

Comparing Novel Recurrent Neural Networks with Artificial Neural Networks for Predicting Mental Depression from Online Video Gaming

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Abstract: The aim of this research was to enhance the accuracy in predicting mental depression in online gamers using the Novel Recurrent Neural Network, juxtaposed against the Artificial Neural Network algorithms. Data, sourced from various online platforms and supplemented with recent research findings, was scrutinised with a 95% confidence interval for mean and standard deviation, iterating the process 20 times. The Novel Recurrent Neural Network proved more accurate with a 94% precision rate, as opposed to the Artificial Neural Network's 91%. An Independent Sample T-test further corroborated the significant disparity in predictive abilities between the two, highlighted by a p-value of 0.00 ($p < 0.05$). In conclusion, within the set constraints, the Novel Recurrent Neural Network offers a superior predictive capability for mental depression in online gamers.

1 INTRODUCTION

The auditor's primary consideration is determining the high level of authenticity of mental depression in online gaming (Gackenbach and Brown 2017; Mamun et al. 2022). The analysis of mental depression caused by online gaming involves conducting experiments on various examples and with different individuals (Fazeli et al. 2020). This study utilises MATLAB source code and multiple samples for each participant. Predictions can be made for bipolar disorder, persistent depressive disorder, and major depressive disorder, among other forms of depression (Maruta, Nazarchuk, and Denysenko 2015; Irie et al. 2022). Whilst the precise origin of depression remains elusive, it results from a combination of genetic and environmental factors. Depression is typically addressed through a blend of treatments, medications, and lifestyle adjustments.

This research draws upon 1700 articles related to the identification of mental depression or disability, including 350 from IEEE Xplore, 100 from Researchgate, 900 from Google Scholar, 200 from Hindawi, and 150 from Elsevier (Mun and Lee 2021; AS, Vickram et al. 2013). It's vital to seek help if experiencing depressive symptoms. Depression is a

treatable condition, and with proper care, most individuals can alleviate their symptoms and lead fulfilling lives (Jung, Yi, and JeongDongJin 2018). If you suspect you might be suffering from depression, it's essential to consult a medical professional or mental health specialist to secure an accurate diagnosis and treatment plan (Bonnaire and Baptista 2019). If either you or someone you know is grappling with depression, seeking assistance from a trusted source or mental health expert is imperative (Dias, Barbosa, and Vianna 2018; G.R et al 2014).

Table 1: Accuracy values for novel recurrent neural network and artificial neural network.

S NO	Novel Recurrent Neural Network	Artificial Neural Network
1	92.02	88.94
2	92.74	89.17
3	93.39	89.77
4	93.94	90.07
5	94.87	90.46
6	95.54	91.38
7	95.85	91.92
8	96.28	92.62
9	96.93	92.85
10	97.27	93.30

The survey identified a gap in research. Although many methods for detecting mental depression or disability exist, most have limited success rates. The aim of this study is to enhance the accuracy of mental depression detection by employing both Novel Recurrent Neural Networks and Artificial Neural Networks algorithms.

2 MATERIALS AND METHODS

NOVEL RECURRENT NEURAL NETWORKS

A Novel Recurrent Neural Network (RNN) operates on the principle of retaining memory from previous stages. Imagine trying to predict the next word in a sequence without knowing the preceding context; it would be quite tricky. Accurate predictions hinge on this context. Traditional neural networks often operate under the assumption that inputs and outputs are entirely separate entities. However, in many real-world scenarios, this isn't the case.

To address this, RNNs were introduced. Central to the RNN's design is the Hidden Layer, which plays a pivotal role in overcoming this challenge. The hidden state, intrinsic to the Novel RNN, stands out as its most defining characteristic, pivotal for retaining sequential information.

Procedure

- Step 1: Load a dataset comprising a collection of job adverts.
- Step 2: Carry out pre-processing on the dataset to cleanse and ready the data for analysis.
- Step 3: Extract a set of features from the pre-processed dataset.
- Step 4: Choose a classification algorithm and use it to categorise the job adverts based on the extracted features.
- Step 5: Determine the accuracy of the classification algorithm by assessing its performance on ten randomly selected samples from the dataset.

2.1 Artificial Neural Networks

Artificial neural networks have garnered interest as a potential diagnostic and therapeutic tool for predicting mental illnesses, including depression. Given their capacity to manage and analyse vast amounts of data, such as patient details and various clinical data, Artificial Neural Networks are aptly suited for this purpose. One application of Artificial Neural Networks in the realm of mental health is predicting a patient's likelihood of developing

depression. For instance, a study utilising Artificial Neural Networks to assess data from a large patient cohort, as published by the Journal of Affective Disorders, found that the algorithm was remarkably precise in predicting the onset of depression or disability.

2.1.1 Procedure

- Step 1: Define the input and output datasets for the neural network.
- Step 2: Pre-process the data.
- Step 3: Initialise the weights and bias for the artificial neural network.
- Step 4: Iterate over the training data.
- Step 5: Test the Artificial Neural Network on the dataset to assess its performance.
- Step 6: Generate accuracy values for ten samples.

Table 2: Group statistics displaying the mean and standard deviation were 94% and 1.79858, 91% and 1.58348 respectively.

	GROUP NAME	N	Mean	Standard Deviation	Standard Error Mean
Accuracy	Novel Recurrent Neural Networks	10	94.88.	1.79	.56
	Artificial Neural Networks	10	91.04	1.58	.50

2.1.2 Statistical Analysis

The study examined independent variables associated with online gaming disorders. The dependent variables in this context are accuracy, game hours, and platform. Among the independent variables are the search for excitement and basic psychological needs. The results of the novel recurrent neural network were compared with those of the artificial neural network using the t-test (Mun and Lee 2021).

3 RESULTS

Table 1 provides a comparison of accuracy between an artificial neural network and a novel recurrent neural network classifier. Table 2 displays the mean and standard deviation for the accuracy of the Artificial Neural Networks and Novel Recurrent Neural Networks algorithms, which stood at 94% with a deviation of 1.79858, and 91% with a deviation of 1.58348, respectively. The Artificial Neural Networks demonstrated a smaller standard error of .50074 in comparison to the Novel Recurrent Neural Networks. The independent sample t-tests indicate a significant difference in accuracy between the two

Table 3: The independent sample test revealed a substantial variation in accuracy among the suggested two stages and the standard single stage. Since $P=0.000$ and $p<0.05$, there is a substantial variation between the two methods.

Independent Sample Test										
Levene's Test for Equality of Variances				T-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Differences	95% Confidence Interval of the Difference	
									Lower	Upper
Accuracy	Equal Variances assumed	.13	.722	5.06	18	0.0	3.83	.75	2.24	5.4
	Equal Variances not assumed			5.06	17.71	0.0	3.83	.75	2.24	5.4

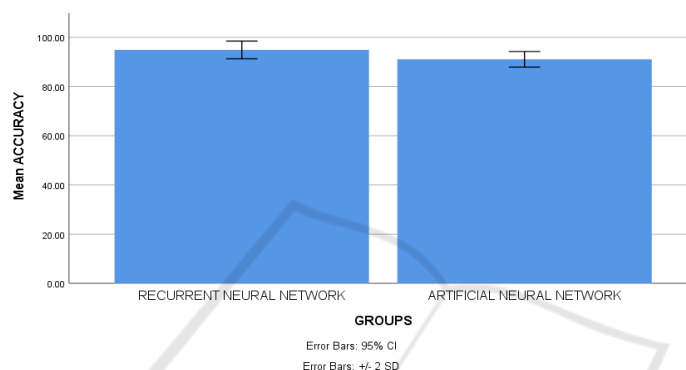


Figure 1: Mean accuracy comparison of novel recurrent neural network (94%) and artificial neural network (91%) on online gaming mental disorder identification. X-axis represents novel recurrent neural network and artificial neural network; Y-axis represents mean accuracy ± 2 SD.

techniques. Table 3 underscores that the independent sample test showcased a notable difference in accuracy between the proposed two-stage approach and the conventional single stage. Given that $P=0.000$ ($p<0.05$), there exists a significant difference between the two techniques.

Figure 1 depicts the mean accuracy results derived from the artificial neural network method and the proposed input relative to the selected input. The title of the graph reads: "Diagnosing mental illnesses in online gamers: A comparison of the mean accuracy of artificial neural networks versus innovative recurrent neural networks". The proposed technique achieved a mean accuracy of 94%, surpassing the 91% accuracy of the artificial neural network. The X-axis signifies accuracy while the Y-axis illustrates mean accuracy ± 2 SD.

4 DISCUSSION

From the tests, it's evident that the Novel Recurrent Neural Networks algorithm outperformed the Artificial Neural Networks. Accuracy was measured

using the SPSS tool for both the Novel Recurrent Neural Networks and the Artificial Neural Networks. The results for mental depression or disability in the dataset indicated that the Novel Recurrent Neural Network achieved an accuracy of 94%, which is better than the 91% achieved by the Artificial Neural Networks.

The focus of this study is the exploration of the correlation between young adults' use of social media and their mental well-being. Recent studies have identified a connection between increased social media engagement and declining mental health. This link is particularly alarming given that young adults, the most frequent users of social media, face an unusually high risk of mental health challenges. This dissertation delves into both individual and societal theories that could elucidate the still enigmatic relationship between social media engagement and mental health. It examines the impact of social media on personal relationships, inappropriate behaviour, sleep disruption due to exposure to blue light, the influence of social media on children, and the repercussions of sedentary behaviour on mental well-being.

Online gaming is associated with an elevated risk of mental disorders, including depression. Both Novel Recurrent Neural Networks and Artificial Neural Networks are recent subjects of research as promising tools for predicting and addressing the adverse effects of online gaming on mental health (Paulus et al. 2018). One potential application of Artificial Neural Networks and Novel Recurrent Neural Networks in this realm is to predict a gamer's probability of developing depression based on their gaming patterns and other factors (Biolcati, Pupi, and Mancini 2021). The Novel Recurrent Neural Networks, a subtype of Artificial Neural Networks, is adept at analysing a player's in-game behaviour over time since it excels in handling sequential data (Hussain and Griffiths 2009).

Another possible application of Artificial Neural Networks and Novel Recurrent Neural Networks in the domain of online gaming and mental health is to identify early indicators of potential problems (Hussain and Griffiths 2009; Mancini, Imperato, and Sibilla 2019; Jung, Yi, and JeongDongJin 2018). In summary, Artificial Neural Networks and Novel Recurrent Neural Networks possess the unique capability to serve as potent tools for predicting and mitigating the negative effects of online gaming on mental health. However, further research is vital to fully understand their potential and limitations in this context (Jung, Yi, and JeongDongJin 2018). Moreover, due to lockdowns and the subsequent disruptions to work and education, individuals might have excess leisure time, or they might find themselves more easily distracted by online gaming while working from home. Additionally, diverse connections were observed between gamers' motivations for playing and their choice of game genres in relation to their psychological well-being. Notably, those motivated by distraction and action game enthusiasts displayed the most pronounced effects. Further studies are essential to ascertain whether these threats to mental health are caused by or a consequence of video gaming.

5 CONCLUSION

The study at hand sought to utilise cutting-edge machine learning methods to forecast mental depression among online video game players. The findings revealed that the Novel Recurrent Neural Network algorithm notched an accuracy of 94%, while its counterpart, the Artificial Neural Network algorithm, achieved a slightly lower rate of 91%. In juxtaposing the two, the Novel Recurrent Neural

Network algorithm exhibited superior performance in the accuracy domain over the Artificial Neural Network algorithm, with a mean accuracy difference of 3.83500 between them. Delving deeper into the research paper, it was accentuated that the Novel Recurrent Neural Network algorithm, in the context of predicting mental depression amongst online gamers, surpasses the Artificial Neural Network algorithm. Such results underscore the significance of progressive machine learning methods, with special emphasis on the Novel Recurrent Neural Network algorithm, as promising tools for pinpointing and addressing mental health challenges tied to online gaming.

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