Classification Experts (MoCE) model. Here, Expert1 captures positive reviews and Expert2 captures negative reviews.

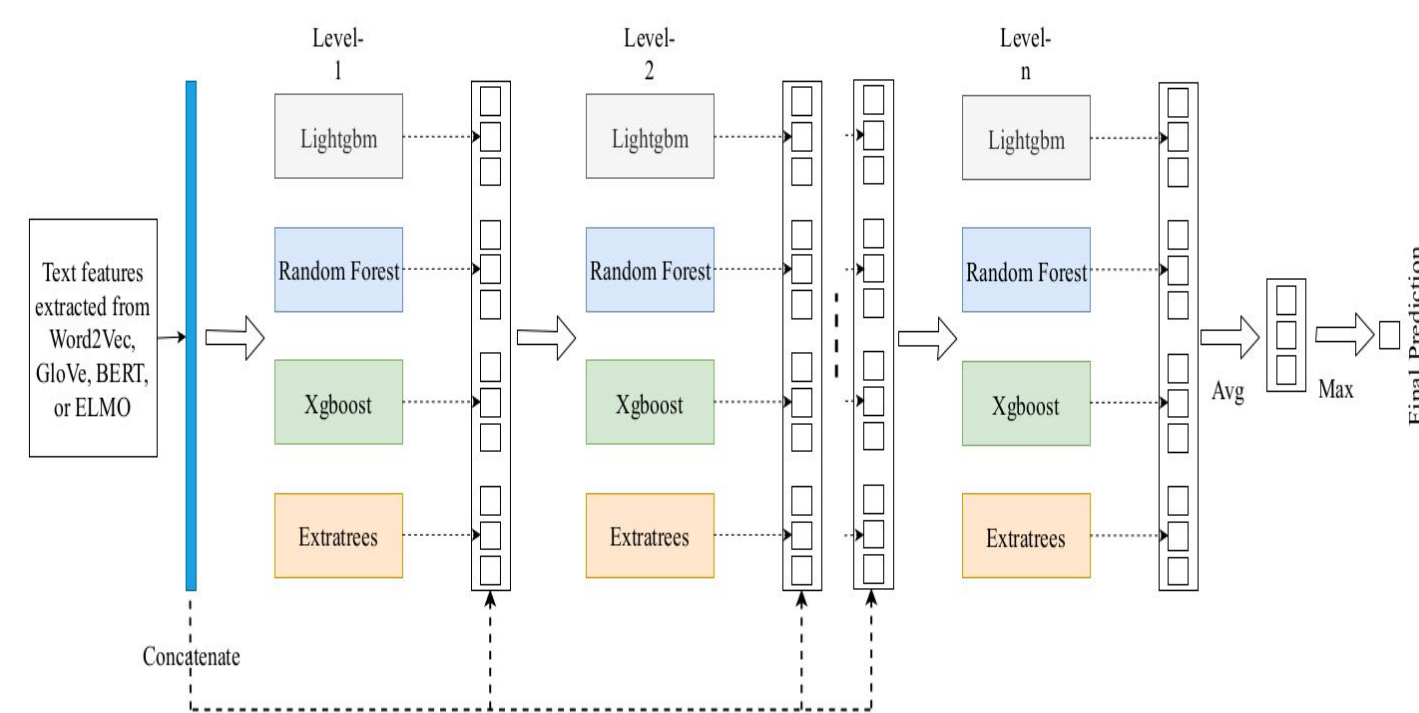


Figure 2: Cascading gcForest Architecture

## RESULTS

Domain	Word2vec		GloVe		BERT		ELMo	
	Expert1	Expert2	Expert1	Expert2	Expert1	Expert2	Expert1	Expert2
Amazon_Instant_Video	0.81	0.86	0.81	0.86	0.54	0.55	0.71	0.72
Automotive	0.81	0.85	0.85	0.82	0.54	0.55	0.72	0.72
Baby	0.73	0.87	0.97	0.05	0.61	0.67	0.77	0.72
Beauty	0.02	0.98	0.86	0.82	0.55	0.54	0.68	0.71
Books	0.82	0.83	0.84	0.83	0.57	0.57	0.75	0.68
Clothing_Accessories	0.90	0.79	0.85	0.88	0.66	0.74	0.78	0.73
Electronics	0.98	0.04	0.85	0.81	0.56	0.55	0.73	0.75
Health	0.80	0.83	0.81	0.84	0.59	0.55	0.71	0.73
Home_Kitchen	0.81	0.87	0.88	0.83	0.59	0.59	0.69	0.73
Movies_TV	0.85	0.80	0.03	0.97	0.54	0.57	0.72	0.76
Music	0.80	0.86	0.85	0.80	0.64	0.62	0.78	0.79
Office_Products	0.99	0.02	0.87	0.80	0.65	0.64	0.80	0.82
Patio	0.03	0.99	0.99	0.04	0.31	0.55	0.69	0.67
Pet_Supplies	0.82	0.80	0.82	0.80	0.54	0.56	0.71	0.73
Shoes	0.92	0.84	0.92	0.86	0.60	0.65	0.77	0.75
Software	0.82	0.84	0.87	0.71	0.55	0.55	0.71	0.73
Sports_Outdoors	0.78	0.87	0.79	0.87	0.58	0.59	0.69	0.73
Tools_Home_Improvement	0.85	0.78	0.85	0.79	0.55	0.54	0.70	0.77
Toys_Games	0.88	0.85	0.87	0.85	0.45	0.43	0.75	0.73
Video_Games	0.81	0.83	0.04	0.99	0.43	0.39	0.71	0.73

## CONCLUSION

In this paper, we have evaluated four neural word embedding methods such as Word2Vec, GloVe, ELMo, & BERT on sentiment analysis task using a mixture of classification experts (MoCE) model.