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Examination of the possibility of developing mental illnesses by the people using social networks

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ABSTRACT
The purpose of the paper was to examine the relationship between people's use of social networks (SNs) and the possibility of developing related underlying diseases that usually affect the human mental system. The significant and thought-provoking point about using SNs is that we have to know how effective the use of these networks is in the real lives and whether the improper use of these networks can pose a threat to people's health. The data were selected from both genders and using a series of basic parameters like age, social network name, gender, type of disease and social network use and were examined. Then a series of statistical analyses was performed in Spss and then using the predictive power of neural networks (NNs) and using NeuroSolution software, which is easily added as an add-on to Excel, the probability of infection was specified.
Keywords: SNs, mental illness, NNs

Introduction

SNs are a kind of web-based community allowing the individuals to share their personal information with other people. The significance of the issue of using SNs can be examined as today the use of these networks has become widespread in the lives of most people in society. Many of these SNs enable their users to use mobile devices like mobile phones to join and use them, which shows that people can easily use SNs at any time and place. Most of the users of these networks are the young people who have used SNs for different causes like games, entertainment, communication with friends, as well as sending information and files to others. The discussion of social pathology can add to the significance of examining this issue and what risks may arise for the user following the use of these networks. A study by two University of Michigan researchers (Madeson and Steven, 2004) examined the continued use of Facebook for more than two weeks. The results indicated that those who used Facebook for a long time experienced a kind of depression in their daily work, and this caused people to not feel satisfied and happy with their lives. In another study conducted on one of the university's most important sites, a researcher of Cornell University (Steven Strogatz, 2012) showed that users who use SNs significantly do not have the opportunity to communicate properly and meaningfully with people in the real world or at least it is difficult for them to communicate properly. In other words, the time and focus devoted to such virtual relationships

undermines or sometimes even destroys many of people's real relationships. In the studies on trauma caused by SNs in an American institute (Toll Free Forwarding, 2014) in Los Angeles found that those who use SNs extensively have less power and skill to learn several things at a time compared to the ordinary people. This is due because the brain of such people cannot focus and ignore some of the distractions caused by different information, making it impossible for them to learn several things at the same time. Using NN detection and prediction power in this study can help us achieve results. Given their strong mathematical nature, NNs can help to solve and simulate problems around human life more by analyzing and examining the parameters in various problems. NNs can be used with great ability to understand the meanings of complex and ambiguous data, to extract patterns, and to identify complex processes. One hypothesis for this discussion is that there is a significant relationship between SNs use and mental illness. The main question raised by the study, to which a clear answer must be found in the end, is whether there is any connection between SNs and mental illness in individuals or not, which highlights the importance of this question for officials. The first view is that if there are no relationships, they may take actions that will be practically useless and futile. The second view is that there is a relationship, in which case, according to the severity of the relationship, practical solutions can be proposed to solve the existing problems.

Methods

Given points set forth in the previous section and the possibility of infection, a list of 908 people from a group of people from different ages, mainly from 17 to 38, was prepared and saved as a file in Excel software, a sample of which is given below. However, the number of rows in Excel was 3002 rows, a small number of which are shown here.

Table 1: Database of the people using SNs

	A	B	C	D	E
1	**Hour**	**Disease**	**Social media**	**Age**	**Sex**
2	12	Schizophrenia	Facebook	22	Female
3	14	Generalized anxiety disorder	Wechat	30	Female
4	15	Atypical depression	Facebook	34	Male
5	10	Hypochondriasis	Line	18	Female
6	11	Delusional disorder	Instagram	26	Male
7	10	Atypical depression	Line	26	Male
8	13	Hypochondriasis	Whatsapp	31	Female
9	10	Schizophrenia	Whatsapp	19	Male
10	13	Delusional disorder	Telegram	29	Female
11	9	Generalized anxiety disorder	Telegram	33	Male

After doing this and because NNs are used for the probability of this prediction, it is necessary to determine whether there is a significant correlation between the data in the table or not. This is significant as it is possible to determine the type of NN used for the data, given the degree of correlation and the type of data, as well as the fact that NNs have various types and each of them shows better results for a different set of data selected to get more realistic results. Among the available statistical analysis software, SPSS software was used given its good features as well as the simple and understandable performance of its environment, which shows the relationship between variables. Spearman test was used in this software for data, which shows the significant level of data relationship with each other. After determining how the variables relate to each other, the desired NN is selected. Neurosolution software was used to use the NN in Excel, as it is easily added as a plug-in at the top of Excel and data can be parsed there.

Results

As already stated, the correlation of data with Spearman test was first examined using SPSS, as is seen in the figure below.

Correlations

			Hour	Disease	Social media	Age	Sex
Spearman's rho	Hour	Correlation Coefficient	1.000	-.008	-.036*	-.030	.010
		Sig. (2-tailed)	.	.667	.046	.105	.593
		N	3002	3002	3002	3002	3002
	Disease	Correlation Coefficient	-.008	1.000	.046*	-.008	.014
		Sig. (2-tailed)	.667	.	.011	.681	.453
		N	3002	3002	3002	3002	3002
	Social media	Correlation Coefficient	-.036*	.046*	1.000	-.016	-.002
		Sig. (2-tailed)	.046	.011	.	.375	.901
		N	3002	3002	3002	3002	3002
	Age	Correlation Coefficient	-.030	-.008	-.016	1.000	-.053**
		Sig. (2-tailed)	.105	.681	.375	.	.004
		N	3002	3002	3002	3002	3002
	Sex	Correlation Coefficient	.010	.014	-.002	-.053**	1.000
		Sig. (2-tailed)	.593	.453	.901	.004	.
		N	3002	3002	3002	3002	3002

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 1: Image of the degree of correlation of data and their significance of the relationship

The figure above shows the correlation of the data, showing a significant relationship between the data at 0.05 and 0.01 levels. A multilayer linear perceptron NN with support vector machine (SVM) algorithm is used depending on the type of data, as data are not time series, and are nonlinear. SVM algorithm allows the data to be mapped to a larger space so that it can be linearly separated in a new space for neural prediction. There are five variables of input to NN, one or more of which can be given to the NN as input. However, the output variable must be the name of the disease so that the results and percentage of prediction can be seen in the output of the NN. To test various modes, one can test the number of times NN can be checked in different ways. For instance, it allocated 1,800 lines for testing, 300 lines for cross-validation, 700 lines for testing, and 202 lines for predicting NNs. The next page shows the shape of one of the usual states.

All Runs	*Training Minimum*	*Training Standard Deviation*	*Cross Validation Minimum*	*Cross Validation Standard Deviation*
Average of Minimum MSEs	0.147247966	0.001574961	0.130078241	0.010478596
Average of Final MSEs	0.105047966	0.004802607	0.101756387	0.017586877

Best Networks	*Training*	*Cross Validation*
Run #	1	1
Epoch #	2	1
Minimum MSE	0.127048349	0.106750453
Final MSE	0.114571488	0.110482244

Performance	*disease(Generalized anxiety disorder)*	*disease(Atypical depression)*	*disease(Schizophrenia)*	*disease(Hypochondriasis)*	*disease(Delusional disorder)*
MSE	0.014705239	0.034785167	0.014792578	0.054129461	0.187057498
NMSE	1.004712389	0.546820009	1.000477511	1.011078979	1.087546244
MAE	0.007354811	0.073198757	0.082274152	0.036741539	0.178091339
Min Abs Error	0.097254534	0.099074765	0.1007869	0.017450268	0.079298858
Max Abs Error	0.962677774	0.980217676	0.981572217	0.996454437	0.952073205
r	-0.064180064	0.033490719	-0.001493069	-0.100718656	-0.004154313
Percent Correct	69.721534	64.008716	75.11850347	60.45139092	77.41008756

Figure 2: The result of a typical state and the prediction with NN

In this mode, 1900 lines were considered for training data, 300 lines for cross-validation, 500 lines for test data and 302 lines for prediction, the percentage of prediction of which is shown below. The following figure shows the maximum amount of prediction, which was the best in the tested cases.

All Runs	Training Minimum	Training Standard Deviation	Cross Validation Minimum	Cross Validation Standard Deviation
Average of Minimum MSEs	0.105047966	0.000232607	0.107021241	9.95726E-05
Average of Final MSEs	0.105047966	0.000232607	0.107524873	6.69941E-05

Best Networks	Training	Cross Validation
Run #	1	1
Epoch #	2	1
Minimum MSE	0.104883488	0.107150833
Final MSE	0.104883488	0.107572244

Performance	disease(Generalized anxiety disorder)	disease(Atypical depression)	disease(Schizophrenia)	disease(Hypochondriasis)	disease(Delusional disorder)
MSE	0.039850239	0.039477167	0.052312578	0.036589461	0.100027498
NMSE	1.005687089	0.996272001	1.012275109	1.054329787	1.005746244
MAE	0.087387824	0.07376357	0.082280517	0.093985394	0.202791339
Min Abs Error	0.024517343	0.015044786	0.01378869	0.007446799	0.079298858
Max Abs Error	0.962677774	0.980217676	0.981572217	0.996454437	0.918173205
r	-0.020701716	0.072630293	-0.005239685	-0.134386564	-0.014994313
Percent Correct	84.236703	86.257418	88.584716	79.65127402	87.47619048

Figure 3: The best case with high prediction in tested cases

In this case, 2000 lines were considered for training data, 200 lines for cross-validation, 600 lines for testing data and 202 lines for prediction.

Discussion

As already stated in the previous part, various modes of prediction can be imagined with multilayer linear perceptron neural network and by classification of diseases with SVM algorithm for this study. However, some of these modes were considered and considering various modes of the multilayer linear perceptron NN for periods (Epoch) less than 700% resulted in the correct percentage prediction of the linear perceptron NN less than 50% for all mental illnesses. On the other hand, with different experiments for states and periods in 1700-2200 cycles, it was found that the highest probability of a correct prediction percentage for each mental illness can exist in this range. However, it was obtained with the result that from 3002 lines possible in Excel data, the amount of data for training of the NN is in the range of 1800 to 2100 lines, and cross-validation (Cross Val) should be considered in the range of 200 to 350 lines. Out of this number of data, the data for NN testing for cases with a number of tests ranging from 600 to 800 lines along with the forecast data, which ranged from 200 to 350 lines, showed better results than the prediction. Given the many states and samples that could exist in these ranges, the closest and best possible modes were selected from all the modes. The number of these cases was seventeen, which was in this range, which could have shown better results. It has to be noted again that the best case scenario was associated with the highest percentage of correct predictions for a situation in which 2000 lines were considered for testing, 200 lines for cross-validation, 600 lines for testing, and 202 lines for disease prediction.

Conclusion

The purpose of the study was to examine and predict the likelihood of people using SNs getting mental illness using NNs. The question and hypothesis related to this discussion was raised. The methods and samples of data correlation as well as simulations by NNs by placing the shapes and their results were mentioned. Various modes of testing were expressed linearly by the perceptron NN. Considering the question of whether or not there is a relationship between mental illness and the use of SNs, a relationship

was found between excessive use of SNs and suffering from mental illness. The hypothesis was examined as well and a close and direct relationship was found between excessive use of SNs and mental illness. The implications that can be made for this may include those that prevent excessive use of SNs. For instance, they are planning to do daily activities, making people deal with their lives with better quality. Research suggestions that can be made for this is that as these samples were taken in a small population and the number of samples was limited, one expand the studies in this field. Moreover, by expanding this issue, one can obtain more favorable results. However, the evaluations made in this field and in this study relieved all the doubts that the excessive use of these networks harms humans. Another suggestion is that, other statistical analysis software as well as other NNs software like MATLAB can be used to carry out such studies and see their results.

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