ABSTRACT

Machine learning is employed in appointment scheduling to identify the patients with the highest no-show risk, so as to schedule them into overbooked slots and thereby maximize the clinic performance. However, if the patients at highest risk of no-show belong to the same demographic group, then that group of people will be scheduled into overbooked slots disproportionately to the general population. This is problematic because patients in overbooked slots tend to have a worse service experience than the other patients, as measured by the time they spend in the waiting room. Motivated by the real-world case of a large specialty clinic whose black patients have a higher no-show probability than white patients, we analytically study what contributes to the racial bias: we find that the racial bias increases if the machine learning performance increases, and that some schedule structures lead to a higher bias than others. We also provide two solutions to eliminate the racial bias while maintaining some of the benefits deriving from machine learning: either intervening on the machine learning component by removing all variables correlated to the racial group, or intervening on the optimization component by explicitly taking into account the racial bias in the objective function.

(Copies of the paper are available in the AOIS Department offices)