

VISTA Activities 2012-16

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1 About

1.1 Document

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This document describes the process for calculating the spread of activities of Melbournians by time of day. The Victorian Integrated Survey of Travel & Activity (VISTA) 2012-16 data is used for this purpose.

2 Data | Victorian Integrated Survey of Travel & Activity

2.1 Sourcing VISTA 2012-16 Data

The Victorian Integrated Survey of Travel & Activity (VISTA) 2012-16 data was downloaded from the following URL on 10th May 2019:

https://transport.vic.gov.au/-/media/tfv-documents/vista/vista_2012_16_v1_sa1_csv.zip

The Zip archive was uncompressed, and the contained CSV files recompressed using GZip giving:

```
./VISTA_2012_16_v1_SA1_CSV/JTW_VISTA12_16_SA1_V1.csv.gz
./VISTA_2012_16_v1_SA1_CSV/S_VISTA12_16_SA1_V1.csv.gz
./VISTA_2012_16_v1_SA1_CSV/H_VISTA12_16_SA1_V1.csv.gz
./VISTA_2012_16_v1_SA1_CSV/P_VISTA12_16_SA1_V1.csv.gz
./VISTA_2012_16_v1_SA1_CSV/JTE_VISTA12_16_sa1_V1.csv.gz
./VISTA_2012_16_v1_SA1_CSV/T_VISTA12_16_SA1_V1.csv.gz
```

2.2 Understanding Trip Data

We use Trip Table (T_VISTA12_16_SA1_V1.csv) with these select columns:

Column	Description
PERSID	Person ID number
TRAVDOW	Travel day day-of-week
ORIGPURP1	Origin Purpose (Summary)
DESTPURP1	Destination Purpose (Summary)
STARTIME	Time of Starting Trip Stage (in minutes, from midnight)
ARRTIME	Time of Ending Trip Stage (in minutes, from midnight)
CW_WDTRIPWGT_LGA	Trip weight for an 'Average weekday' of the combined 2012-14 and 2014-16 ReportingPeriods, using the ASGC.
CW_WETRIPWGT_LGA	Trip weight for an 'Average weekend day' of the combined 2012-14 and 2014-16 ReportingPeriods, using the ASGC.

2.3 Example Trip Record for a Person

PERSID	TRAVDOW	ORIGPURP1	DESTPURP1	STARTIME	ARRTIME	CW_WDTRIPWGT_LGA
Y12H0000126P01	Friday	At or Go Home	Work Related	475	535	139.78
Y12H0000126P01	Friday	Work Related	Personal Business	580	590	139.78
Y12H0000126P01	Friday	Personal Business	Work Related	600	610	139.78
Y12H0000126P01	Friday	Work Related	At or Go Home	1050	1125	139.78

3 Activities by Time of Day

3.1 Extracting Activities from Trip Records

We convert every person's trip record:

PERSID	TRAVDOW	ORIGPURP1	DESTPURP1	STARTIME	ARRTIME	CW_WDTRIPWGT_LGA
Y12H0000126P01	Friday	At or Go Home	Work Related	475	535	139.78
Y12H0000126P01	Friday	Work Related	Personal Business	580	590	139.78
Y12H0000126P01	Friday	Personal Business	Work Related	600	610	139.78
Y12H0000126P01	Friday	Work Related	At or Go Home	1050	1125	139.78

To that person's activity record like this:

PERSID	TRAVDOW	ACTIVITY	ACT.START.TIME	ACT.END.TIME	CW_WDTRIPWGT_LGA
Y12H0000126P01	Friday	At or Go Home	0	475	139.78
Y12H0000126P01	Friday	Work Related	535	580	139.78
Y12H0000126P01	Friday	Personal Business	590	600	139.78
Y12H0000126P01	Friday	Work Related	610	1050	139.78
Y12H0000126P01	Friday	At or Go Home	1125	1439	139.78

3.2 Simplifying Activity Labels

Group activities into activity groups as follows:

Activities	Activity Group
At or Go Home	Home
Accompany Someone	With Someone
Change Mode	Mode Change
Unknown purpose (at start of day), Other Purpose, Not Stated	Other
Personal Business	Personal
Work Related	Work
Education	Study
Buy Something	Shop

Social Recreational
Pick-up or Drop-off Someone, Pick-up or Deliver Something

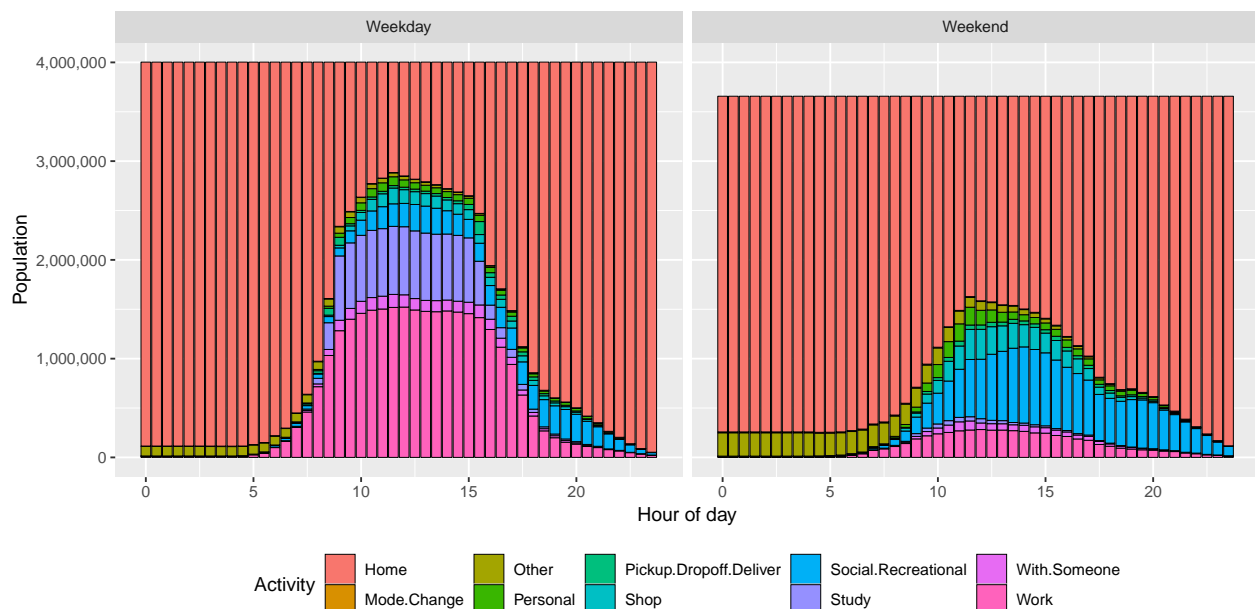
Social/Recreational
Pickup/Dropoff/Deliver

3.3 Creating Activity Bins by Time of Day

1. Cut the day into fixed time bins of configurable size (30/60/120 mins)
2. For every activity record, count CW_WDTRIPWGT_LGA persons in every time bin that overlaps with the activity time
3. For any time bins that do not add up to the expected population (sum of CW_WDTRIPWGT_LGA per unique person), scale up the time bin vector of activities to the expected population size, proportionally.

```
dd<-aggregate(activities,by=list(activities$Person),FUN=head,n=1)
popnsize<-sum(dd$Count)
actCounts<-t(apply(actCounts,1, function(x, mx) {(x/sum(x))*mx}, mx=popnsize))
```

3.4 Activities by Time of Day for Greater Melbourne



4 Activity Chains | or what follows what

4.1 Markov Chain Model

- Start with our activity groups, but with the Home group refined as follows:

Activity Type	Mapping to VISTA Activity
Home Morning	At or Go Home, when first activity of the day
Home Night	At or Go Home, when last activity of the day
Home Daytime	At or Go Home, when not the first or last activity of the day
Mode Change	Change Mode

Other	Unknown purpose (at start of day), Other Purpose, Not Stated
Personal	Personal Business
Pickup/Dropoff/Deliver	Pick-up or Drop-off Someone, Pick-up or Deliver Something
Shop	Buy Something
Social/Recreational	Social, Recreational
Study	Education
With Someone	Accompany Someone
Work	Work Related

- Use VISTA data to create a matrix giving transition probabilities between each activity
- Home Night is the *absorbing state* as there are zero transitions out from it.
- Use the transition matrix to create a *Markov Chain* model (using R package markovchain)

4.2 Weekend Activities Markov Chain

