Vehicle Type Model Update

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Current Status & Agenda

Have working versions of vehicle type choice option 4 (body, fuel, and age) and vehicle allocation model with *almost* every utility term implemented

Agenda

- Review the vehicle type model
    - Estimation results
    - Implementation
    - Outstanding issues
- Same for vehicle allocation model

Vehicle Type Model

Want to select a body type, fuel type, and age for each vehicle in each household.

Runs after auto ownership.

Option 4:

- Predict body type, fuel type, and age simultaneously
- Choice model alternatives include all combinations

Option 2:

- Predict body type and age, then use an input probability table to determine the fuel type

Vehicle Type Input Data:

body_type	fuel_type	vehicle_year	BT-FT-Year	NumMakes	NumModels	MPG	Range	NewPrice
Car	Gas	2017	Car_Gas_2017	39	738	24	0	32926.61346
Car	Gas	2016	Car_Gas_2016	39	734	23.7	0	33383.61537
Car	Gas	2015	Car_Gas_2015	39	740	23.4	0	33369.12233
Car	Gas	2014	Car_Gas_2014	41	717	23.2	0	32571.33539

Output Vehicle Table:

vehicle_id	household_id	vehicle_num	vehicle_type
0	982875	1	Car_11_Hybrid
1	1810015	1	Car_1_Gas
2	1099626	1	Car_20_Gas
3	763879	1	Car_6_Gas

Vehicle Type Model: Complicated Details

Estimation includes terms that depend on the household already owning certain types of vehicles. How to deal with this in ActivitySim where we must make vehicle choices for each household from scratch?

Solution

- Run vehicle type choice iteratively for each *vehicle_num* in the household
    - Will select the first vehicle, then the second, etc. until all vehicles are chosen
    - Second+ choices will be able to use coefficients on interacting with the first owned vehicle

Drawbacks

- This doesn't *exactly* match how the estimation was performed…
- Makes estimation mode complicated… would have to append the estimation mode file after each iteration?

Vehicle Allocation Model

Want to select a vehicle that will be used for each tour.

Runs right before tour mode choice.

- Setup the example to have 5 alternatives:
    - 4 possible household vehicles (max from auto ownership model)
    - 1 for a non-household vehicle
    - Can be extended if auto ownership model is extended by just adding an alternative column to spec
- Need to run the model once for each occupancy level:
    - Have occupancy values of 1, 2, and 3.5 for sov, shared-2, and shared-3+ modes (configurable setting)
    - tour file is output with one vehicle allocated for each occupancy level

Vehicle Allocation Model: Open Questions

- How to handle vehicles for tour mode choice logsums?
  - Vehicles have not been decided for logsums in work and school location choice. Would need some default vehicle operating characteristics in mode choice.
  - There is a term for BEV that depends on whether tour distance is more than range. We decided to not re-run vehicle allocation for every destination alternative to satisfy this term

- What vehicle should be used for non-household vehicles?
  - One default alternative
  - Sample from region-wide distribution
  - Both options? Others?

Next Steps

- Finish outstanding tasks for option 4 and vehicle allocation
- Implement utility expressions for option 2
- Add modifications in tour and trip mode choice depending on vehicle choice
- Test with larger samples

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