

CPCE Health Conference 2021

Post-pandemic health and
long-term care: A new paradigm

The Accuracy of Artificial Neural Network in Predicting the Impact of COVID19 on Students Mental Health

Presented at the 6th CPCE Health Conference

September 20, 2021

Authors: Adam Wong, Kia Tsang, Joseph So, and Ada Chan

Motivation for Study

- Mental health is an important part of a person's overall well-being.
- However, unlike physical health, mental health is difficult to measure, and often ignored.
- If mental health issues are not properly resolved in time, it will cause more severe problems such as frustration, stress, and depression.
- The Corona Virus Disease (also known as COVID-19) in late 2019 forced most, if not all, schools at different levels to convert from traditional F2F teaching to online learning.
- It is important to examine the effect of such a change on students in different age groups, from primary schools to adult learners.
- Traditional prediction methods is not sufficient for such purpose.

Description of Dataset

- The data in this is from a cross-sectional survey conducted in India.
- The dataset consists of responses from 1182 students of different age groups from different educational institutions in Delhi, India.

Rating of Online Class experience	Medium for online class	Time spent on self study	Time spent on fitness	Time spent on social media	Prefered social media platform	Time spent on TV	Number of meals per day	Change in your weight	Time utilized	Do you find yourself more connected with your family, close friends , relatives ?	Mental Health issue during lockdown
Good	Laptop/Desktop	4.0	0.0	3.0	Linkedin	1.0	4	Increased	YES	YES	NO
Excellent	Smartphone	0.0	2.0	3.0	Youtube	0.0	3	Decreased	YES	NO	NO
Very poor	Laptop/Desktop	3.0	0.0	2.0	Linkedin	0.0	3	Remain Constant	NO	YES	NO
Very poor	Smartphone	2.0	1.0	5.0	Instagram	0.0	3	Decreased	NO	NO	NO
Good	Laptop/Desktop	3.0	1.0	3.0	Instagram	1.0	4	Remain Constant	NO	NO	NO

Description of Dataset

Features

- Age of subject
- Time spent on online class
- online class
 - on self study
 - on sleep
 - on social media
 - spent on TV
- What you miss the most
- Number of meals per day
- Change in your weight
- Preferred social media platform
- Stress busters
- More connected with your family, close friends , relatives ?

Label

- Health issue during lockdown

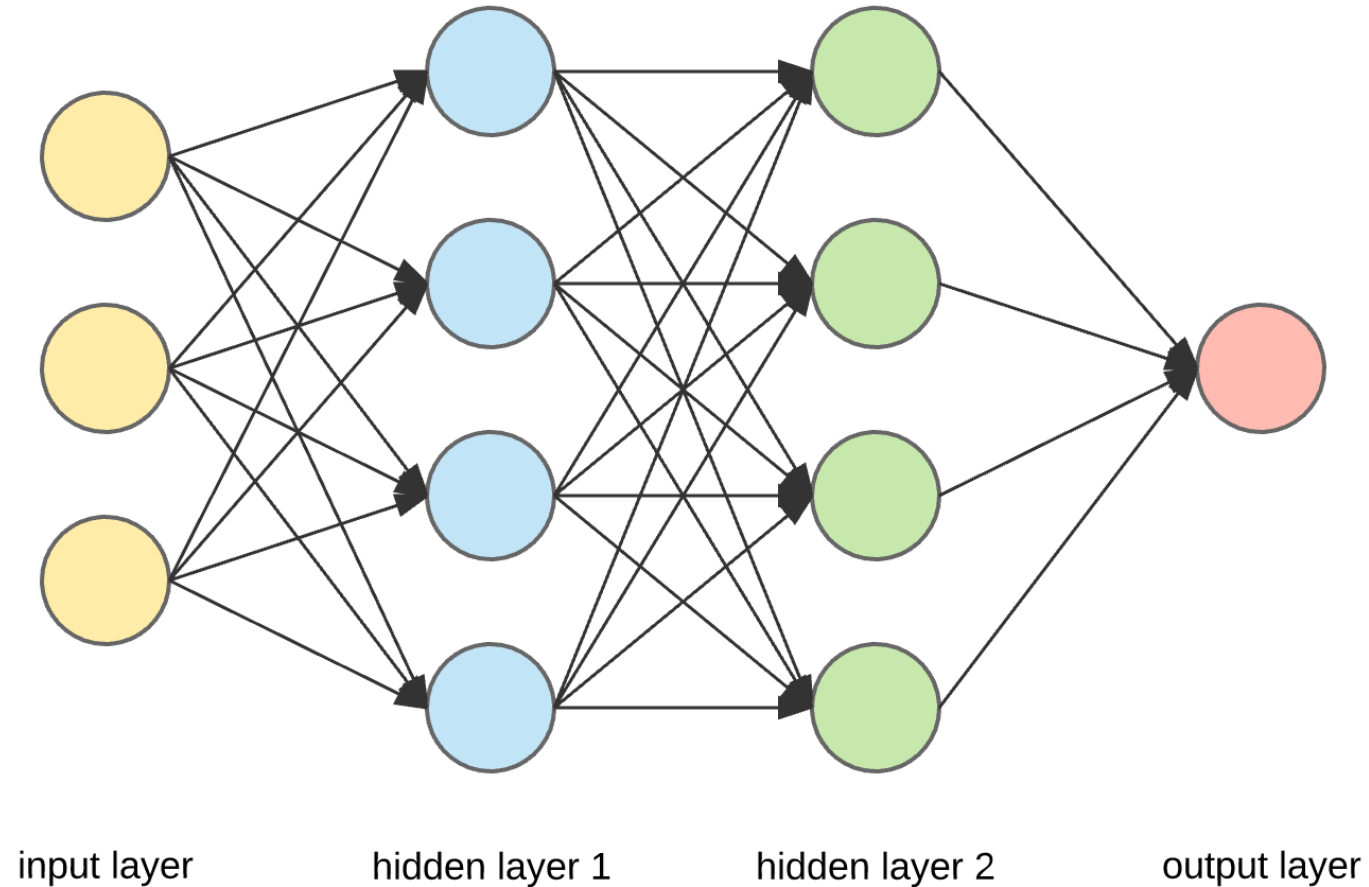
Related Research

- Chaturvedi, K., Vishwakarma, D. K., & Singh, N. (2021). COVID-19 and its impact on education, social life and mental health of students: A survey. *Children and youth services review*, 121, 105866.
 - Charts and descriptive statistics were used.
 - No machine learning was used in the above article.
- Koul, R. (2021). *Impact of COVID-19 on Students(Mental Health)*. Retrieved from <https://www.kaggle.com/rishabkoul1/impact-of-covid-19-on-students-mental-health>
 - Machine learning programme written in Python
 - Used scikit-learn libraries for data preprocessing
 - Data scaling was not applied correctly
 - The initial code for our study

Problems with the initial code

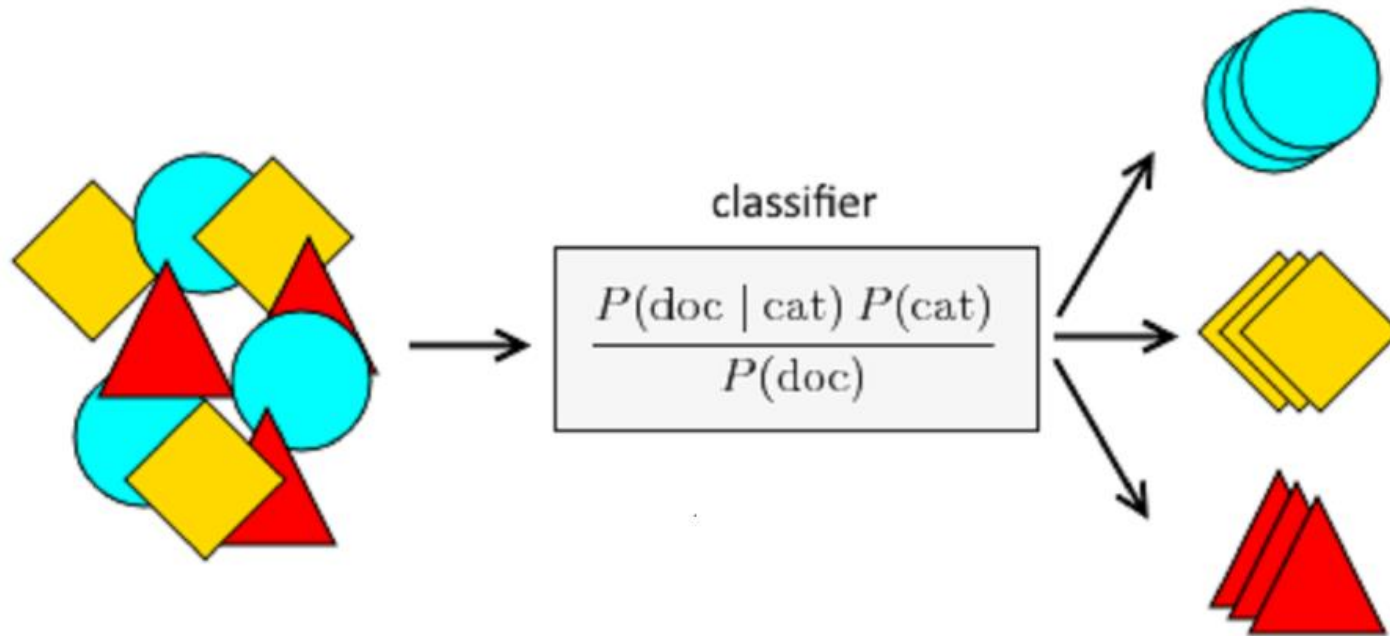
- The feature scaling should not be applied to all columns. It is because the dummy variables should not be standardized.
- The feature scaling should not be applied to the whole dataset at once. It should be applied to the test set and training set separately.

Artificial Neural Network



Source: Dertat (2017)

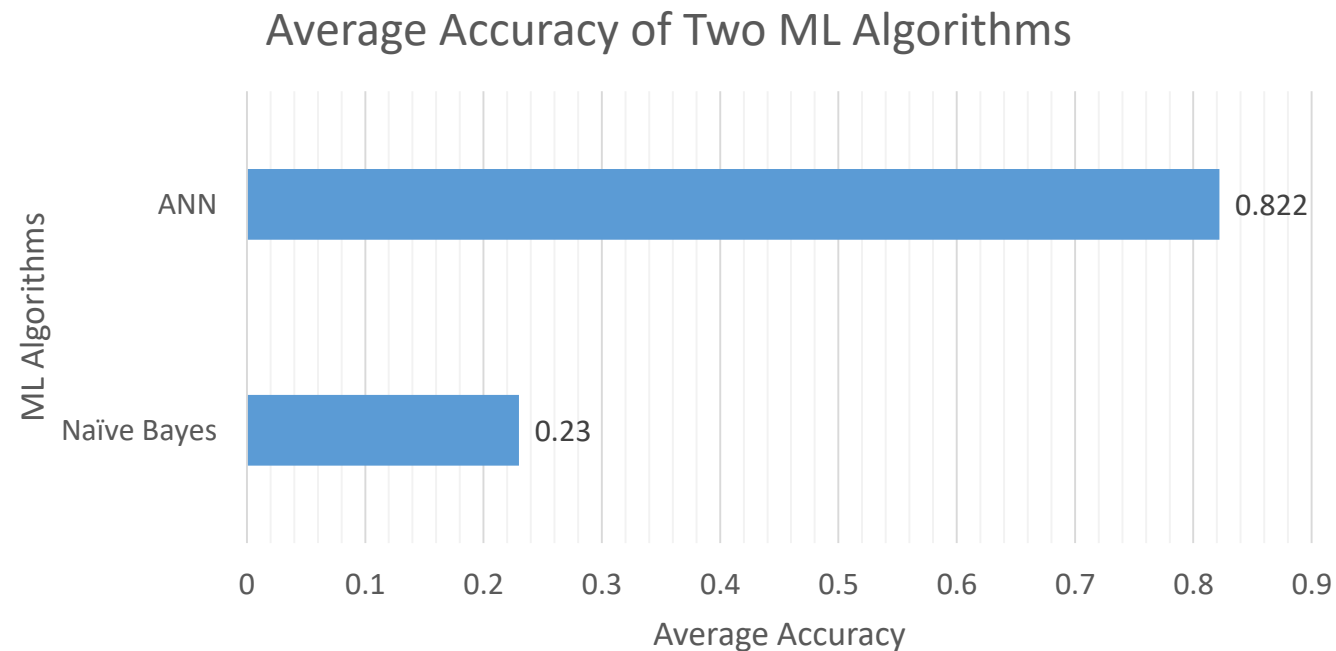
Naïve Bayes



Source: Gusain (2020)

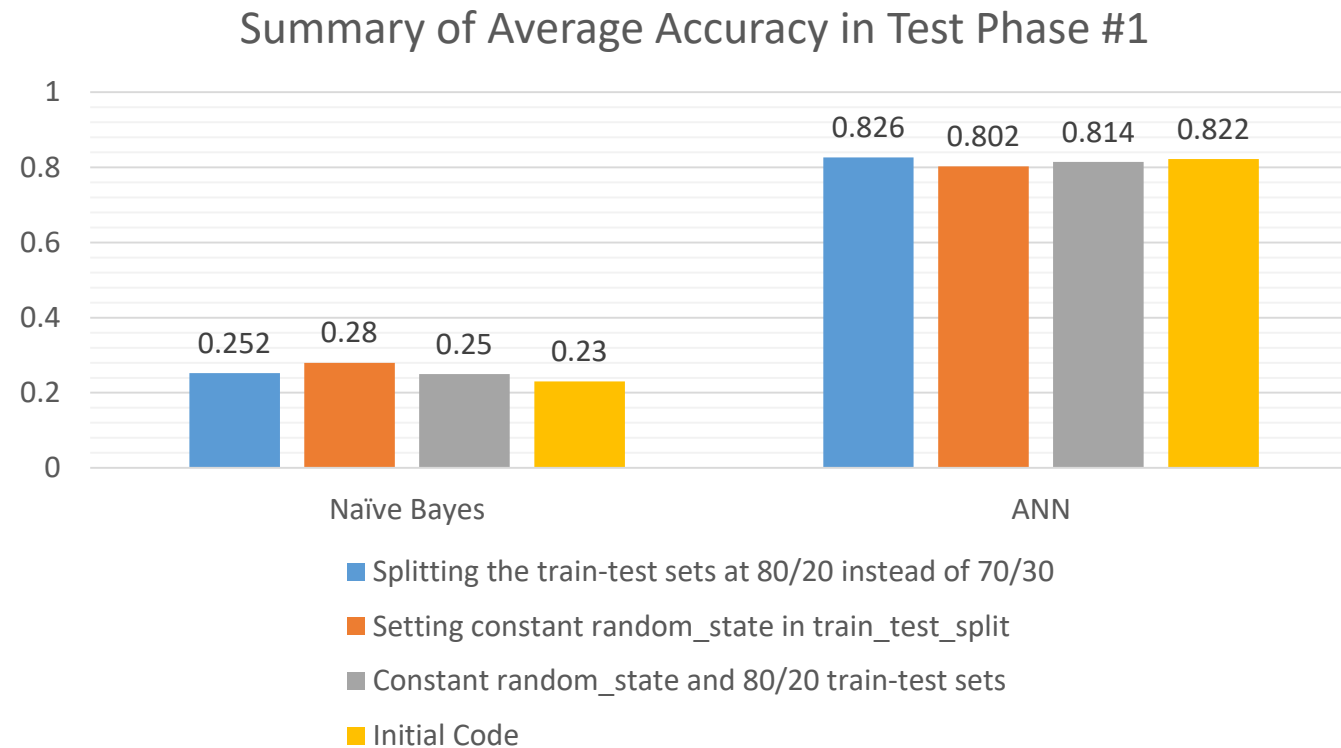
Before the testing

- To compare the performance with our proposed changes, the initial code was run five times to measure the average accuracy of ANN and Naïve Bayes.



Findings

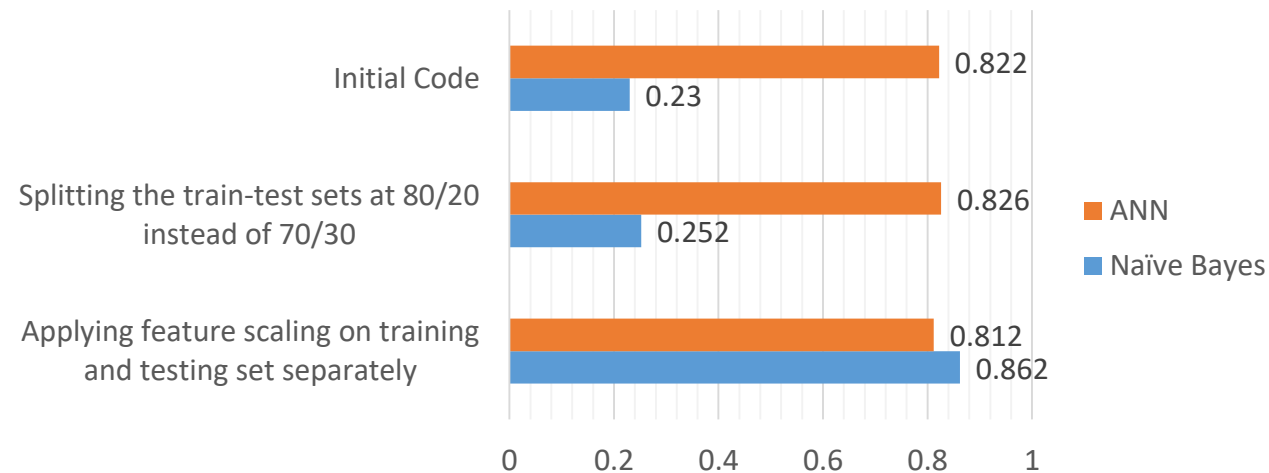
- In phase #1, we found that splitting the train-test sets at 80/20 instead of 70/30 achieves higher average accuracy.



Findings

- In phase #2, we found that the followings can further enhance the performance.
 - Applied Phase #1 (i.e. splitting the train-test sets at 80/20 instead of 70/30)
 - Applied feature scaling on training and testing set separately

Summary of Average Accuracy in Test Phase #2



Findings

- Naïve Bayes algorithm shows slightly inconsistent performance, while ANN performed consistently.
- Performance of both algorithms was enhanced when splitting the train-test sets at 80/20 instead of 70/30 and applying feature scaling on training and testing set separately .

References

- Chaturvedi, K., Vishwakarma, D. K., & Singh, N. (2021). COVID-19 and its impact on education, social life and mental health of students: A survey. *Children and youth services review*, 121, 105866.
- Dertat, A. (2017). *Applied deep learning - part 1: Artificial neural networks*. Retrieved from <https://towardsdatascience.com/applied-deep-learning-part-1-artificial-neural-networks-d7834f67a4f6>
- Gusain, R. (2020). *Naïve bayes classifier from scratch with hands on examples in r*. Retrieved from <https://insightimi.wordpress.com/2020/04/04/naive-bayes-classifier-from-scratch-with-hands-on-examples-in-r/>
- Koul, R. (2021). *Impact of COVID-19 on Students(Mental Health)*. Retrieved from <https://www.kaggle.com/rishabkoul1/impact-of-covid-19-on-students-mental-health>
- Pedregosa, F., et al. (2011). Scikit-learn: Machine learning in python. *JMLR*, 12 2825-2830.

The End