VISTA Activities 2012-16

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About

Document version: May 14, 2019

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.

Data

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
```

Understanding Stop Data

We use Stop Table (`S_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_WDSTOPWGT_LGA  Stop weight for an 'Average weekday' of the combined
                  2012-14 and 2014-16 ReportingPeriods, using the ASGC.
CW_WESTOPWGT_LGA  Stop weight for an 'Average weekend day' of the combined
                  2012-14 and 2014-16 ReportingPeriods, using the ASGC.
--------------------------------------------------------------------------
```

Example Stop Record for a Person

```
----------------------------------------------------------------------------------------------
```

```
          PERSID TRAVDOW         ORIGPURP1          DESTPURP1 STARTIME ARRTIME CW_WDSTOPWGT_LGA
-------------- ------- ----------------- ----------------- -------- ------- ----------------
Y12H0000126P01  Friday          At 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           Go Home     1050    1125           139.78
-------------------------------------------------------------------------------------------
```

Extracting Activities from Stop Records

We convert every person's trip record:

```
-------------------------------------------------------------------------------------------
          PERSID TRAVDOW         ORIGPURP1          DESTPURP1 STARTIME ARRTIME CW_WDSTOPWGT_LGA
-------------- ------- ----------------- ----------------- -------- ------- ----------------
Y12H0000126P01  Friday          At 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           Go Home     1050    1125           139.78
-------------------------------------------------------------------------------------------
```

To that person's activity record like this:

```
--------------------------------------------------------------------------------------------
          PERSID TRAVDOW          ACTIVITY ACT.START.TIME ACT.END.TIME CW_WDSTOPWGT_LGA
-------------- ---------------- -------- -------------- ------------ ----------------
Y12H0000126P01  Friday           At 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           Go Home           1125         1439           139.78
--------------------------------------------------------------------------------------------
```

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 Home, 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
--------------------------------------------------------------------------------------------
```

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_WDSTOPWGT_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_WDSTOPWGT_LGA` per unique person), scale up the time bin vector of activities to the expected population size, proportionally.
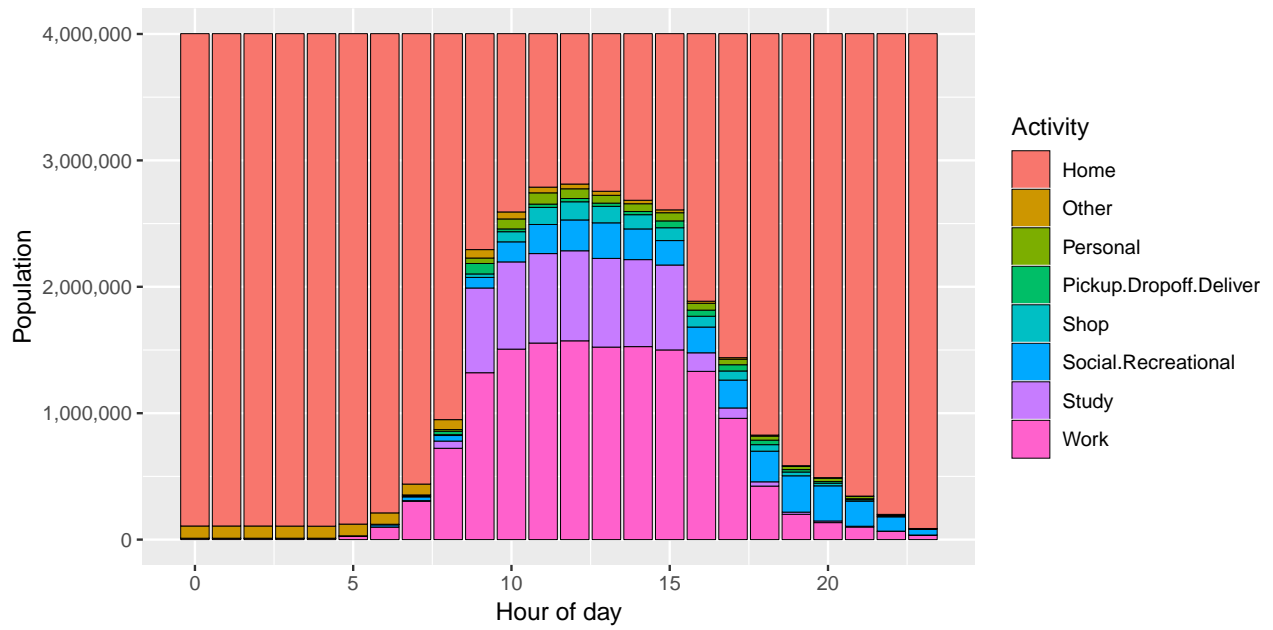
```
dd<-aggregate(activities,by=list(activities$Person),FUN=head,n=1)
popnsize<-sum(dd$Count)
actCounts<-t(apply(actCounts,1, function(x, mx) {(x/sum(x))*mx}, mx=popnsize))
```

Outputs

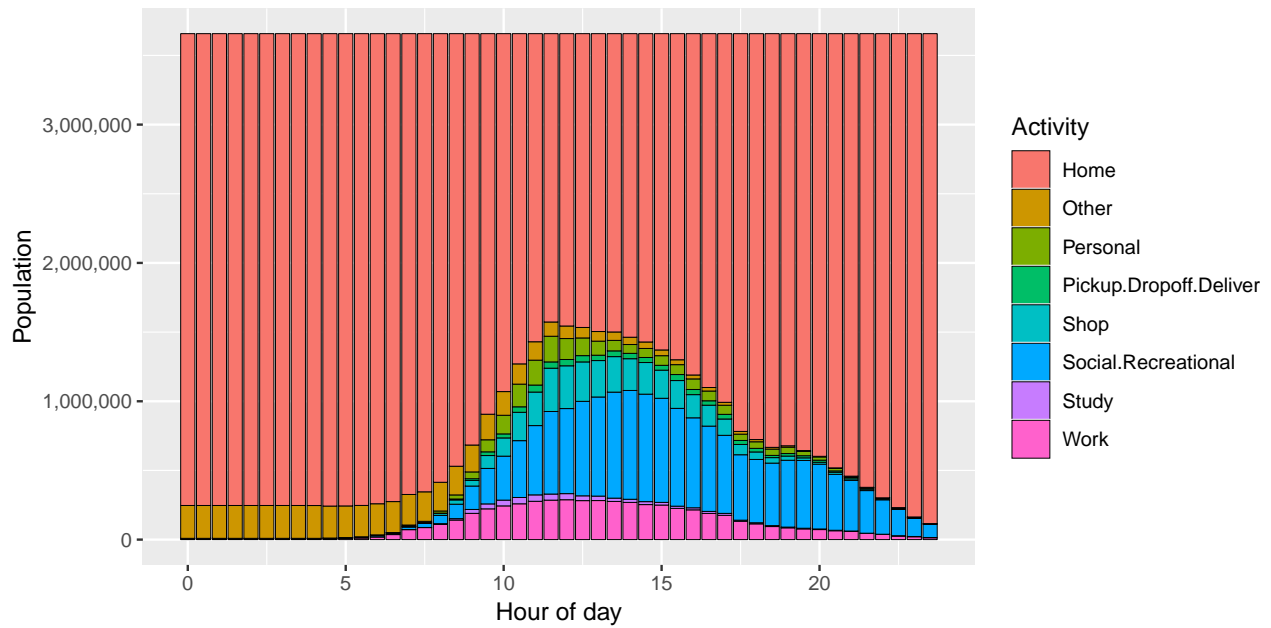## Weekday activities for Greater Melbourne | 30 min bins
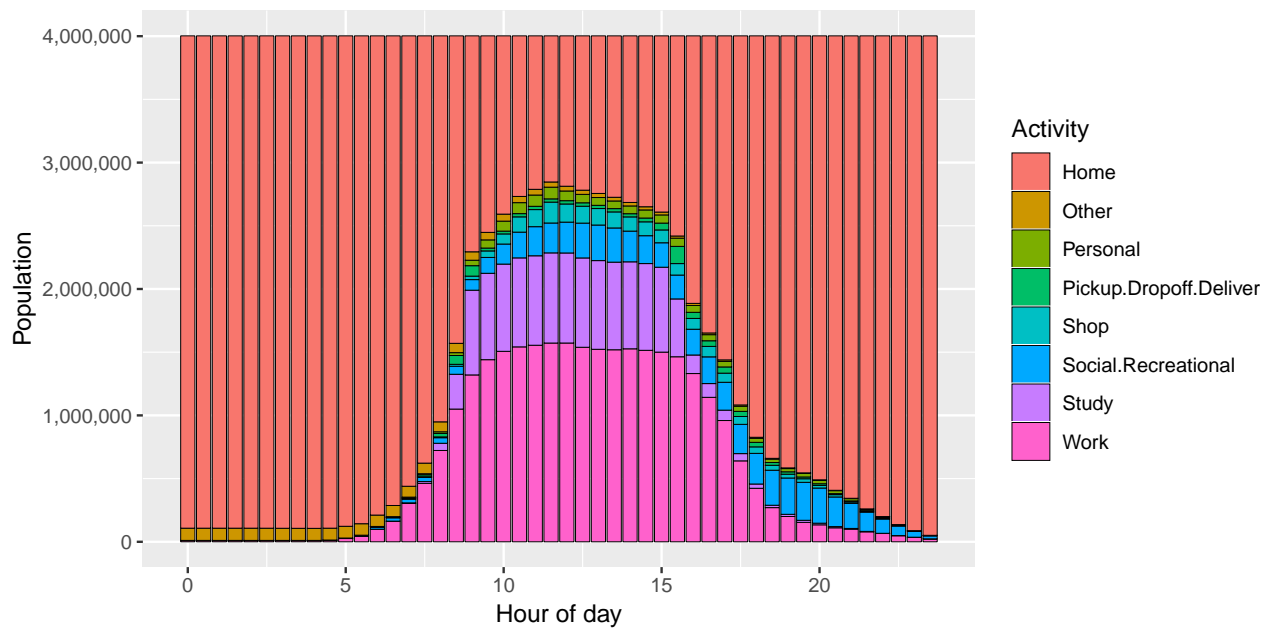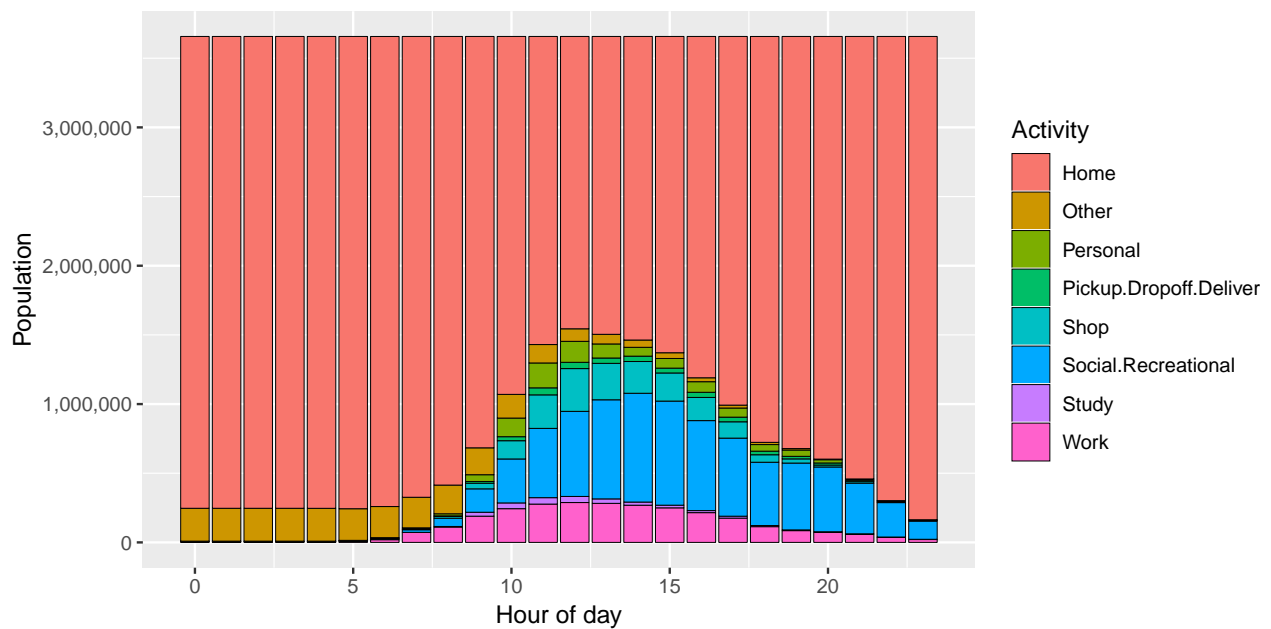
Weekday activities for Greater Melbourne | 60 min bins

Weekday activities for Greater Melbourne | 120 min bins
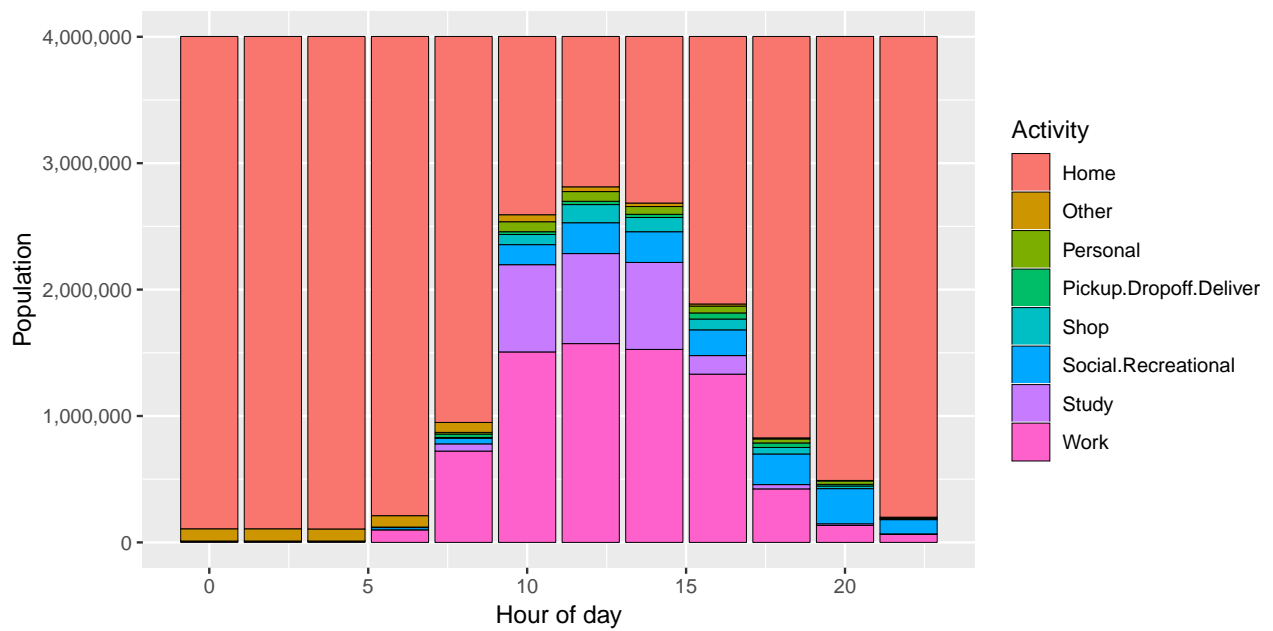
Weekend activities for Greater Melbourne | 30 min bins

Weekend activities for Greater Melbourne | 60 min bins

Weekend activities for Greater Melbourne | 120 min bins