Prediction of Chronic Stress through a Computational Linguistic Machine Learning Model

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Chronic stress, a disorder marked by dangerously prolonged stress levels, is becoming increasingly widespread, and current diagnostic methods are inadequate to address the issue. The sole public tool to predict chronic stress is the Perceived Stress Scale (PSS), which is not administered during routine psychological checkups. This project aimed to produce an alternative tool to determine whether an individual was experiencing chronic stress. To this end, the researcher sought to employ machine learning to recognize patterns between an individual's writing characteristics and their self-reported stress score. To record respondents' writing, the researcher developed a positive prompt and a negative prompt. The researcher hypothesized that chronic stress patients feel constant psychological pressure, which manifests in writing patterns, especially in negative situations. Thus, the researcher predicted that the negative prompt would produce a more accurate tool than the positive prompt to predict chronic stress. To test this hypothesis, the researcher administered the PSS and the two prompts to 500 participants. The researcher then utilized the Linguistic Inquiry and Word Count program, a sentiment and semantic analytic software, to extract numerical data from participants' responses, employing machine learning to identify data correlations and generate a predictive tool autonomously. Analysis of the predictive tool's efficacy revealed that the model based on responses to the positive prompt achieved 98% accuracy in predicting chronic stress in males and females based solely on writing samples ($p<0.00001$). Hence, the study created a predictive tool that can be self-administered and does not require extensive experience, unlike current predictive means.

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