

Consumer Survey Data Analysis for Market Adoption of Plug-in Hybrid Vehicles

Abstract

Concerns regarding instability in oil prices and environmental health have led to pressure in the United States to reduce oil consumption and pollution associated with transportation. Plug-in Hybrid Electric Vehicles (PHEVs) are one potential factor in oil consumption and pollution reduction, while offering many of the same capabilities of conventional vehicles. However, it is not clear what combinations of governmental policies and manufacturer-marketing strategies will be most cost-effective in promoting successful market penetration of this new vehicle technology. In this work, we attempt to detect novel multivariate associations using real-world consumer survey data, with the aim of discovering which demographic or attitudinal characteristics might best predict whether consumers are likely to become early adopters of PHEVs. We collected a large consumer dataset using Amazon Mechanical Turk (a crowd sourcing platform). Demographic comparisons to USA demographics show strong nation-wide representation. To overcome the statistical challenges inherent to large datasets, preliminary exploration utilized a genetic algorithm to find which combination of consumer attributes best predict their likelihood of purchasing a PHEV. Prediction capability and attribute associations are also explored with more traditional statistical methods and Artificial Neural Networks. These findings will then be used to better inform our existing agent based model of PHEV market penetration, with the ultimate aim of helping policy makers identify leverage points where policies might be most effective in promoting consumer adoption.