

Development of a Model to Predict Intention Using Deep Learning

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This paper presents a method to analyze discussions from social network by using deep learning. We have prepared a new dataset by collecting discussions from a social network and annotating remarks of the discussion. The annotation consists of two types of labels for each message: intention type and direction of intention. Using this dataset and pre-trained word embeddings we have evaluated two neural network structures. On the basis of evaluation, we chose a model to automatically predict intention types and direction of intention of an arbitrary message from any social network.

Dataset

Dataset was formed using Russian social network – Vkontakte as the source of discussions and texts. Raw data was downloaded using VKMiner¹ program. It contains 21192 texts.

The annotation consists of two types of labels for each message: intention and direction of intention:

- **25 intention types;**
- **5 intention supertypes;**
- **4 directions of the intention;**
- **25x4 = 100 intention types and directions;**

All discussions were dedicated to political topics. Using this dataset and retrained word embeddings we have built two models of a neural network to automatically predict an intention of an arbitrary message from any social network user.

Table 1: Intentions classification by direction

No.	Meaning	Example
1	"I"/"We" - the comment author about themselves and "us"	I disagree I think We can together etc.
2	"They" - author(s) of the article/post	They are right They are not right They do wrong etc.
3	"They" - other comment authors	They do not understand They talk nonsense etc.
4	Someone/Something in general, not "I"/"We", not "They"	Russia the USA capitalists etc.

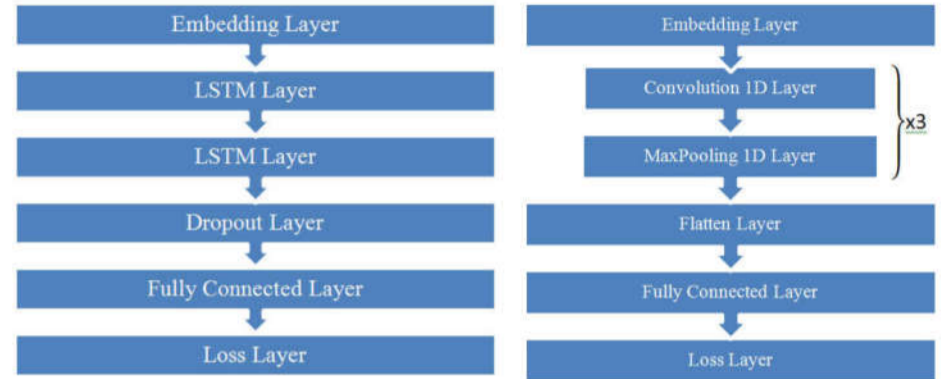
Table 2: Intention types and supertypes

Information reproducing type, To Reproduce the observable in speech	Emotionally consolidating type, Suggestion of the own world picture for cooperative collaboration	Manipulating type, Social domination, hierarchy establishment	Order-directive type, To encourage addressee to an action, make changes in the fragment of reality	Control-reactive type, To express evaluative reaction regarding the situation
A Surprise Question	F Selfpresentation	K Abusement	P Inducement to a positive action/recomendation	U Acceptance Accolade
B Showing disagreement Hesitation	G Attention attraction (discourse, rhetorical questions)	L Frightening, threats	Q Solicitation to negative	V Sarkasm Malevolence
C Agreement expression Support	H Auditorium aussuagement Reassurance	M Discredit (authority disruption)	R Accusation	W Criticism
D Non-acceptance, rejection from communication	I Forecasts, claims for truth	N Force demonstration (without obvious threat)	S Consequences caution	X Irony
E Commiseration, sympathy	J Justification (as self-justification, e.g. without accusation)	O Moralisation, homily	T Accusation offset (if is accused)	Y Exposure

The aim of this research was to find a model, suitable to predict intentions of users which they express in discussions in social networks.

We apply two neural network structures with embeddings pre-trained on the Ruscorpota.

Deep Learning Classifiers: LSTM and CNN



(a) Structure of the LSTM network.

(b) Structure of the CNN network.

Experimental results showed that model based on LSTM allows to obtain better results. The classification by the directions of intention showed the best accuracy. We explain it not only by a low number of classes, but because of the fact that directions are often represented using explicit words.

Table 3: Experimental results on CNN and LSTM in dependence with the epoch quantity

num. of classes	Intention supertypes		Directions of the intention		Intention types		Intention types and directions	
	5	5	4	4	25	25	100	100
num. of epochs	LSTM	CNN	LSTM	CNN	LSTM	CNN	LSTM	CNN
	5	0.35	0.06	0.63	0.36	0.07	0.01	0.06
20	0.35	0.24	0.65	0.60	0.15	0.10	0.05	0.07
100	0.34	0.09	0.63	0.45	0.08	0.02	0.05	0.01

¹ <https://linis.hse.ru/soft-linis>