

# PRESCRIPTIVE AIRLINE PASSENGER SATISFACTION OPTIMIZATION USING PREDICTIVE MODELING AND BUDGET-CONSTRAINED MIXED-INTEGER PROGRAMMING

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*It is commonly known that airlines are the quickest and safest mode of transportation. However, in reality, travellers often face various problems due to the services of airline companies. Gradually, airlines are losing their reliability. For this reason, predicting passenger satisfaction is very important in determining customer experiences, expectations, and habits, among other things. This paper proposes a prescriptive analytics framework or predict-then-optimize framework that combines probabilistic satisfaction prediction with operations research-based optimization to develop actionable service improvement policies. Initially, large-scale airline customer satisfaction dataset is learned by logistic regression model to estimate likelihood of satisfaction and assess the relative impact of various service attributes. These learned coefficients are then embedded into a budget-constrained mixed-integer linear programming (MILP) formulation that determines optimal segment-wise service improvement actions under ordinal rating and cost constraints. Experimental results produce a fairly balanced predictive performance with an accuracy of 0.8286 and ROC-AUC of 0.9035, while the optimization model produces interpretable and targeted service investment strategies exhibiting diminishing returns with respect to budget. The proposed approach moves beyond prediction toward decision-oriented satisfaction management and offers a practical tool for airline service planning.*

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