

# Automatic classification of the Big-Five personality traits from texts using embeddings and Long Short Term Memory Network

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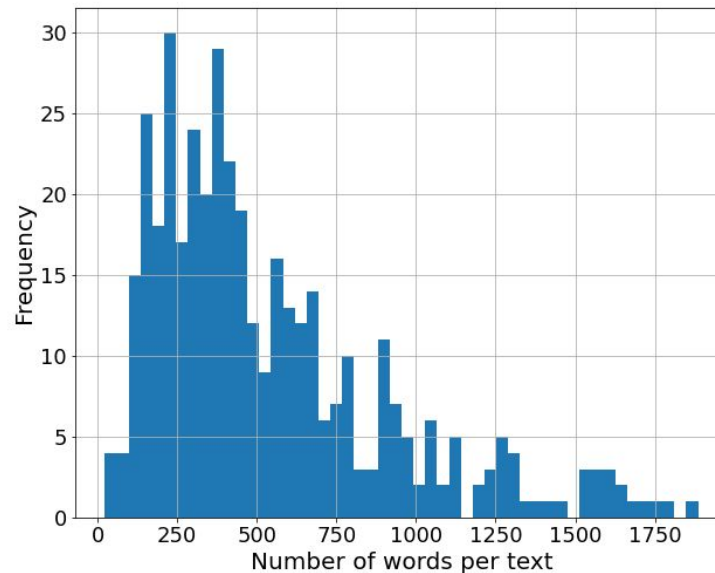
- Dataset
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There are considered the transcripts of the audio from vlogs of a set of 404 YouTube vloggers that explicitly show themselves in front of the a webcam talking about a variety of topics including personal issues, politics, movies, books, etc [1].

Trait	Texts with presence of the trait	Texts with absence of the trait
<b>Openness to experience</b>	201	203
<b>Conscientiousness</b>	195	209
<b>Extraversion</b>	195	209
<b>Agreeableness</b>	186	218
<b>Emotional stability</b>	201	203

1. Biel, J. I., Tsiminaki, V., Dines, J., & Gatica-Perez, D. (2013, December). Hi YouTube! Personality impressions and verbal content in social video. In *Proceedings of the 15th ACM on International conference on multimodal interaction* (pp. 119-126).

The transcriptions contains a total of approximately 10K unique words and 240K word tokens. Regarding the gender of the YouTube vloggers, a balance is presented, where 52% of them are female (210 vloggers) and 48% are male (194 vloggers).



Before all, the data must be cleaned and standardized to avoid noise and getting them ready for analysis.

- Convert all the texts to lower case
- Crutches (i.e. words like “um”, “am”) are removed.
- Remove punctuation
- Remove numbers
- Remove Stopwords
- Lemmatization: to transform the words into their root form

Original text:

¡She is reading a Math book! um um She and her boyfriend are going to seE a movie , ¿are they going to dinner together? uh uh

Preprocessed text:

she be read math book she and her boyfriend be go to see movie be they go to dinner together

## GloVe Architecture

Layer (type)	Output Shape	Param #
input_1 (InputLayer)	(None, 300)	0
embedding_1 (Embedding)	(None, 300, 300)	1500000
BiLSTM (Bidirectional)	(None, 1024)	3330048
dense_1 (Dense)	(None, 1)	1025
Total params: 4,831,073		
Trainable params: 3,331,073		
Non-trainable params: 1,500,000		

## ELMo Architecture

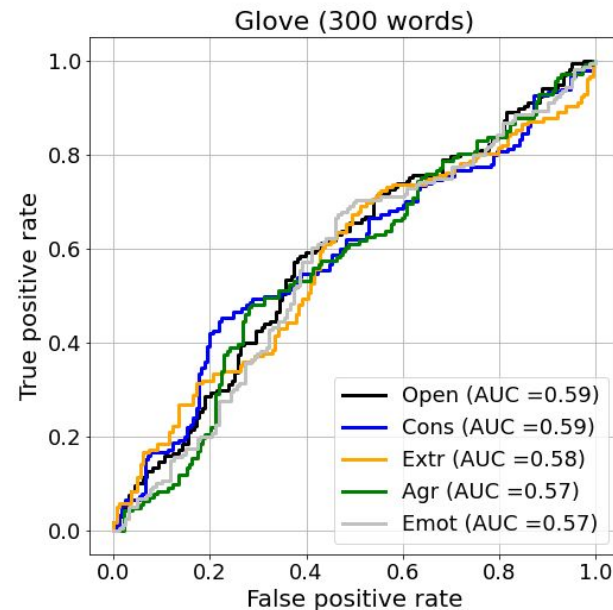
Layer (type)	Output Shape	Param #
input_2 (InputLayer)	(None, 300)	0
lambda_2 (Lambda)	(None, 300, 1024)	0
BiLSTM (Bidirectional)	(None, 1024)	6295552
dense_2 (Dense)	(None, 1)	1025
Total params: 6,296,577		
Trainable params: 6,296,577		
Non-trainable params: 0		

# Results Glove (300 words)



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Trait	Accuracy (%)	Sensitivity (%)	Specificity (%)
Openness to experience	58,1	63,1	53,4
Conscientiousness	62,2	45,3	77,1
Extraversion	58,4	65,4	51,8
Agreeableness	61,3	48,2	71,5
Emotional stability	59,1	61,0	57,1

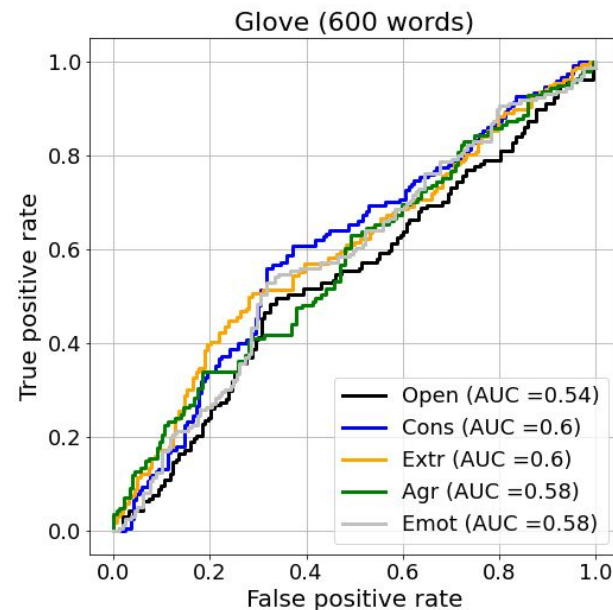


# Results Glove (600 words)



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Trait	Accuracy (%)	Sensitivity (%)	Specificity (%)
Openness to experience	57,8	46,5	68,7
Conscientiousness	61,3	56,7	65,3
Extraversion	60,3	41,7	78,1
Agreeableness	60,6	34,0	81,6
Emotional stability	60,3	54,1	66,5



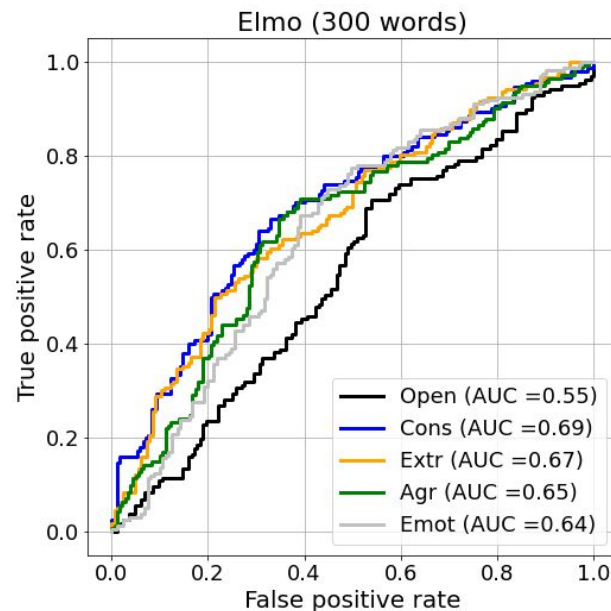


# Results Elmo (300 words)



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Trait	Accuracy (%)	Sensitivity (%)	Specificity (%)
Openness to experience	57,8	70,7	45,4
Conscientiousness	66,9	64,0	69,4
Extraversion	64,1	53,5	74,4
Agreeableness	65,9	66,7	65,4
Emotional stability	64,1	67,3	60,9

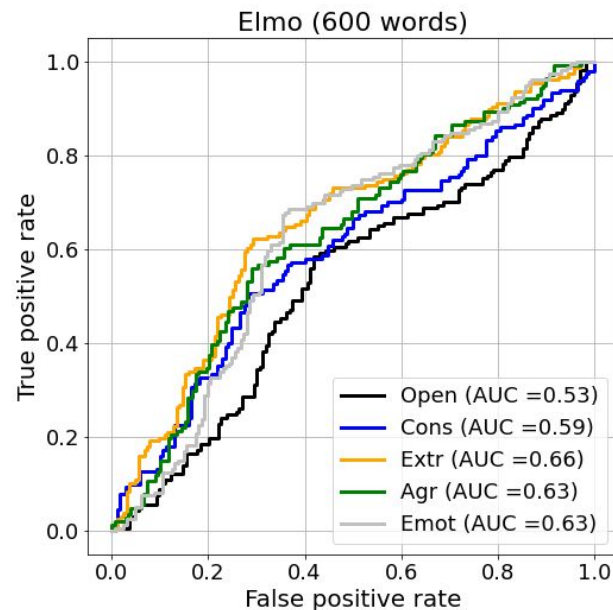


# Results Elmo (600 words)



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Trait	Accuracy (%)	Sensitivity (%)	Specificity (%)
Openness to experience	57,8	59,9	55,8
Conscientiousness	61,9	50,7	71,8
Extraversion	65,3	62,8	67,7
Agreeableness	64,4	56,0	76,9
Emotional stability	64,7	68,6	60,9



Best results vs. Baseline (SVM with Gaussian Kernel)				
	Baseline Accuracy (%)	Accuracy (%)	Number of words	Embedding
Openness to experience	56.50	58,13	300	GloVe
Conscientiousness	63.40	66,86	300	ELMo
Extraversion	63.80	65,31	600	ELMo
Agreeableness	60.90	65,94	300	ELMo
Emotional stability	56.70	64,69	600	ELMo

- As shown in the results, using the proposed architecture it was possible to improve up to 8% of the accuracy of the models with respect to the baseline, which proves the capacity of architectures like ELMo for the classification of personality traits.
- Preprocessing is an important phase in text analysis because depending on the content of our data when introduced into a neural network, the performance of the model will change, since words with similar semantic and syntactic meaning according to the context should be represented by nearby word embeddings.
- One of the great advantages of bidirectional long short term memory is that these allow embeddings as input (GloVe), and also capture context forward and backward. This considerably improves the performance of current models for the classification and prediction of personality traits.

# Automatic classification of the Big-Five personality traits from texts using embeddings and Recurrent Neural Networks

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