A Demonstration of MNTG – A Web-based Road Network Traffic Generator

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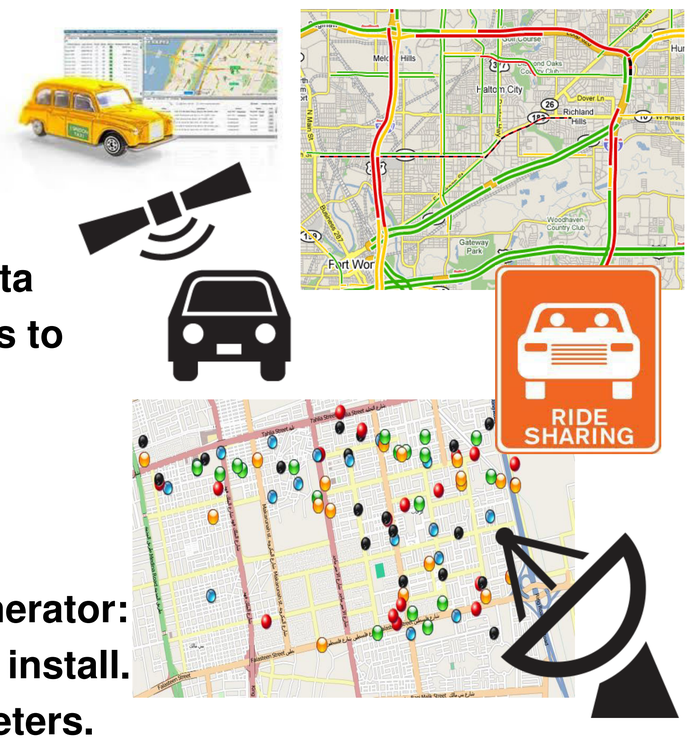
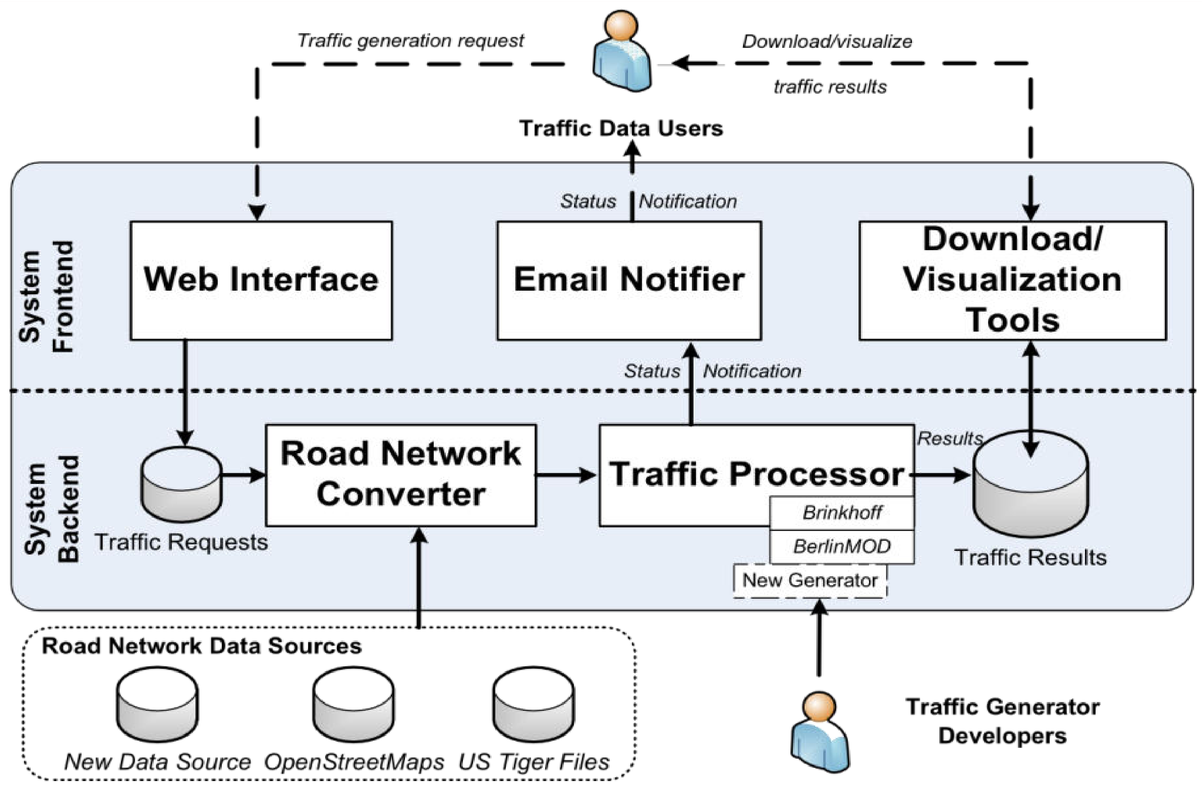
www.mntg.cs.umn.edu

Motivation

- Increased importance of analyzing spatiotemporal data (e.g. GPS tracks)
- Need to test system performance.
- Very hard to obtain real data
  - Microsoft spent four years to collect data from 182 volunteers
- Generate synthetic traffic data that simulate real life behavior.
- Limitations of Existing generator:
  - Very complex to setup and install.
  - Many configuration parameters.
  - Not easy to work in arbitrary area.



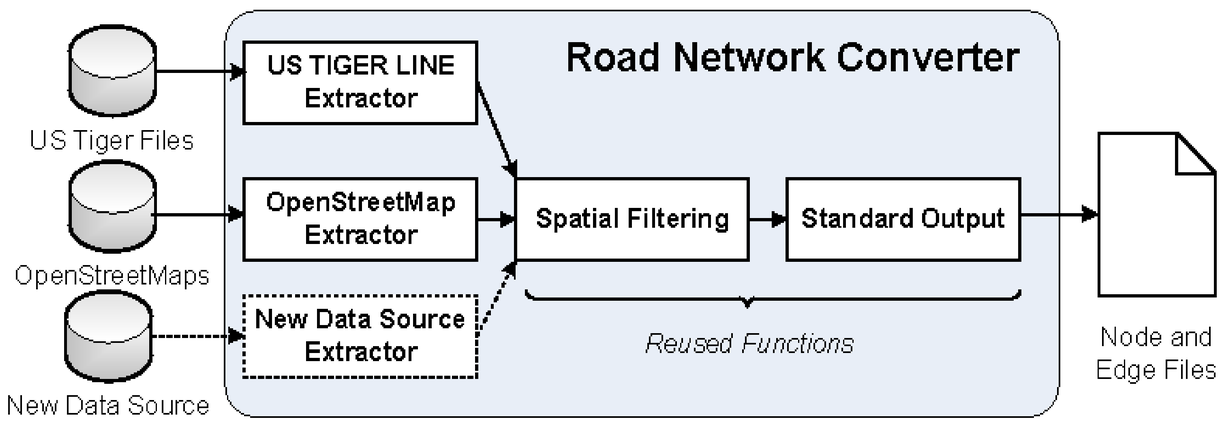
System Architecture



Road Network Converter

Main Idea:

- Extract road network as a graph.
- Extendable road network dataset could be added.
- Prepare standard output .
- Support Range query.
- Cover whole world road network.

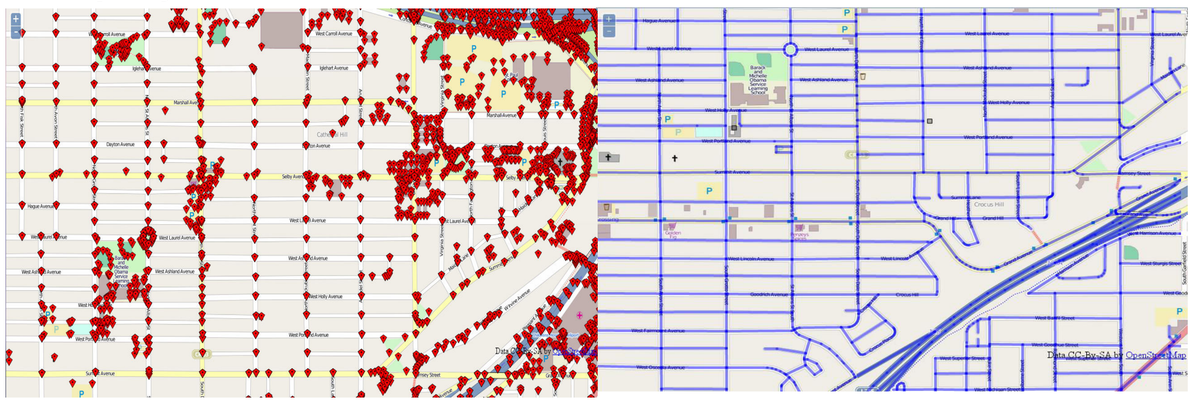


US Tiger File:

- Updated yearly once US census bureau publish most recent US geospatial data.
- US geospatial partitioned and organized based on US counties.
- Find corresponding counties covered by user query.

OpenStreetMap

- Updated weekly, cover the whole world geospatial data.
- Planet.osm stores all data in one large XML file.
- Use Map-reduce Extraction tools to extract and partition data.



(a) Extracted nodes

Node_ID	Lat	Lng
54956254019183	44.85923581362268	-92.989281234375
19567871005131	45.032414105220745	-93.2028993984375
27380416518383	44.99418225712112	-93.4431044765625

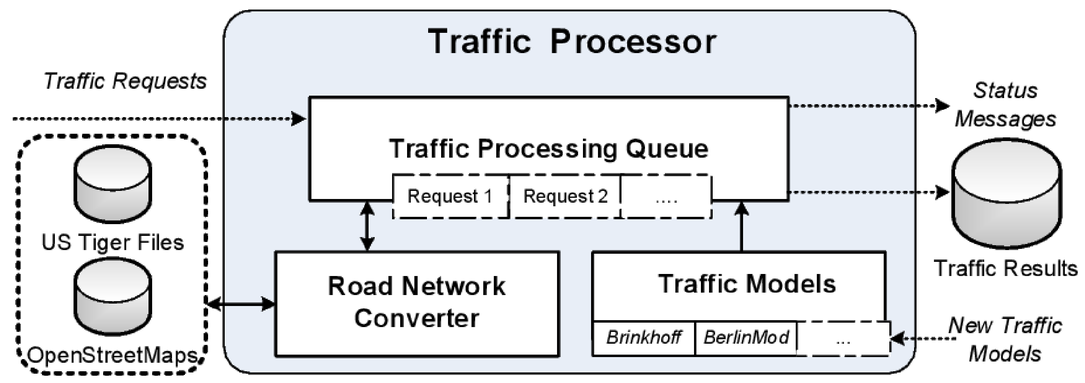
(b) Extracted edges

Edge_ID	Node_1	Node_2	Tags
0	33352568523324	33481417542144	highway
1	35667555893384	38510824242033	oneway
2	34881576878577	35839354585144	

Traffic Processor

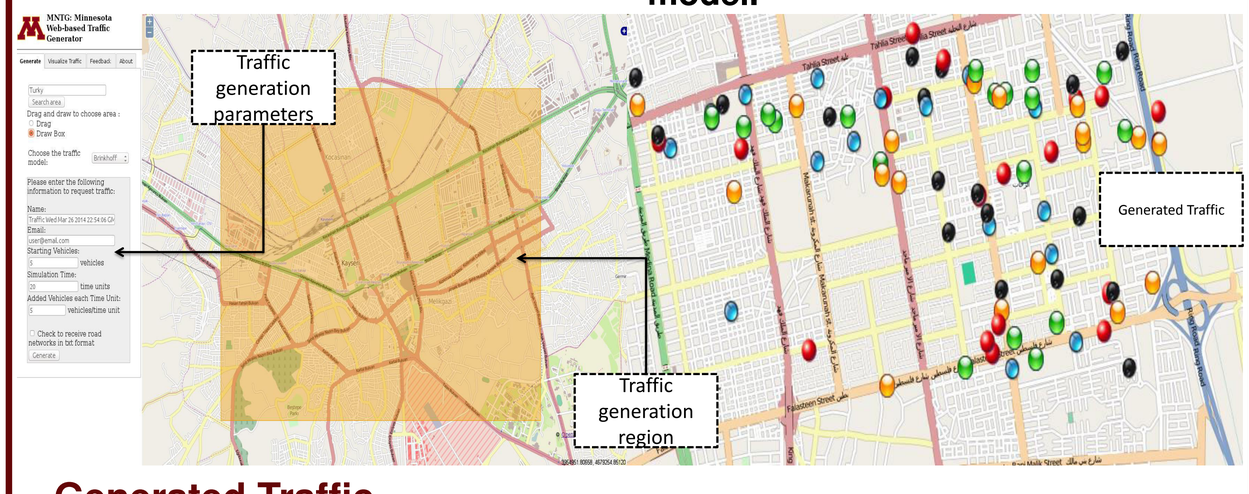
Main Idea:

- Generate the traffic data based on the selected traffic model.
- Accommodate various input format and running environment for different traffic model.
- Define abstract model to support more traffic generators.



Functionality

- Employ different execution methods, configurations, and environments.
- Build a wrapper around each traffic model.
- Convert road network from standard format to specific format used by the generator model.
- Convert the generator model result to standard output format.
- Produce the final result to user.
- Brinkhoff is executed with java.
- BerlinMOD runs with a script file.
- Perform the generation traffic model.



Generated Traffic

OID	TS	Type	Lat	Lng
0	0	newpoint	44.986362410452	-93.2982044219971
1	0	newpoint	44.998948892253	-93.1812858581543
2	0	newpoint	44.966607085432	-93.2727378845215
0	1	move	45.031348772862	-93.2991374040413
1	1	move	44.953949943361	-93.3676484298706

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"MNTG: An Extensible Web-based Traffic Generator". In Proceedings of the 13th International Symposium on Spatial and Temporal Databases, SSTD 2013, Munich, Germany

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