The present invention provides a predictive tool for predicting Apopnea Hypopnea Index (AHI) in the diagnosis of Obstructive sleep apnea (OSA). The predictive tool is developed by recording pulse oximetry readings, obtaining delta index, oxygen saturation times and oxygen desaturation events from the oximetry readings. A multivariate non-parametric analysis and bootstrap aggregation is performed to obtain predictive models which can be used to predictive AHI in an individual and to classify an individual as having or not having OSA.