**Progress for Global Datasets Project**

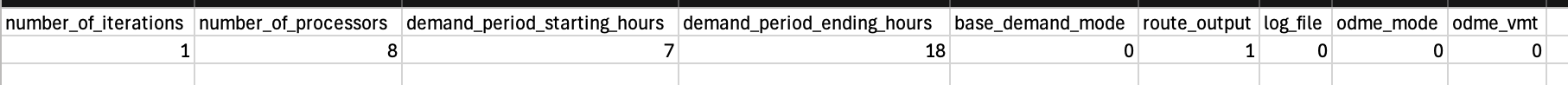
**Step 1: tntp2gmns: generate node.csv, link.csv, demand.csv (depends)**

GitHub link: <https://github.com/bstabler/TransportationNetworks>

**Step 2: Update link.csv**

|  |  |
| --- | --- |
| **Updated filed name** | **Definition** |
| length | Link length, unit is **meter** |
| vdf\_length\_mi | Link length, unit is **miles** |
| free\_speed | Free flow speed, unit is kmph |
| vdf\_free\_speed\_mph | Free flow speed, unit is **mph** |
| vdf\_fftt | Free flow travel time, unit is **min** |
| vdf\_alpha | Parameter of volume delay function. |
| vdf\_beta | Parameter of volume delay function. |
| vdf\_plf | Peak load factor. The value is 1. |
| ref\_volume | from standard assignemnt results |
| vdf\_toll | for mode type 1 for one mode only |
| vdf\_toll\_sov, vdf\_toll\_truck | for mode 2 or other modes |
| obs\_volume | from sensor observations for mode type 1: for one mode only |
| obs\_volume\_sov, obs\_volume\_truck | from sensor observations for mode type 2 or others |
|  |  |

**Step 3: Update settings.csv**



**Step 4: Validate inputs**

**Level 1: Basic Data File Validation**

o File Existence: Ensures that the node and link CSV files are available and can be loaded.

o Required Fields & Data Types: Verifies that key fields (like node\_id for nodes and link\_id for links) exist and that the data types are as expected (e.g., integer for IDs, float for coordinates or speeds).

o Sorted Data Structure: Confirms that nodes and links are sorted (nodes by node\_id and links by from\_node\_id and to\_node\_id), which is critical for efficient processing in methods like shortest path calculations.

o Link Endpoints: Ensures that every link’s starting and ending node is present in the node file.

**Level 2: Demand and Zone Consistency**

o Zone Centroids: Validates that each zone has a corresponding centroid (a node where node\_id equals zone\_id) and that these centroids are grouped together at the start of the file.

o Connector Links: Identifies and validates the “connector” links that connect centroids to physical nodes.

o Demand File Structure: Checks the demand CSV to ensure it has exactly the expected three columns (o\_zone\_id, d\_zone\_id, and volume) in the correct order.

o Zone Consistency Across Files: Verifies that the zones referenced in the demand file exist in the node file.

**Level 3: Network Attributes Validation**

o Speed and Length Units: Ensures that the speed values are in the correct units (e.g., free-flow speeds in km/h and VDF free speeds in mph) and that link lengths are appropriately measured (meters vs. miles).

o Capacity Values: Checks that link capacities are within a reasonable range (e.g., no negative or implausibly high values) and that capacity per lane is consistent with expected highway capacities.

o Unit Conversions: Validates that related fields (like link length in meters vs. miles or speed in km/h vs. mph) are consistent based on standard conversion factors.

o VDF Parameters: Verifies that the Volume Delay Function (VDF) parameters (like vdf\_alpha, vdf\_beta, etc.) are present, non-negative, and make sense given the network’s context.

**Level 4: Single Mode Configuration Validation**

o Configuration Files: Looks for the presence and proper formatting of key configuration files such as mode\_type.csv and settings.csv.

o Single Mode Requirement: For a single mode setup, it checks that only one mode type is defined. Multiple mode types might trigger a warning if the network isn’t intended to support multimodal assignments.

o Parameter Consistency: Ensures that the settings (e.g., number of iterations, demand period hours) are within reasonable limits for simulation performance.

**Level 5: Observed Volume Checks and ODME Preparation**

o Observed Volumes: In the link file, it validates the obs\_volume field (if present), ensuring that there are no negative values and that there is sufficient positive volume data to support Origin-Destination Matrix Estimation (ODME).

o ODME Requirements: Prepares the network for ODME by confirming that the necessary observed volume data is present and reasonable.

**Level 6: Accessibility Assessment**

o OD Connectivity: Uses performance files (like od\_performance.csv) to verify that all origin-destination (OD) pairs (especially those with significant demand) have feasible paths in the network.

o Route Assignments (if available): In addition to OD performance, it optionally validates the route assignment file to further confirm that the network's structure allows for efficient connectivity.

o Accessibility Metrics: Calculates metrics such as the number of accessible destinations per origin and the number of origins reaching each destination. It also flags cases where these numbers fall below acceptable thresholds, indicating potential connectivity issues.

**Level 7: Traffic Assignment Validation**

o Link and Route Performance: Analyzes detailed traffic assignment outputs, checking metrics like total assigned volume, vehicle miles traveled (VMT), vehicle hours traveled (VHT), and average speeds.

o Statistical Comparisons: Compares assigned volumes with reference and observed volumes using metrics such as the R² (coefficient of determination), RMSE (Root Mean Squared Error), and MAPE (Mean Absolute Percentage Error) to assess assignment quality.

o Route Consistency: Validates route assignments by ensuring that each OD pair’s route probabilities sum to 1, that multiple routes exist where expected, and that congestion ratios (travel time versus free flow time) are within realistic bounds.

**Level 8: (Extended) ODME Post-Quality Checks**

o Target Demand Matching: Although not explicitly implemented as a separate method in the code snippet, Level 8 typically involves verifying that the adjusted demands in the ODME process match the target demands.

o Feasible High-Demand Paths: Checks that high-demand OD pairs have been assigned feasible paths and that there are no significant deviations in travel times and volumes.

o Outlier Identification: Flags outliers in both route assignments and volume discrepancies, ensuring overall network assignment quality.

**Step 5: Run DTALite to get outputs**

link\_performance.csv

od\_performance.csv

route\_assignment.csv

google\_maps\_od\_distance.csv

validation\_report.json

**Step 6: Check errors and update inputs**

1️. File Existence Check

Ensure the following files are present:

• mode\_type.csv

• od\_performance.csv

• link\_performance.csv

• link.csv

2️. Missing or Incorrect Fields

3️. Parameter and Setting Validation

4️. Anomalies Checking

5️. Data Consistency and Sorting

6️. Assignment and Accessibility Validation

• Ensure od\_performance.csv is available for accessibility validation.

• Ensure link\_performance.csv is available for assignment validation.