VISTA Activities 2012-16

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0.1 About

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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.

1 Data | Victorian Integrated Survey of Travel & Activity

1.1 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
```

1.2 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.
-------------------------------------------------------------------------
```

1.3 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
-------------------------------------------------------------------------------------------
```

2 Activities by Time of Day

2.1 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
-------------------------------------------------------------------------------------------
```

2.2 Simplifying Activity Labels

1. Remove `Change Mode` activitiy which is an in-transit mode-change event.

2. Remove `Accompany Someone` activity which is a secondary activitiy.

3. Group the remaining activities into activity groups as follows:

```
--------------------------------------------------------------- -----------------------
Activities                                                      Activity Group
--------------------------------------------------------------- -----------------------
At or Go Home                                                   Home
Unknown purpose (at start of day), Other Purpose, Not Stated    Other
Personal Business                                               Personal
Work Related                                                    Work
Education                                                       Study
Buy Something                                                   Shop
Social Recreational                                             Social/Recreational
Pick-up or Drop-off Someone, Pick-up or Deliver Something       Pickup/Dropoff/Deliver
```

2.3 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))
```

2.4 Activities by Time of Day for Greater Melbourne