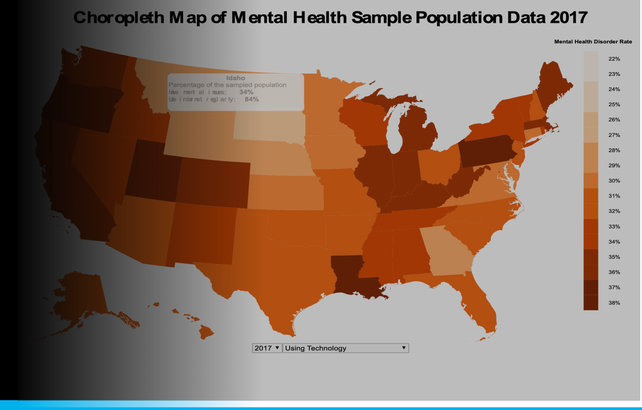
Lowering Depression and Anxiety

A Quantitative Research on the Effects of Six Common Behaviors on Human's Mental Health



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Motivation / Introduction

Depression and anxiety are two widespread types of disorders that cause a tremendous consequence on human life. The World Health Organization (WHO) has ranked depression as the fourth leading cause of human disability. By 2020,it is expected to be the second leading cause [19].

Depression causes health complications [32], cardiovascular diseases [14], in some cases increases the risk of cardiovascular diseases by 80% [25]. In case of anxiety, on average, up to 33.7% of the human populations experience it in their life time [12].

To have a healthy society, we need to address mental health issues. In order to address them, we need to better understand what causing them.

Hypothesis

Our research hypothesis is that human behavioral factors such as smoking, drinking alcohol, eating unhealthy, physical activity, education/knowledge, and social media/internet factors has direct effect on the mental health mainly depression and anxiety.

Our Research Approach

By research survey, we identified six behavioral factors that proven to have impact on mental health (depression and anxiety).

We decided to quantitatively understand the effect of these factors, come up with a statistical model that could help identify or prevent mental issues based on these behavioral factors. We identified six factors: **smoking**, **drinking alcohol**, **eating unhealthy**, **physical activity**, **education/knowledge**, and **social media/internet**.

We used Behavioral Risk Factor Surveillance System (BRFSS)[4] as the source of our research dataset. We statistically analyzed the data for years 2007 to 2017. The statistical results approved our hypothesis that these six factors indeed effects the mental health.

We used machine learning and deep learning models and produced predictive models with 72% accuracy in two weeks effort.

We also produced an interactive visualization that is portable on all operating systems. In this visualization, users can pick a behavioral factor, and not only visually see the effect of this factor on mental health for eleven years, but also can get information from each US state by hover the mouse over the state. A picture of the interactive visualization is in the top right corner of this poster.

Research Novelty

The novelty of this research is that, we examined six behavior factors while usually few factors are examined. We statistically showed the effect of these factors on mental health. And above all, we produce a ML/DL models that could predict mental health.

The Data

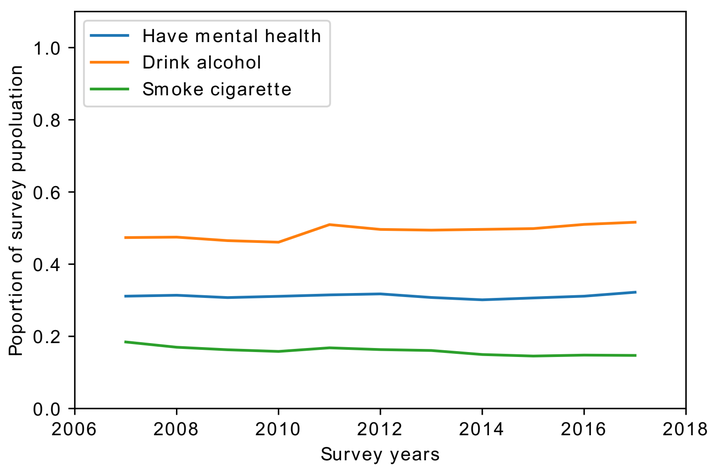
We used 11 years of BRFSS data (3GB from 2007 to 2017). We obtain the data in SAS XPT format and we converted it to SQLite tables.

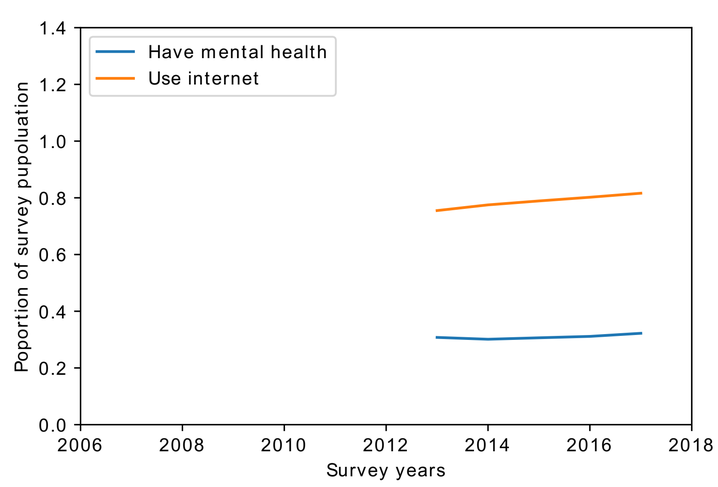
We used the database to extract the data we needed. The extracted data were saved in CSV files.

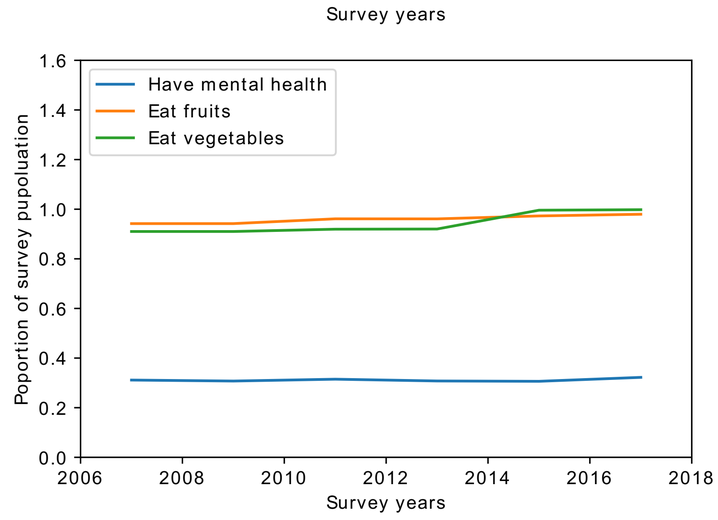
Due to the large size of database, we kept the SQLite database available online

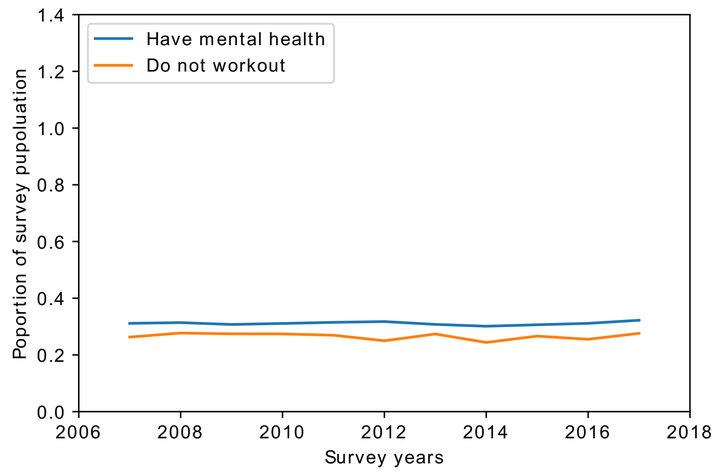
Experiments and Results

The results of statistical analysis of BRFSS data from 2007 to 2017 of the effects of six factors on mental health (depression and anxiety). The analysis of data was our evaluation method of approving the hypothesis.





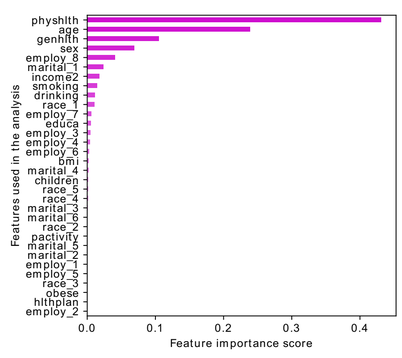


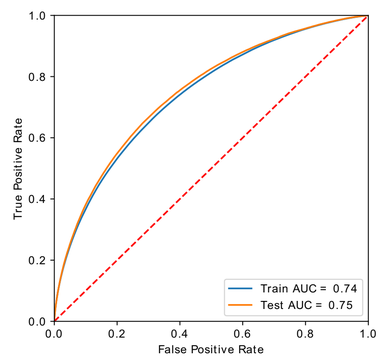


We used Machine Learning and Deep Learning analysis to produce a prediction model.

To prune some of features, we used Random Forest feature importance, applied PCA using the first 24 principle components. And we used MINMAX method to normalize data.

The result of this effort was that the accuracy of our models for Random Forest and Gradient Boosting and DL increased to 72%.





Conclusion

The research showed that the six behavioral habits has effect on mental health particularly on depression and anxiety. The research conducted set of analysis to extract the data from BRFSS dataset from 2007 to 2017.

The analytics activities included, data conversion, cleaning, normalization, aggregation, and applying machine and deep learning algorithms. The best accuracy achieved was 69% with the six features of the research and got enhanced to 72% after tuning the model by adding new features and removing some features.

The research also produced an interactive visualization that showed the effects of the six factors on mental health in the form of choropleth map in which user can visually interact with the map and get information on the proportion of BRFSS takers who has mental health and one of the six factors for year 2007 to 2017.

Works Cited

Please refer to the paper.