**Selecting the right model and tree structure:**

1. Multinomial model

**Root**

Walk

PT

Walk

PT

Driver

Passenger

Walk

Bicycle

1. Nested logit model: tree structure

**Root**

Car

PT

PT

Driver

Passenger

Walk

Bicycle

PT

Walk

Car

**LR test results for NL model option 1 versus MNL model:**

LR test result shows that NL model option 1 has a better fit than MNL data.

LL par

Model MNL -7747.63 91

Model NL -7727.64 93

Difference 19.99 2

Likelihood ratio test-value: 39.98

Degrees of freedom: 1

Likelihood ratio test p-value: 2.082e-09

**Variables in models**

*Socio-demographic variables:*

Some of the socio-demographic variables were reclassified to have more balanced data in their categories.

Age group:

Reclassified categories: <14, 15-24, 25-34, 35-44, 45-54, 55-64, 65+

Gender:

Male, Female

Household income

Reclassified categories: "less than $59999", $60000 to $94999", "$95000 to $139999","$140000 to $189999", "more than $190000","missing/refused to respond"

Household structure”

Reclassified categories: “Households with children”, “Household without children” (to be created)

Work type:

Reclassified categories: "Fixed Hours", "Flexible Hours", "Rostered shifts", "not in work force "

Number of cars in households:

Reclassified categories: 0,1, 2, 3 or more

Number of bikes in households

Reclassified categories: 0,1, 2, 3 or more

*Route attributes included in the model:*

Four models have been run for each route type. In the first model (M1) attractiveness (as a composite measure of Eye-level greenness, Shannon index, Presence of POIs, Presence of negative POIs, Crime records and Street light count along with stress link and stress junction have been included in the nested logit models. In the second model (M2) the components of attractiveness plus stress link and stress junctions have been included in the utility functions.

Note: for Melbourne, we didn’t have data for lighting and crime.

M3 and M4 models are like M! and M2 in terms of variables (M3: attractiveness plus stress link and junction) and M4 (components of attractiveness plus stress link and junction). However, in M3 and M4 models log-transformed mean of walk and bike distances has been used as the weighting variable in the control settings of the nested logit models.

As shown in table 1 among the three route types, from M1 to M4, short route attributes had the best fit on the data.

Table 1. comparing models using model selection criteria

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | AIC\* | | | BIC\* | | |
| Models | JIBE | Short | Fast | JIBE | Short | Fast |
| M1 | 15664.2 | 15641.28 | 15647.04 | 16322.63 | 16299.71 | 16305.47 |
| M2 | 15645.81 | 15621.34 | 15621.94 | 16346.72 | 16322.25 | 16322.85 |
| M3 | 139781.2 | 138361.4 | 138415.1 | 140439.6 | 139019.8 | 139073.5 |
| M4 | 139557.2 | 138122.9 | 138133.5 | 140258.1 | 138823.8 | 138834.4 |

\*Smaller values show better fit (highlighted in red).