Beyond the Validity Scale: Using Machine Learning to Find Inconsistent Responses in Psychological Surveys

In the field of cognitive science and psychology, self-report surveys retain their position as the data-gathering approach of preference. This is because the validity of research fundamentally depends on the quality of data provided by research participants. A major issue pervading this area of research is the issue of insufficient effort responding (IER), which is a situation or phenomenon where research respondents provide answers that do not accord with their real opinions for lack of motivation or fatigue. This is shown by Huang et al. (2012) to significantly contaminate research results despite a low rate of data inconsistencies. Even a small percentage of such inconsistent data can significantly distort research findings, leading to invalid conclusions and spurious correlations.

Traditionally, a number of standardized indexes have been employed to identify such anomalies. These techniques, reviewed comprehensively by Meade & Craig (2012), were such as the employment of attention check questions, the assessment of response times, and the search for consecutive answers that were the same. While these conventional techniques provide a foundation for gauging data cleanliness, they often tend to be too simplistic or ineffective in identifying more subtle anomalies of carelessness, for example, random responding that tends to resemble real data patterns.

Notably, recent literature shows evidence of moving in the direction of more complex and data-based models. Current literature, such as that of Ward & Meade in 2023, suggests that sophisticated models of data analysis have the ability to spot complex response patterns that were neglected by more basic measurement indices. It is on the premise of such models that the current thesis recommends using the application of AI-ML algorithms.

The primary aim of this study is to build and test a machine learning model that could distinguish between high-quality and low-quality data with better effectiveness than current approaches. This proposed study would make use of a combined data source that would include real-world psychological data from surveys as well as fake careless response vectors. This could be achieved by training models for supervised learning using techniques such as random forests or support vector machines. An important aspect of the research plan is to benchmark the performance of such AI models with the standardized indices that have been established in the literature. In benchmarking in such a way, it would be shown that AI-based detection is both viable and superior for preserving the integrity of psychological data.