

Abstract

In modeling HIV/AIDS progression, we carried out a comprehensive investigation into the risk factors for state-specific-failure rates to identify the influential co-variables using Bayesian Model averaging method (BMA). BMA provides a posterior probability via Markov Chain Monte Carlo (MCMC) for each variable that belongs to the model. It accounts for model uncertainty by averaging all plausible models using their posterior probabilities as the weights for model-averaged predictions and estimates of the required parameters. Patients' age, and gender, among other co-variables, have been found to influence the state-specific-failure rates highly. However, the impact of each of the factors on the state specific-failure was not quantified. This paper seeks to evaluate and quantify the contribution of the patient's age and gender, CD4 cell count during any two consecutive visits, and state movement on the state-specific-failure rates for patients transiting either to the same, better or worse state. We used R Studio statistical Programming software to implement the method by applying BMS and BMA packages. State movement had a comparatively large coefficient with a posterior inclusion probability (PIP) of 0.8788 (87.88%). Hence, the most critical variable followed by observation-two-CD4-cell-count with a PIP of 0.1416 (14.16%), age and gender were the last with a PIP of 0.0556 (5.56%) and 0.0510 (5.10%) respectively for patients transiting to the same state. For patients transiting to a better state, the patients' age group dominated with a PIP of 0.9969 (99.69%), followed by patients' gender with a PIP of 0.0608 (6.08%). Patients' CD4 cell count during the second observation had the least PIP of 0.0399 (3.99%). For patients transiting to a worse disease state, patients CD4 cell count during the second observation proved to be the most important, with a PIP of 0.6179(61.79%) followed by state movement with a PIP of 0.2599 (25.99%), patients gender tailed with a PIP of 0.0467 (4.67%).