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Development and validation of predictive models for depression using patient health questionnaire-9 data

Jonathan C Huang
The Episcopal Academy, USA

Depression, the leading cause of suicide worldwide, is a serious, widespread and growing mental health disorder that has now been labeled a global health epidemic. The patient health questionnaire-9 (PHQ-9), a depression-screener questionnaire, has emerged as an effective diagnostic tool globally. Using US PHQ-9 patient response data and corresponding demographic data from 2013-2014 and 2015-2016, this study conducts a comprehensive big data analysis of the response data to develop and validate predictive models for depression probability. Age at screening, gender, race/ethnicity, education level and body weight were proposed as factors correlated with depression. Two models were constructed using RStudio to explore these correlations: a logistic regression model and an artificial neural network. The logistic regression predictive model performed better than the artificial neural network in an unfamiliar dataset, whereas the opposite was true in a familiar dataset. Both models supported that the proposed factors are indeed significantly correlated with depression. The logistic regression model indicated that females and those with weight problems are more likely to have depression and that the likelihood of depression increases with age, decreases with higher education levels and varies by race. The artificial neural network indicated that age, the Asian race, some college education and weight problems are the most significant factors affecting depression probability, in that order. Based on these results, populations most at-risk for depression are identified and appropriate measures should be taken to combat depression.

jonathanhuang19@gmail.com