**Instructions for the TCI code**

The code for the TCI project is available on github at <https://github.com/cities-lab/tci> . The R scripts are organized by different methods of computing TCI, including survey (for the survey-based approach), cluster (for the cluster-based approach), and individual (for individual-based approach, unfinished due to extensive data requirements and poor computation performance).

In general, the whole process of computing TCI can be invoked through a start\_[project][year].R script, which in turn calls settings.R, prepare\_[project][year].R (optional), compute.R and plot.R

For example, code/survey/start\_Portland2011.R calculates TCI for Portland with the survey-based method using the 2011 Oregon Travel Activity Survey (OTAS) data. Running this R script file will automatically calculate and plot travel costs and save plots and results in output/survey/Portland2011 directory (by default, directory location can be changed by users).

**start\_Portland2011.R** defines project name, method name and year first, and sources then several R script files in sequence to calculate and plot travel costs.

1. **settings.R**

This file defines common settings for all projects and methods:

* abbreviation

Income groups, trip purposes, travel modes, time periods and calculation methods

* unit.name

Unit name is defined for converting travel cost measurement between minutes and dollars. Through changing unit name definition, travel costs are calculated by minutes or dollars. When line 22 code[[1]](#footnote-1) is used and line 23 code[[2]](#footnote-2) is commented, travel costs are calculated by dollars; when line 22 code is commented and line 23 code is used, travel cost is calculated by minutes.

* directories

Define input directory, intermediate directory, output directory based on method, project and data year. By default, the input directory (INPUT\_DIR) would be in data/<project.name>[year], while the output directory in output/<method.name>/<project.name>[year]/unit.name. These default setting can be overridden by users in the start\_[].R script.

1. **settings\_OHAS.R (optional, since there are more than one projects using the OHAS dataset, the OHAS related settings are kept in settings\_OHAS.R. For most other projects, the settings are either in settings.R or start\_[].R)**

The unit.name setting allows the output to be accounted in either minutes or dollars.

It also defines unit costs by modes, including travel time costs and monetary costs. The unitcosts allows flexibility in the formula to calculate transportation costs by mode:

transportation costs = constant + VOT \* travel time + mcpm \* travel distance

where

constant is a mode-specific constant term, 0 by default;

VOT is Value of Time;

mcpm is monetary cost per mile

1. **functions.R**

This file defines common functions. More details about each functions can be found in this script file.

1. **prepare\_Portland2011.R (optional)**

This file transforms OHAS data to the format required by compute.R, primarily:

* identify four trip purposes lined trips : home-based work (HBW), home-based shopping (HBS), home-based recreation (HBR) and home-based other (HBO)
* calculate trip duration in hours and trip distance in miles
* reclassify income categories (low income: $0- $24,999; mid income: $25,000 - $49,999; high income: $50,000 or more)
* identify Transportation Analysis Zone (TAZ) and geographical districts of residence location of households.

1. **compute.R**

This file computes trip-level transportation costs and then aggregate them by household, trip purposes, income groups, TAZs and/or districts.

1. **plot.R**

This file plots transportation cost results, including density line plot, boxplot, line chart plot and map.

1. unit.name <- ifelse(exists('unit.name'), unit.name, 'dollars') [↑](#footnote-ref-1)
2. unit.name <- ifelse(exists('unit.name'), unit.name, 'minutes') [↑](#footnote-ref-2)