

Manage model runs

Input parameters

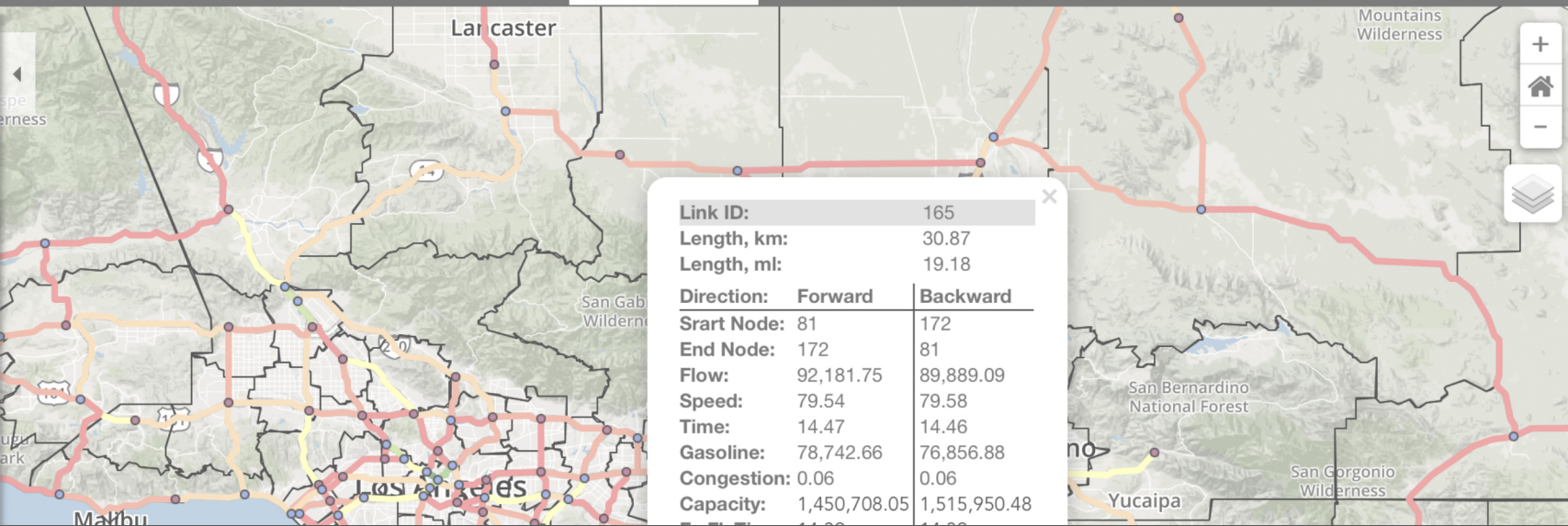
Symbology on links

Symbology

Symbology mode

Attribute Capacity (forward) ▾

Method Natural Breaks (Jenks) ▾



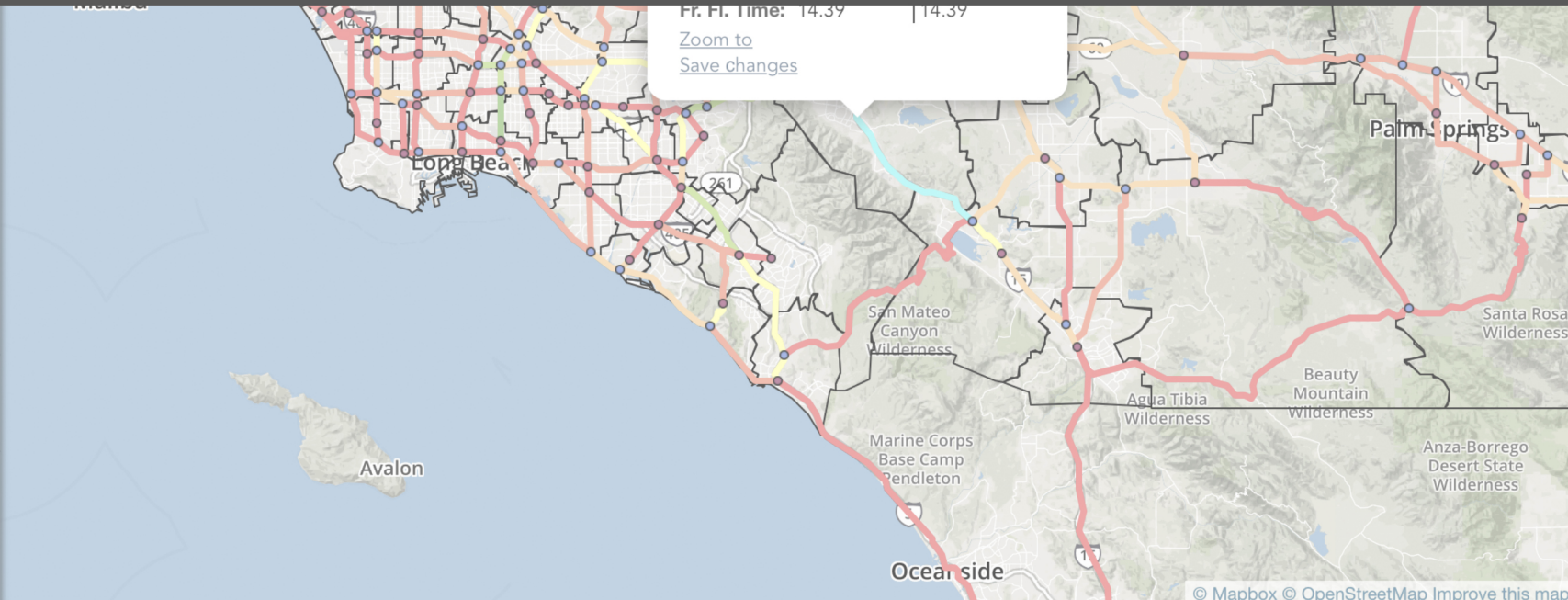
RELU-TRAN GUI User's Guide

- 11,628 – 418,207.94
- 418,207.94 – 1,051,553.27
- 1,051,553.27 – 1,995,345.08
- 1,995,345.08 – 3,521,296.76
- 3,521,296.76 – 5,616,943.29
- 5,616,943.29 – 7,620,157.71
- 7,620,157.71 – 10,960,560.04

Other output results

Compare model runs

Download the results



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1 Introduction

This User Guide provides the basic instructions for conducting model runs using the most recent online GUI client developed for the Los Angeles Regional Economy, Land Use and Transportation (RELU-TRAN) project. In addition, it discusses how to manipulate and customize the map's layers used in the GUI as well as what kind of input parameters RELU-TRAN model can take and how to access the results from a given model run. The most recent version of the GUI has quite intuitive, easy to follow interface and broad functionality, which is discussed below. In several simple steps you will be able to preform an extensive analysis of the economy, land use and transportation network of Los Angeles area and make a live comparison of your model runs with each other. Point out, however, that **the GUI is only compatible with Safari, Mozilla Firefox and Google Chrome browsers**. Internet Explorer has some compatibility issues and thus should not be the choice.

2 RELU-TRAN vs. TRAN models

RELU-TRAN is a complex general equilibrium model that describes various aspects of a metropolitan economy. While a transportation component (TRAN) is a part of the global RELU-TRAN model, it can also be accessed as a separate unit in this GUI. When working with the TRAN model, a system allows you to see the effect of the desirable changes only on the transportation system, treating all other aspects of the economy as exogenous.

3 The concept of a model run

Without regard to which model you are working with, the full RELU-TRAN or just the TRAN unit, the first step is to create a new "model run". Each model requires a set of files to store its data. These files include a set of layers that store attributes and can be rendered on the map, files that contain information on the input parameters and another set of files that store the output data. By starting a new model run, you are making a personal copy of these files. Thus, an easy way to understand the concept of a model run is to think about a bunch of all the files that are necessary to work with the model.

A number of model runs that can be created by a user is limited to 3 runs for each model. Each model run is independent from another. This means that you can work on one model run while the other one is converging. You can also rerun your model runs an infinite number of times - there is no need to create a new model run every time you want to test the model with a different values of input parameters. The **Manage model runs** menu located on the navigation sidebar allows you to start new runs, load your old runs or delete the runs that are no longer needed.

Please follow "Introduction to the model" link from the navigation bar to get more detailed information about the RELU-TRAN model.

4 GUI navigation

The GUI has two major sources of control to perform the analysis: a **navigation sidebar** (Figure 1) that is located on the left and a **map** which resides on the background. These control features complement each other and should be used as a bundle.

The navigation sidebar provides you with a menu that creates a logical sequence for the model analysis. The tabs in this menu allows you to manage the model runs, make changes to the input parameters, render the links layer, download the results, etc. Each tab will be discussed below in more details.

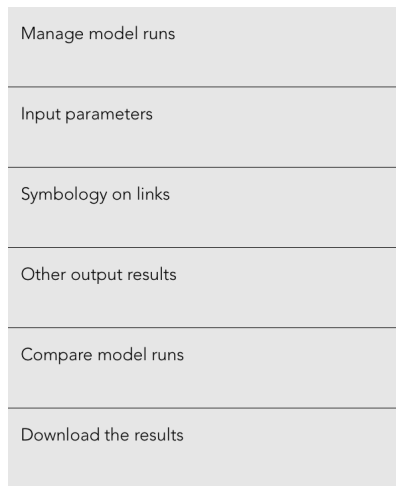


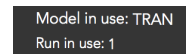
Figure 1: A navigation sidebar.

The map does not only visualize the results, but also serves as a great instrument to operate model's input and output data as well as allows you to make a quick and simple comparison of the model runs. It has a navigation panel located in the top right corner of the active map window. This panel allows you to switch between two view modes (Light Grey and Streets) as well as turn off/on active layers for the matter of convenience.

The GUI also has a **navigation bar** that is located on top. It has two buttons that allow you to switch between a full RELU-TRAN model or its smaller TRAN component and an info window that provides you with an additional information about what model and what model run are currently in use (Figure 2).



(a) Model switcher.



(b) Model and run information window.

Figure 2: Two parts of the navigation bar.

5 Layers

The RELU-TRAN model is a complex system that operates on a vast array of data. As any other Geographical Information System (GIS), it uses the concept of layers to store, check and display most of its data. ESRI, which is de facto the main supplier of the GIS software these days, defines a layer as a mechanism used to display geographic datasets. A more intuitive way to understand the idea behind a layer is to think about a set of symbology plotted on the map, which references the spatial data that you are dealing with. This spatial data is called layer's attributes.

The GUI operates on five layers: Counties, Zones, Links, Origin-Destination (OD) nodes and Intersection nodes. The set of attributes associated with each layer can be studied by clicking on that layer, which would result in displaying a popup window with the corresponding attributes' values.

- “Counties” layer combines six counties that form a geographical area covered by the RELU-TRAN model. These are: Imperial, Los Angeles, Orange, Riverside, San Bernardino and Ventura. The layer holds data on the average rent, value, stock and occupancy for each type of land use in every county. The land use patterns defined by the model are: Single family, Apartments, Commercial land, Industrial land, Public land and Vacant land.
- “Zones” layer contains data on the 97 zones defined for the RELU-TRAN. These zones are smaller geographical divisions of the six counties mentioned above. They contain the same data on land use pattern as well as the data on economics that includes an average wage, number of jobs and population for the 4 types of workers.
- “Intersection nodes” layer is an informative layer, which shows the points of intersection of the highways with other major roads. It does not bring any valuable information except of the node identifier number.
- “OD nodes” layer contains 97 points. Each point represents a logical center of a zone. In addition, it can also be used as an origin or a destination in the model. This is needed for the navigation through OD-type input/output data such as the number of trips, time (in minutes) or monetary cost (in dollars) for any OD pair of nodes.
- “Links” layer combines multiple roads and highways together. Each link has forward and backward directions, which are defined by the corresponding start-end pair of nodes. Each link contains a set of informative attributes such as flow, speed, time, gasoline consumption and congestion level for each direction on that link. In addition, the TRAN model has two variable attributes, which can be used as model input parameters: capacity and free flow time.

6 Working with models

6.1 Step 1. Create/load a model run

Before starting using the model you need to create a new model run or load an old run if you have any. To do this you should open the **Manage model runs** tab from the navigation sidebar and click on the **Start a new run** button. If you have less than 3 runs, the system will notify you that a new model run has been created and load all the required files automatically. This process should take no longer than 5-10 seconds, depending on your internet speed.

If you have any old runs that you want to get back to and work on or if you want to delete them, you can also do this in the **Manage model runs** tab. Just select a desired model run and click on **Load run** button to load it or **Delete run** button to delete the run. You will be asked for a confirmation before the run is deleted as this procedure can not be undone.

6.2 Step 2. Set up the input parameters

The number of input parameters you can control is different for RELU-TRAN and TRAN models. That's why this section contains two separate subsections depending on what model you are interested in.

6.2.1 TRAN

There are three sets of input parameters you can define: "Trip Matrix", "Links" and "Fuel price and multipliers".

1. Trip Matrix

Trip matrix contains data on the number of trips between any two origin-destination nodes. To change this value for any pair of nodes, you can use a corresponding form in the "Step 2" menu. As soon as you specify a pair of the origin and destination nodes, the corresponding table cell with the number of trips will be filled in automatically. You can then change this value and click Enter to save your results. If the correct number was used as an input, a word "Saved" will appear in the lower left corner of the form to inform you that the input parameter was updated successfully.

There are two ways you can choose a particular node to become an origin or a destination: by entering a node ID in the corresponding field in the form or by clicking the node icon on the "OD Nodes" layer on the map and choosing either "Use as Origin" or "Use as Destination" option. Moreover, every time you click on the origin/destination input field in the form or change its value to one of the OD nodes, the GUI will make a selected node blink in green on the map. This helps quickly locate that node, which is currently being selected.

2. Links

Each piece of the broad network of roads has two variables, which can be altered: capacity and free flow time. To change the value of either of these two, you first have to click on the link that you want to alter. As soon as the popup window with the attributes associated with that link shows

up, pick the direction (forward or backward) and the desired variable to be altered: capacity or free flow time. Enter a new value without comma separators and click on “Save changes” button at the bottom of the popup window. **Make sure you click on “Save changes” button after you altered a desired property’s value.** By clicking “Save changes” button you are adding a desired change to the array of changes on links that will be submitted to the model solver as soon as you run the model. Otherwise, the value will be updated locally on your client, but it will not be submitted to the model solver.

The direction of each link is defined by a pair of start-end nodes associated with that link.

3. Fuel price and Multipliers

The “Input parameters” form located in the “Step 2” allows you to define the fuel price in the region as well as the set of input-multipliers. Each multiplier affects the corresponding attribute value on all links or all OD nodes at the same time. The value of 1 is associated with 100% or the default value. If, for example, the value for “Capacity on all major roads” was set to 1.2, this would mean that the capacity on all major roads was increased by 20%. In addition this form has two checkboxes. There is a checkbox, which you can use to apply a toll on traffic congestion and a checkbox, which would make the GUI send you an email notification as soon as the model converges.

If all the input parameters have valid values, you will see a text status saying “The model is converging . . .”, which will be located next to the “Run the model” button when you click it. If the convergence was successful, the previous status will be replaced by “Convergence is achieved.” Note, that **convergence can take a long time depending on the values of input parameters.** That is why it may be advised to select “Notify me when the model converges” checkbox so that you do not have to keep watching over the status change for an unknown amount of time.

6.2.2 RELU-TRAN

The RELU-TRAN model is less flexible in terms of user-defined input parameters. It only allows you to change the value of a fuel price and a set of multipliers. A set of multipliers, however, is wider than the one available in TRAN model. To get more details on the “Fuel price and Multipliers”, please, refer to the corresponding section of the TRAN model above.

6.3 Step 3. Symbology on links

This section allows you to render the links layer using a green-red color scheme with 5 classes to show values of the selected attribute. This can be done by turning on the color symbology mode. After this checkbox has been selected, the input form will be expanded to display the legend. You can also change the rendering attribute and the rendering method by changing the values from the two drop-down lists in the form.

6.4 Step 4. Other output results

In the way the GUI allows you to change three types of input parameters, it also generates three types of output results, which can be checked in the same manner:

1. Links
2. Aggregated results
3. Time and monetary cost matrix

6.4.1 Links

By clicking on any link you will be able to see a popup window with the updated results on the following set of attributes: Flow, Speed, Time, Gasoline consumption and Congestion level on each link for each direction.

6.4.2 Aggregated results

The set of aggregated results on Total gasoline consumption per day (in gallons), Total private vehicle time per day (in minutes) or Weighted average congestion level can be found in the top table of the “Step 4” menu section.

6.4.3 Time and monetary cost matrix

The bottom section of the “Step 4” menu can be used to get the convergence Time (in minutes) and Monetary Cost (in dollars) for any origin-destination pair of nodes. The way to use this form is absolutely the same as the one, which was described above in the “Step 2” menu section, except of fact that this is not an input form and the option to edit the data values is excluded.

6.5 Step 5. Compare model runs

If you have more than two model runs, which have successfully converged, you can compare them together. The GUI allows you to compare any two model runs that belong to the same model (either RELU-TRAN or TRAN) at a time. By clicking on the drop-down menu and selecting the model run ID, you are able to pick the model run which you would like to use for comparison against your currently active model run. As a reminder, your current model run ID is displayed in the upper right corner of the GUI.

Turning on the comparison mode will do two things: expand the “Step 5” menu section to accommodate three additional table-forms and change the type of popup window on the “Counties”, “Zones” and “Links” layers. Now each link’s popup window will contain the results of both model runs as well as the percentage change between them. For each attribute your currently active model run goes first, followed by the results of the model run that you are comparing to and the percentage change between them.

The data that does not belong to any of the layers will be compared in the “Other output results” tab. It contains three table-forms with the results. The first one of these table-forms displays the comparison of input-multipliers, which have been used in each of the model runs. The second one makes a comparison

of the aggregate output results. And the third one stands to compare the actual values and the percentage change for time and monetary cost on any OD pair of nodes.

6.6 Step 6. Download the results

This navigation menu section allows you to download all of the results belonging to your current model run as a series of “comma-separated values” (csv) files compressed in one zip archive.