An investigation of mode choice in microsimulation.

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Abstract

This is where the abstract should go.

Keywords: Mode Choice Passive Data Location Choice

1. Introduction

This repository serves as a template both in how to write a report, and how to do so in RStudio and Bookdown. The parent repository is available as a free template at https://github.com/byu-transpolab/template_bookdown.

The advice in this document comes from numerous sources. Some of it is my own, some has been shared by others. Particular note belongs to:

- Laurie Garrow
- Lisa Rosenstein
- Kara Kockelman

The introduction of your report is not simply an "introduction", but rather a **motivation** of why your project matters. What is the cost of not solving this problem? What have been previous attempts to solve this problem? The *why* is more important than the *what*. Why is this article worthy of archiving?

A three or four-paragraph structure can work well here.

1. Identify the problem and why it matters.
2. A high-level overview of some previous attempts to solve it, and why those attempts were limited (this might be two paragraphs).
3. Describe the approach (very briefly), and provide an overview of what is to come. "In this paper we present …"

2. Literature

Here is a review of existing methods. Use the `bookdown` (Xie, 2015) package referencing system to make it easy on yourself.

The literature review is not simply a "review" or a list of what has been done in the past. This needs to a thoughtful synthesis that accomplishes two things:

- Shows that you understand the previous efforts that other people have made on this problem.

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Table 1: Descriptive Statistics of Dataset

		regcar (N=10930)		sportuv (N=1048)		sportcar (N=880)		stwagon (N=4446)		truck (N=5628)	
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev
price		4.2	1.9	4.7	1.9	4.8	2.2	4.1	1.9	4.2	2.0
range		237.2	94.5	241.6	94.7	233.6	96.7	238.7	94.3	238.2	93.1
size		2.4	0.8	2.1	1.0	1.4	1.0	2.3	0.8	2.4	0.8
		N	%	N	%	N	%	N	%	N	%
fuel	gasoline	2704	24.7	280	26.7	218	24.8	1096	24.7	1413	25.1
	methanol	2729	25.0	246	23.5	225	25.6	1091	24.5	1445	25.7
	cng	2767	25.3	260	24.8	238	27.0	1109	24.9	1360	24.2
	electric	2730	25.0	262	25.0	199	22.6	1150	25.9	1410	25.1

- Identifies the limitation or the gap in those previous efforts.

You will have already mentioned this gap in the introduction, but here you need to build a solid case for why what you are doing is a meaningful contribution.

Literature reviews do not have a specific guidelines for length or number of citations. It's more about making a rhetorical argument; if it's a new problem then the review can be shorter. But you'll need to refer to previous attempts at the problem, the methods you are trying, and other things.

3. Methods

In this chapter, you describe the approach you have taken on the problem. This usually involves a discussion about both the data you used and the models you applied.

3.1. Data

Discuss where you got your data, how you cleaned it, any assumptions you made.

Often there will be a table describing summary statistics of your dataset. Table 1 shows a nice table using the `datasummary` functions in the `modelsummary` package.

3.2. Models

If your work is mostly a new model, you probably will have introduced some details in the literature review. But this is where you describe the mathematical construction of your model, the variables it uses, and other things. Some methods are so common (linear regression) that it is unnecessary to explore them in detail. But others will need to be described, often with mathematics. For example, the probability of a multinomial logit model is

$$P_i(X_{in}) = \frac{e^{X_{in}\beta_i}}{\sum_{j \in J} e^{X_{jn}\beta_j}} \tag{1}$$

Use LaTeX mathematics. You'll want to number display equations so that you can refer to them later in the manuscript. Other simpler math can be described inline, like saying that $i, j \in J$. Details on using equations in bookdown are available here.

Table 2: Model Estimation Results

	Model 1	Model 2
typesportuv	0.833 (5.945)	0.815 (5.805)
	(0.140)	(0.140)
typesportcar	0.614 (4.192)	0.628 (4.259)
	(0.146)	(0.147)
typestwagon	-1.415 (-22.979)	-1.428 (-23.119)
	(0.062)	(0.062)
typetruck	-1.002 (-20.600)	-1.010 (-20.673)
	(0.049)	(0.049)
typevan	-0.812 (-17.431)	-0.806 (-17.183)
	(0.047)	(0.047)
price	-0.221 (-8.475)	-0.191 (-7.130)
	(0.026)	(0.027)
range		0.003 (18.923)
		(0.000)
Num.Obs.	4654	4654
AIC	15460.9	15075.0
BIC		
Log.Lik.	-7724.469	-7530.510
rho2	-0.052	-0.026
rho20	0.074	0.097

4. Applications

This section might be called "Results" instead of "Applications," depending on what it is that you are working on. But you'll probably say something like "The initial model estimation results are given in Table 2." That table is created with the `modelsummary()` package and function.

With those results presented, you can go into a discussion of what they mean. first, discuss the actual results that are shown in the table, and then any interesting or unintuitive observations.

4.1. Additional Analysis

Usually, it is good to use your model for something.

- Hypothetical policy analysis
- Statistical validation effort
- Equity or impact analysis

If the analysis is substantial, it might become its own top-level section.

5. Conclusions

This section need not be overly long. You should address any limitations of your results, such as dependence on underlying assumptions or geographic scope. You should also provide a map for future research.

Finally, you should underline the contributions of this work and any practical relevance.

References

Xie, Y. (2015). *Dynamic Documents with R and knitr*. Chapman and Hall/CRC, Boca Raton, Florida, 2nd edition. ISBN 978-1498716963.